Practice: 309 - Agrichemical Handling Facility

Scenario: #1 - Enclosed building for storage and handling

Scenario Description:

This practice scenario is an agrichemical handling facility for storage and mixing and loading operations. This practice addresses water quality degradation and due to mis-handling, storing and mixing of agrichemicals where nutrients and/or chemicals are running off into surface waters or leaching into ground water.
Associated practices: Heavy Use Area Protection (561), Diversion (362), Access Road (560), Pipeline (516), Roof Runoff Management (558), Pumping Plant for Water Control (533), Nutrient Management (590), Pest Management (595)

Before Situation:

Agrichemicals are improperly stored on the ground or next to a well. Operator mixes the agrichemicals and fills the sprayer tank next to a hydrant. Spills or overflows of agrichemicals contaminate the soil, runoff to surface waters and leaching to ground water.

After Situation:

An agrichemical storage and handling facility is constructed inside an enclosed building. The average size of the agrichemical handling facility for storage and mixing and loading is 35' x 40' with an application equipment length of 36 ft. The handling pad for mixing and loading operations is sized to contain the length of the agrichemical spray tank and its volume. Install a curbed reinforced concrete handling pad for mixing and loading with proper storage of associated dry and/or liquid agrichemicals. The concrete is sealed and sloped to a collection sump, facility containment is surrounded by square and ramped curbs. This practice will contain agrichemicals and prevent contamination of surface and ground water resources.

Scenario Feature Measure: Total Containment Area

Scenario Unit: Square Foot

Scenario Typical Size: 1,400

Scenario Cost: $28,717.21 **Scenario Cost/Unit:** $20.51

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	18	$2,896.20
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	10	$5,083.70
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	8	$539.60
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	8	$300.16
Materials						
Post Frame Building, enclosed 4 sides	1046	Enclosed post frame building, four walls. Building sites with expected snow loads up to 30 lbs per square foot and wind exposure in semi protected areas (wooded or terrain with numerous closely spaced obstructions). Includes materials, shipping, and lab	Square Foot	$9.47	1760	$16,667.20
Painting, concrete surface, impermeable	1497	Painting of concrete surfaces with an impermeable coating. Includes materials and application.	Square Foot	$1.05	1400	$1,470.00
Emergency shower and eye wash station	1499	Emergency shower and ewe wash station unit. Materials only.	Each	$586.94	1	$586.94
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	22	$845.90
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Mobilization

Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	1	$70.87

Practice: 309 - Agrichemical Handling Facility

Scenario: #2 - Handling Pad without a building

Scenario Description:

An agrichemical storage and handling facility is constructed including a slab for storage, mixing, and loading operations. This practice addresses water quality degradation and due to mis-handling, storing and mixing of agrichemicals where nutrients and/or chemicals are running off into surface waters or leaching into ground water.
Associated practices: Heavy Use Area Protection (561), Diversion (362), Access Road (560), Pipeline (430, 516), Roof Runoff Management (558), Pumping Plant (533), Nutrient Management (590), Integrated Pest Management (595)

Before Situation:

Agrichemicals are improperly stored on the ground or next to a well. Operator mixes the agrichemicals and fills the sprayer tank next to a hydrant. Spills or overflows of agrichemicals contaminate the soil, runoff to surface waters and leaching to ground water.

After Situation:

An agrichemical storage and handling facility is constructed on a slab with out a roof. The average size of the agrichemical handling facility for storage and mixing and loading is 35' x 40' with an application equipment length of 36 ft. The handling pad for mixing and loading operations is sized to contain the length of the agrichemical spray tank and its volume. Install a curbed reinforced concrete handling pad for mixing and loading with proper storage of associated dry and/or liquid agrichemicals. The concrete is sealed and sloped to a collection sump, facility containment is surrounded by square and ramped curbs. This practice will contain agrichemicals and prevent contamination of surface and ground water resources.

Scenario Feature Measure: Total Containment Area

Scenario Unit: Square Foot

Scenario Typical Size: 1,400

Scenario Cost: $11,463.07 **Scenario Cost/Unit:** $8.19

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	8	$539.60
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	18	$2,896.20
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	10	$5,083.70
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	8	$300.16
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	22	$845.90
Painting, concrete surface, impermeable	1497	Painting of concrete surfaces with an impermeable coating. Includes materials and application.	Square Foot	$1.05	1400	$1,470.00
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	1	$70.87
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 309 - Agrichemical Handling Facility

Scenario: #3 - Earthen Liquid Storage With A Concrete Handling Pad

Scenario Description:

An earthen lined agrichemical handling facility is constructed for storage of liquid agrichemicals along with a concrete handling pad for mixing and loading operations. This practice addresses water quality degradation and due to mis-handling, storing, and mixing of agrichemicals where nutrients and/or chemicals are running off into surface waters or leaching into ground water. Associated practices: Heavy Use Area Protection (561), Diversion (362), Access Road (560), Pipeline (516), Pumping Plant for Water Control (533), Nutrient Management (590), Pest Management (595), Pond Sealing or Lining Flexible Membrane (521A)

Before Situation:

Agrichemicals are improperly stored on the ground or next to a well. Operator mixes the agrichemicals and fills the sprayer tank next to a hydrant. Spills or overflows of agrichemicals contaminate the soil, runoff to surface waters and leaching to ground water.

After Situation:

An agrichemical handling facility is constructed for storage of liquid agrichemicals along with a handling pad for mixing and loading operations. The average size of the agrichemical handling facility for proper storage of liquid agrichemicals is in an earthen lined containment with bottom dimensions of 30 ft x 40 ft. A handling pad for mixing and loading is located next to the liquid containment and is 20' x 40' with an application equipment length of 36 ft. The handling pad for mixing and loading operations is sized to contain the length of the agrichemical spray tank and its volume. Install a curbed (6") reinforced concrete handling pad for mixing and loading. The concrete is sealed and sloped to a collection sump. This practice will contain agrichemicals and prevent contamination of surface and ground water resources.

Scenario Feature Measure: Floor surface area of Liquid Containment Area + Handling pad

Scenario Unit: Square Foot

Scenario Typical Size: 2,000

Scenario Cost: $5,487.55 **Scenario Cost/Unit:** $2.74

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	70	$171.50
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	15	$2,413.50
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	235	$556.95
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	9	$350.73
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	13	$499.85
Painting, concrete surface, impermeable	1497	Painting of concrete surfaces with an impermeable coating. Includes materials and application.	Square Foot	$1.05	800	$840.00
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	2	$141.74
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 309 - Agrichemical Handling Facility

Scenario: #4 - Fabricated Liquid Storage with adjacent Concrete Handling Pad

Scenario Description:

This practice scenario is a fabricated agrichemical handling facility for storage of liquid agrichemicals along with an adjacent concrete mixing and loading pad. Due to topography, limited site space and/or geological conditions a fabricated structure with flexible membrane lined walls is needed. This practice addresses water quality degradation and due to mis-handling, storing, and mixing of agrichemicals where nutrients and/or chemicals are running off into surface waters or leaching into ground water.

Associated practices: Heavy Use Area Protection (561), Diversion (362), Access Road (560), Pipeline (516), Pumping Plant (533), Nutrient Management (590), Integrated Pest Management (595), Pond Sealing or Lining Flexible Membrane (521A)

Before Situation:

Agrichemicals are improperly stored on the ground or next to a well. Operator mixes the agrichemicals and fills the sprayer tank next to a hydrant. Spills or overflows of agrichemicals contaminate the soil, runoff to surface waters and leaching to ground water.

After Situation:

An agrichemical handling facility is constructed for storage of liquid agrichemicals along with a handling pad for mixing and loading operations. The average size of the agrichemical handling facility for proper storage of liquid agrichemicals is in fabricated containment that is 30 ft x 40 ft with formed, reinforced concrete walls. A handling pad for mixing and loading is located next to the liquid containment and is 16' x 32' with an application equipment length of 28 ft. The handling pad for mixing and loading operations is sized to contain the length of the agrichemical spray tank and its volume. Install a curbed reinforced concrete handling pad for mixing and loading. The concrete is sealed and sloped to a collection sump. This practice will contain agrichemicals and prevent contamination of surface and ground water resources. Liner for liquid storage should be contracted as Pond Sealing or Lining Flexible Membrane (521A)

Scenario Feature Measure: Liquid Containment Area + Handling Pad

Scenario Unit: Square Foot

Scenario Typical Size: 1,712

Scenario Cost: $14,699.87 **Scenario Cost/Unit:** $8.59

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	8	$346.56
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	8	$539.60
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	15	$36.75
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	14	$7,117.18
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	28	$4,505.20
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	38	$1,461.10
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	4	$155.88
Painting, concrete surface, impermeable	1497	Painting of concrete surfaces with an impermeable coating. Includes materials and application.	Square Foot	$1.05	512	$537.60

Practice: 309 - Agrichemical Handling Facility

Scenario: #5 - Outdoor Liquid Agrichemical Storage with a Roofed Building for Dry Chemical Storage and Handling Pad

Scenario Description:

This practice scenario is an outdoor, earthen lined agrichemical handling facility for storage of liquid agrichemicals along with a roofed mixing and loading pad that is also sized to store dry chemicals. This practice addresses water quality degradation and due to mis-handling, storing, and mixing of agrichemicals where nutrients and/or chemicals are running off into surface waters or leaching into ground water. Associated practices: Heavy Use Area Protection (561), Diversion (362), Access Road (560), Pipeline (516), Pumping Plant for Water Control (533), Nutrient Management (590), Pest Management (595), Pond Sealing or Lining Flexible Membrane (521A), Roof Runoff Management (558)

Before Situation:

Agrichemicals are improperly stored on the ground or next to a well. Operator mixes the agrichemicals and fills the sprayer tank next to a hydrant. Spills or overflows of agrichemicals contaminate the soil, runoff to surface waters and leaching to ground water.

After Situation:

An agrichemical handling facility is constructed for storage of liquid agrichemicals along with a roofed building to store dry agrichemicals with a handling pad for mixing and loading operations. The average size of the agrichemical handling facility for proper storage of liquid agrichemicals is in an earthen lined containment with bottom dimensions of 60 ft x 40 ft. A roofed building for dry agrichemicals and handling pad for mixing and loading is located next to the liquid containment and is 30' x 40' with an application equipment length of 36 ft. The handling pad for mixing and loading operations is roofed and sized to contain the length of the agrichemical spray tank and its volume. Install a curbed (6") reinforced concrete handling pad for mixing and loading. The concrete is sealed and sloped to a collection sump, facility contaiment has at least two sides construced of 5 ft post and plant walls. This practice will contain agrichemicals and prevent contamination of surface and ground water resources.

Scenario Feature Measure: Floor surface area of Liquid Containment Area + Handling pad

Scenario Unit: Square Foot

Scenario Typical Size: 3,600

Scenario Cost: $23,546.64 **Scenario Cost/Unit:** $6.54

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	19	$3,057.10
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	3	$1,525.11
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	231	$565.95
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	380	$900.60
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	80	$1,846.40
Materials						
Roof, Post Frame Building, 30' to 60' wide	1676	Post Frame Building, no sides, - 30' to 60' width. Building sites with expected snow loads up to 30 lbs per square foot and wind exposure in semi protected areas (wooded or terrain with numerous closely spaced obstructions). Includes materials, shipping	Square Foot	$5.40	2000	$10,800.00
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	19	$730.55

Materials

Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.85	853	$725.05
Painting, concrete surface, impermeable	1497	Painting of concrete surfaces with an impermeable coating. Includes materials and application.	Square Foot	$1.05	1200	$1,260.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	38	$1,480.86

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	2	$141.74

Practice: 309 - Agrichemical Handling Facility

Scenario: #6 - Concrete Pad For Mixing and Loading

Scenario Description:

This practice scenario is an agrichemical handling facility for mixing and loading operations. This practice addresses water quality degradation and due to mis-handling, and mixing of agrichemicals where nutrients and/or chemicals are running off into surface waters or leaching into ground water. Associated practices: Heavy Use Area Protection (561), Diversion (362), Access Road (560), Pipeline (516), Pumping Plant for Water Control (533), Nutrient Management (590), Pest Management (595)

Before Situation:

Agrichemicals are improperly stored on the ground or next to a well. Operator mixes the agrichemicals and fills the sprayer tank next to a hydrant. Spills or overflows of agrichemicals contaminate the soil, runoff to surface waters and leaching to ground water.

After Situation:

This scenario is an agrichemical handling facility pad for mixing and loading operations. The average size of the agrichemical handling pad for mixing and loading is 16' x 40' with an application equipment length of 36 ft. The handling pad for mixing and loading operations is sized to contain the length of the agrichemical spray tank and its volume. Install a curbed reinforced concrete handling pad for mixing and loading. The concrete is sealed and sloped to a collection sump, containment of the pad is surrounded by sloped and ramped reinforced concrete. This practice will contain agrichemicals and prevent contamination of surface and ground water resources.

Scenario Feature Measure: Total Containment Area

Scenario Unit: Square Foot

Scenario Typical Size: 640

Scenario Cost: $3,827.01 **Scenario Cost/Unit:** $5.98

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	12	$1,930.80
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	4	$269.80
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	4	$150.08
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	4	$92.32
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	10	$384.50
Painting, concrete surface, impermeable	1497	Painting of concrete surfaces with an impermeable coating. Includes materials and application.	Square Foot	$1.05	640	$672.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	1	$70.87

Practice: 309 - Agrichemical Handling Facility

Scenario: #7 - For Greenhouse, Pallet Drum Storage And Poly Pad For Handling

Scenario Description:

This practice scenario is an agrichemical storage and handling facility for mixing and loading operations within a greenhouse. This practice addresses water quality degradation and due to mis-handling, storing, and mixing of agrichemicals where nutrients and/or chemicals are running off into surface waters or leaching into ground water. Associated practices: Heavy Use Area Protection (561), Diversion (362), Pipeline (516), Pumping Plant for Water Control (533), Nutrient Management (590), Pest Management (595)

Before Situation:

Agrichemicals are improperly stored on the ground or next to a well. Operator mixes the agrichemicals and fills the sprayer tank next to a hydrant. Spills or overflows of agrichemicals contaminate the soil, runoff to surface waters and leaching to ground water.

After Situation:

This scenario is an agrichemical handling facility storage an impermeable barrier poly pad for mixing and loading operations. The average size of the agrichemical handling storage is for a pallet drum on a 5 ft x 5 ft (25 sf)containment pallet with sump capacity included. A poly pad is used for mixing and loading that is 8ft x 8ft (64 sf) with an application equipment length of 4 ft. The handling pad for mixing and loading operations is sized to contain the length of the agrichemical spray tank and its volume. This practice will contain agrichemicals and prevent contamination of surface and ground water resources. Total unit are is 64 sf + 25 sf = 89 sf

Scenario Feature Measure: Storage Area + Mixing Area

Scenario Unit: Square Foot

Scenario Typical Size: 89

Scenario Cost: $1,809.11 **Scenario Cost/Unit:** $20.33

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
PVC Containment Basin, 6' x 6'	1611	Poly containment basin typically 8" to 12" deep with area dimensions in the range of 6' x 6' or larger.	Square Foot	$20.89	64	$1,336.96
2 Drum Spill Pallet, 66 Gallon	1610	Pre fabricated containment basin with a capacity of approximately 66 gal. Materials only.	Each	$287.51	1	$287.51

Practice: 309 - Agrichemical Handling Facility

Scenario: #8 - Existing Building, Addition of Storage With Handling Pad

Scenario Description:

This practice scenario is an agrichemical handling facility for storage and mixing and loading operations. This practice addresses water quality degradation and due to mis-handling, storing and mixing of agrichemicals where nutrients and/or chemicals are running off into surface waters or leaching into ground water.

Associated practices: Heavy Use Area Protection (561), Diversion (362), Access Road (560), Pipeline (516), Roof Runoff Management (558), Pumping Plant for Water Control (533), Nutrient Management (590), Pest Management (595)

Before Situation:

Agrichemicals are improperly stored on the ground or next to a well. Operator mixes the agrichemicals and fills the sprayer tank next to a hydrant. Spills or overflows of agrichemicals contaminate the soil, runoff to surface waters and leaching to ground water.

After Situation:

An agrichemical storage and handling facility is constructed inside an existing building. The average size of the agrichemical handling facility for storage and mixing and loading is 24 ft x 36 ft (964 sf) with an application equipment length of 30 ft. The handling pad for mixing and loading operations is sized to contain the length of the agrichemical spray tank and its volume. Install a curbed reinforced concrete handling pad for mixing and loading with proper storage of associated dry and/or liquid agrichemicals. The concrete is sealed and sloped to a collection sump, facility containment is surrounded by square and ramped curbs and independent of the existing building. This practice will contain agrichemicals and prevent contamination of surface and ground water resources.

Scenario Feature Measure: Total Containment Area

Scenario Unit: Square Foot

Scenario Typical Size: 864

Scenario Cost: $9,922.97 **Scenario Cost/Unit:** $11.48

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	10	$433.20
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.30	7	$128.10
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	4	$269.80
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	8	$4,066.96
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	14	$2,252.60
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	10	$223.30
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	4	$150.08
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	16	$369.28

Materials

Materials

Painting, concrete surface, impermeable	1497	Painting of concrete surfaces with an impermeable coating. Includes materials and application.	Square Foot	$1.05	864	$907.20
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	14	$538.30

Mobilization

Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	1	$70.87
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 311 - Alley Cropping Scenario:

#1 - Tree Planting, Single Row Scenario

Description:

The crop or grass land is planted with rows of trees to increase crop diversity. Final row width, and spacing of trees within the row, is based on farm equipment size, growth form of trees, light needs of annual crop or grass, and intent of the landowner. Typically 2-3 gallon potted seedlings are used, staked and tube-protected. The resource concerns are plant condition - inadequate structure and composition.

Before Situation:

The landscape has been cropped or in perennial grass for many years. It is void of any perennial tree vegetation. On cropland site preparation needs may need deep ripping to eliminate any plow pan and on grass land competing vegetation control is accomplished prior to tree planting.

After Situation:

Trees have been established to diversify the crop production of the field. Typically the area planted is 10 acres on approximately 12 x 40 foot spacing.

Scenario Feature Measure: planted seedling

Scenario Unit: Each

Scenario Typical Size: 900

Scenario Cost: $22,517.74 **Scenario Cost/Unit:** $25.02

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	4	$149.24
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.39	80	$671.20
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$54.81	90	$4,932.90
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	20	$824.60
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	180	$4,154.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	80	$1,786.40
Materials						
Cable ties, plastic	1575	Plastic cable ties (typ. 8-12") to assist in securing items. Materials only.	Each	$0.05	900	$45.00
Tree shelter, solid tube type, 5" x 48"	1571	5" x 48" tree tube for protection from animal damage. Materials only.	Each	$2.09	900	$1,881.00
Stakes, wood, 3/4" x 3/4" x 60"	1583	3/4" x 3/4" x 60" wood stakes to fasten items in place. Includes materials only.	Each	$1.56	900	$1,404.00
Tree, hardwood, seedling or transplant, potted or B&B, 2-3 gal.	1532	Potted or balled and burlapped hardwood tree, 2-3 gal. Includes materials and shipping only.	Each	$7.41	900	$6,669.00

Practice: 311 - Alley Cropping Scenario:

#2 - Tree Planting, 3-Row Sets Scenario

Description:

Cropland is planted with trees in 3-row sets with 40 foot alleyways in between. The outside rows of trees are conifers and the center row a mast-producing high-value hardwood timber species. Typically bare root stock protected with tubes are used for hardwoods; conifers are planted as containers. Between row spacing is 16 feet and between tree spacing is 10 feet. The resource concerns are Plant Condition - inadequate structure and composition; Soil Erosion (wind); Excess/ Insufficient Water (inefficient moisture management); Inadequate Habitat for Fish and Wildlife (food, cover/shelter, continuity).

Before Situation:

The landscape has been cropped for many years. It is void of any perennial tree vegetation. Wind erosion is evident, insufficient water for crops occurs due to excessive winds, wildlife habitat score is very low due to the lack of any perennial vegetation. Site preparation needs may include deep ripping to eliminate any plow pan prior to tree planting.

After Situation:

Trees have been established to diversify the crop production, reduce erosion by wind and water and improve growing conditions for crops in alleyways. Typically the area planted is 10 acres.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $4,870.23 **Scenario Cost/Unit:** $487.02

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	4	$149.24
Mechanical tree planter	1600	Mechanical tree planter. Requires a pulling unit of either tractor or small dozer depending upon site conditions. Does not include labor.	Hour	$6.60	2.5	$16.50
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	12	$494.76
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	40	$923.20
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	2.5	$55.83
Materials						
Tree, conifer, seedling, containerized, 10 cu. in.	1519	Containerized conifer stock, 10 cubic inches (approx 6" plug), 1.7" x 6"). Includes materials and shipping only.	Each	$0.57	1210	$689.70
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.50	605	$302.50
Tree shelter, solid tube type, 5" x 48"	1571	5" x 48" tree tube for protection from animal damage. Materials only.	Each	$2.09	605	$1,264.45
Stakes, wood, 3/4" x 3/4" x 60"	1583	3/4" x 3/4" x 60" wood stakes to fasten items in place. Includes materials only.	Each	$1.56	605	$943.80
Cable ties, plastic	1575	Plastic cable ties (typ. 8-12") to assist in securing items. Materials only.	Each	$0.05	605	$30.25

Practice: 313 - Waste Storage Facility

Scenario: #1 - Earthen Facility, < 50K ft3 Storage

Scenario Description:

An earthen liquid waste impoundment constructed to store wastes such as manure, wastewater, and contaminated runoff as part of an agricultural waste management system. This scenario has a design storage volume of 50,000 ft3 or less. Construction of the structure includes excavation of earth material, where 80 to 100 percent of which is used to build an associated embankment. Earthen storage liners are addressed with another standard. This scenario covers the earthwork associated with installation of the pond. The liner should be contracted under the appropraite 521 standard; any hardened areas for access or maintenance should be contracted using Heavy Use area protection (561); fencing should be contracted under Fence (382); and seeding of the embankment should be contracted under Critical Area Planting (342).

Potential Associated Practices: Pond Sealing or Lining, Bentonite Sealant (521C), Pond Sealing or Lining, Compacted Clay Treatment (521D), Pond Sealing or Lining, Flexible Membrane (521A), Pond Sealing or Lining, Soil Dispersant (521B), Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), Roofs and Covers (367), and Solid/Liquid Waste Separation Facility (632), Waste Treatment (629) .

Before Situation:

Operator presently has a confined animal feeding operation without a waste management system adequate to handle the waste stream leaving the animal production facilities. Manure and other agricultural waste by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or are being transported but not properly utilized or disposed of. This situation poses an environmentally threat of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources.

After Situation:

An earthen storage structure constructed from on-site material provides an environmentally safe facility for storing manure and other agricultural waste by-products. This facility provides the landowner a means of storing waste until it can be utilized in a proper manner in accordance with a nutrient management plan.
Typical design size : Gross storage volume 42,696 ft3; 95x95'' (top); 3:1 inside and 2:1 outside side slopes; cut/fill ratio = 1.25; total depth = 8.4' (design depth = 6.4'); (not inclued in volume - 1' freeboard and 1' sludge accumulation).

Scenario Feature Measure: Gross Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 42,696

Scenario Cost: $11,036.19 **Scenario Cost/Unit:** $0.26

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.32	616	$2,045.12
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.06	844	$3,426.64
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.33	1671	$5,564.43

Practice: 313 - Waste Storage Facility

Scenario: #2 - Earthen Facility, < 50K ft3 Storage, Imported Fill

Scenario Description:

An earthen liquid waste impoundment constructed to store wastes such as manure, wastewater, and contaminated runoff as part of an agricultural waste management system. This scenario has a design storage volume of 50,000 ft3 or less. Site conditions limit excavation depths so that the structure must be mostly above existing grade. Construction of the structure includes minor excavation of earth material at the site, where minimal amounts are used to build the associated embankment. This scenario is for situuations when over 80 percent of the required fill must be imported from 1 mile away to construct the embankment. Earthen storage liners are addressed with another standard. This scenario covers the earthwork assoicated with installation of the pond. The liner should be contracted under the appropraite 521 standard; any hardened areas for access or maintenance should be contracted using Heavy Use area protection (561); fencing should be contracted under Fence (382); and seeding of the embankment should be contracted under Critical Area Planting (342).

Potential Associated Practices: Pond Sealing or Lining, Bentonite Sealant (521C), Pond Sealing or Lining, Compacted Clay Treatment (521D), Pond Sealing or Lining, Flexible Membrane (521A), Pond Sealing or Lining, Soil Dispersant (521B), Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), Roofs and Covers (367), and Solid/Liquid Waste Separation Facility (632), Waste Treatment (629) .

Before Situation:

Operator presently has a confined animal feeding operation without a waste management system adequate to handle the waste stream leaving the animal production facilities. Manure and other agricultural waste by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or are being transported but not properly utilized or disposed of. This situation poses an environmentally threat of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources.

After Situation:

An earthen storage structure constructed from on-site and remote materials provide an environmentally safe facility for storing manure and other agricultural waste by-products. This facility provides the landowner a means of storing waste until it can be utilized in a proper manner in accordance with a nutrient management plan.
Typical design size : design storage volume 42,696 ft3; 95x95'' (top); 3:1 inside and 2:1 outside side slopes; cut/fill ratio = 1.25; total depth = 8.4' (design depth = 6.4'); (not inclued in volume - 1' freeboard and 1' sludge accumulation). Assumes all material is imported for embankment..

Scenario Feature Measure: Gross Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 42,696

Scenario Cost: $56,607.82 **Scenario Cost/Unit:** $1.33

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, clay, large equipment, 1500 ft	1217	Bulk excavation of clay with scrapers with average haul distance of 1500 feet. Includes equipment and labor.	Cubic Yard	$6.00	4223	$25,338.00
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$154.50	85	$13,132.50
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.28	4223	$1,182.44
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.06	3378	$13,714.68
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.12	85	$3,240.20

Practice: 313 - Waste Storage Facility

Scenario: #3 - Earthen Facility, > 50K ft3 Storage

Scenario Description:

An earthen liquid waste impoundment constructed to store wastes such as manure, wastewater, and contaminated runoff as part of an agricultural waste management system. This scenario has a design storage volume greater than 50,000 ft3. Construction of the structure includes excavation of earth material, all, some, or none of which is used to build an associated embankment. Earthen storage liners are addressed with another standard. This scenario covers the earthwork assoicated with installation of the pond. The liner should be contracted under the appropraite 521 standard; any hardened areas for access or maintenance should be contracted using Heavy Use area protection (561); fencing should be contracted under Fence (382); and seeding of the embankment should be contracted under Critical Area Planting (342).

Potential Associated Practices: Pond Sealing or Lining, Bentonite Sealant (521C), Pond Sealing or Lining, Compacted Clay Treatment (521D), Pond Sealing or Lining, Flexible Membrane (521A), Pond Sealing or Lining, Soil Dispersant (521B), Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), Roofs and Covers (367), and Solid/Liquid Waste Separation Facility (632), Waste Treatment (629) .

Before Situation:

Operator presently has a confined animal feeding operation without a waste management system adequate to handle the waste stream leaving the animal production facilities. Manure and other agricultural waste by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or are being transported but not properly utilized or disposed of. This situation poses an environmentally threat of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources.

After Situation:

An earthen storage structure constructed from on-site material provides an environmentally safe facility for storing manure and other agricultural waste by-products. This facility provides the landowner a means of storing waste until it can be utilized in a proper manner in accordance with a nutrient management plan.
Typical design size: Gross pone volume is 585,279 cf; 250'x250' (top); 3:1 inside and 2:1 outside side slopes; total depth = 13' (design depth = 11'); (not inclued in volume - 1' freeboard and 1' sludge accumulation). Assumes cut and fill is balanced on site.

Scenario Feature Measure: Gross Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 585,279

Scenario Cost: $76,765.46 **Scenario Cost/Unit:** $0.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.32	8796	$29,202.72
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.06	2222	$9,021.32
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.33	11574	$38,541.42

Practice: 313 - Waste Storage Facility

Scenario: #4 - Earthen Facility, >50K ft3 Storage, Imported Fill

Scenario Description:

An earthen liquid waste impoundment constructed to store wastes such as manure, wastewater, and contaminated runoff as part of an agricultural waste management system. This scenario has a design storage volume greater than 50,000 ft3. Construction of the structure includes excavation of earth material, none of which is used to build an associated embankment. This scenario is for situuations when over 80 percent of the required fill must be imported from 1 mile away to construct the embankment. Earthen storage liners are addressed with another standard. This scenario covers the earthwork assoicated with installation of the pond. The liner should be contracted under the appropraite 521 standard; any hardened areas for access or maintenance should be contracted using Heavy Use area protection (561); fencing should be contracted under Fence (382); and seeding of the embankment should be contracted under Critical Area Planting (342).

Potential Associated Practices: Pond Sealing or Lining, Bentonite Sealant (521C), Pond Sealing or Lining, Compacted Clay Treatment (521D), Pond Sealing or Lining, Flexible Membrane (521A), Pond Sealing or Lining, Soil Dispersant (521B), Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), Roofs and Covers (367), and Solid/Liquid Waste Separation Facility (632), Waste Treatment (629) .

Before Situation:

Operator presently has a confined animal feeding operation without a waste management system adequate to handle the waste stream leaving the animal production facilities. Manure and other agricultural waste by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or are being transported but not properly utilized or disposed of. This situation poses an environmentally threat of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources.

After Situation:

An earthen storage structure constructed from on-site material provides an environmentally safe facility for storing manure and other agricultural waste by-products. This facility provides the landowner a means of storing waste until it can be utilized in a proper manner in accordance with a nutrient management plan.
Typical design size: Gross pone volume is 585,279 cf; 250'x250' (top); 3:1 inside and 2:1 outside side slopes; total depth = 13' (design depth = 11'); (not inclued in volume - 1' freeboard and 1' sludge accumulation). Assumes all material is imported for embankment.

Scenario Feature Measure: Gross Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 585,279

Scenario Cost: $337,855.10 **Scenario Cost/Unit:** $0.58

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.28	25250	$7,070.00
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$154.50	505	$78,022.50
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.06	20200	$82,012.00
Excavation, clay, large equipment, 1500 ft	1217	Bulk excavation of clay with scrapers with average haul distance of 1500 feet. Includes equipment and labor.	Cubic Yard	$6.00	25250	$151,500.00
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.12	505	$19,250.60

Practice: 313 - Waste Storage Facility

Scenario: #8 - Above Ground Concrete Tank

Scenario Description:

An above ground circular concrete storage tank constructed to store wastes such as liquid manure, wastewater, and contaminated runoff as part of an agricultural waste management system. This scenario is intended for sites located on firm foundations as determined by a qualified engineer and/or the State Geologist and where the potential for settlement is minimal as determined. Additionally the project site should be located in close proximity to a certified concrete batching plant in order to keep construction costs to a minimum. This scenario has a design storage volume of approximately 81,000 ft3. This practice will address soil and water quality by reducing the pollution potential for surface water and groundwater quality degradation.

Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), Solid/Liquid Waste Separation Facility (632), Waste Treatment (629), and Pumping Plant (533).

Before Situation:

Operator presently has a confined animal feeding operation without a waste management system adequate to handle the waste stream leaving the animal production facilities. Manure and other agricultural waste by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or are being transported but not properly utilized or disposed of. This situation poses an environmentally threat of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources.

After Situation:

An above ground 80' diameter concrete manure storage tank provides an environmentally safe facility for storing manure and other agricultural waste by-products. This facility provides the landowner a means of storing waste until it can be utilized in a proper manner in accordance with a nutrient management plan.
Typical design size: design storage volume 81,000 ft3, (not included - 1' freeboard); based on a standard 80' diameter, 16' tall concrete manure storage tank

Scenario Feature Measure: Gross Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 81,000

Scenario Cost: $82,582.02 **Scenario Cost/Unit:** $1.02

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$506.66	99	$50,159.34
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$319.06	93	$29,672.58
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$26.70	103	$2,750.10

Practice: 313 - Waste Storage Facility

Scenario: #9 - Above Ground Concrete Tank, Preload Foundation

Scenario Description:

An above ground circular concrete storage tank constructed to store wastes such as liquid manure, wastewater, and contaminated runoff as part of an agricultural waste management system. This scenario is intended for sites determined by a qualified engineer and/or the State Geologist to be located on weak foundations where the potential for settlement or bearing capacity issues is high. Preloading involves placement of fill equal to the estimated weight of a fully loaded, operation tank. This scenario is appropriate only for sites where preloading is the most cost-effective alternative (i.e. access and proximity to a borrow source, excessive settlement can only be managed by preloading, etc). Once the site has been adequately preloaded, as determined by a qualified NRCS representative, the preload material is removed and a standard concrete tank is constructed. The project site should be located in close proximity to a certified concrete batching plant in order to keep construction costs to a minimum. This scenario has a design storage volume of approximately 81,000 ft3. This practice will address soil and water quality by reducing the pollution potential for surface water and groundwater quality degradation.

Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), Solid/Liquid Waste Separation Facility (632), Waste Treatment (629), and Pumping Plant (533).

Before Situation:

Operator presently has a confined animal feeding operation without a waste management system adequate to handle the waste stream leaving the animal production facilities. Manure and other agricultural waste by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or are being transported but not properly utilized or disposed of. This situation poses an environmentally threat of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources.

After Situation:

Preload material is placed in controlled lifts, site is adequately consolidated under the weight of the preload, preload material is removed, and an above ground 80' diameter concrete manure storage tank provides an environmentally safe facility for storing manure and other agricultural waste by-products. This facility provides the landowner a means of storing waste until it can be utilized in a proper manner in accordance with a nutrient management plan.
Typical design size: design storage volume 81,000 ft3, (not included - 1' freeboard); based on a standard 80' diameter, 16' tall concrete manure storage tank

Scenario Feature Measure: Gross Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 81,000

Scenario Cost: $90,003.42 **Scenario Cost/Unit:** $1.11

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$319.06	93	$29,672.58
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.33	1116	$3,716.28
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.32	1116	$3,705.12
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$506.66	99	$50,159.34
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$26.70	103	$2,750.10

Practice: 313 - Waste Storage Facility

Scenario: #14 - Drystack, Non-reinforced concrete floor, No walls

Scenario Description:

This scenario consists of a dry stack facility with a non-reinforced concrete floor without side walls. This scenario is intended for storing manure capable of being stacked in an area where water tight floors are not needed or required. The purpose of this practice is to properly store manure and other agricultural by-products until they can be hauled away from the site for proper disposal or utilization on land at agronomical rates. Concrete is to be used when required by state regulation or when a compacted earth floor is not adequatre to address the resource concern. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.

Potential Associated practices: 342-Critical Area Planting, 362-Diversion, 561-Heavy Use Area Protection, 367-Roofs and Covers, 558-Roof Runoff Structure, 317-Composting Facility, 633-Waste Recycling, 634-Waste Transfer, 635-Vegetated Treatment Area

Before Situation:

Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmentally threat of excessive nutrients, organics, and pathogens being transported into surface and groundwaters, in addition to the use of excessive amounts of fertilizers.

After Situation:

The typical is 1,600 SqFt (40'x40'). The sitefloor will be prepared by stripping the top 1' of soil as needed, placing 6" of a sand/gravel base and pouring a 6" reinforced concrete slab with 1 foot footing on all four sides. Manure and other agricultural by-products are being controlled, by the collection at the source, and stored temporarily, at an environmentally suitable location, until such time that they are disposed of or utilized in a proper manner, typically in accordance with a nutrient management plan.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 1,600

Scenario Cost: $5,496.90 **Scenario Cost/Unit:** $3.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formless, non reinforced	36	Non reinforced concrete cast-in-placed without forms by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$156.53	30	$4,695.90
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$26.70	30	$801.00

Practice: 313 - Waste Storage Facility

Scenario: #15 - Drystack, Concrete floor, No walls

Scenario Description:

This scenario consists of a dry stack facility with a reinforced concrete floor without side walls. This scenario is intended for situations where consistency of manure or geographical conditions prohibit earthen floors. This scenario is required when a slab is designed as water tight or when the subgrade requires steel reinforcing. The purpose of this practice is to properly store manure and other agricultural by-products until they can be hauled away from the site for proper disposal or utilization on land at agronomical rates. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.

Potential Associated practices: 342-Critical Area Planting, 362-Diversion, 561-Heavy Use Area Protection, 367-Roofs and Covers, 558-Roof Runoff Structure, 317-Composting Facility, 633-Waste Recycling, 634-Waste Transfer, 635-Vegetated Treatment Area

Before Situation:

Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmentally threat of excessive nutrients, organics, and pathogens being transported into surface and groundwaters, in addition to the use of excessive amounts of fertilizers.

After Situation:

The typical is 1,600 SqFt (40'x40'). The site floor will be prepared by stripping the top 1' of soil as needed, placing 6" of a sand/gravel base and pouring a 6" reinforced concrete slab with 1 foot footing on all four sides. Manure and other agricultural by-products are being controlled, by the collection at the source, and stored temporarily, at an environmentally suitable location, until such time that they are disposed of or utilized in a proper manner, typically in accordance with a nutrient management plan.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 1,600

Scenario Cost: $10,372.80 **Scenario Cost/Unit:** $6.48

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$319.06	30	$9,571.80
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$26.70	30	$801.00

Practice: 313 - Waste Storage Facility

Scenario: #16 - Drystack, Concrete floor, Wood walls

Scenario Description:

This scenario consists of a dry stack facility with a concrete floor with wood side walls. This scenario is intended for sites where wall height restrictions, available space, roof type/layout or other site features do not allow for the use of concrete walls. This scenario is intended for situations where consistency of manure or geographical conditions prohibit earthen floors.The purpose of this practice is to properly store manure and other agricultural by-products until they can be hauled away from the site for proper disposal or utilization on land at agronomical rates. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.

Potential Associated practices: 342-Critical Area Planting, 362-Diversion, 561-Heavy Use Area Protection, 367-Roofs and Covers, 558-Roof Runoff Structure, 317-Composting Facility, 633-Waste Recycling, 634-Waste Transfer, 635-Vegetated Treatment Area

Before Situation:

Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmentally threat of excessive nutrients, organics, and pathogens being transported into surface and groundwaters, in addition to the use of excessive amounts of fertilizers.

After Situation:

The typical is 1,600 SqFt (40'x40'). The sitefloor will be prepared by stripping the top 1' of soil as needed, placing 6" of a sand/gravel base and pouring a 6" reinforced concrete slab. Manure and other agricultural by-products are being controlled, by the collection at the source, and stored temporarily, at an environmentally suitable location, until such time that they are disposed of or utilized in a proper manner, typically in accordance with a nutrient management plan.
Volume = 40x40x4' average stacking height

Scenario Feature Measure: Cubic foot of storage

Scenario Unit: Cubic Foot

Scenario Typical Size: 6,400

Scenario Cost: $11,336.64 **Scenario Cost/Unit:** $1.77

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$319.06	30	$9,571.80
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$26.70	30	$801.00
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.74	960	$710.40
Lumber, planks, posts and timbers, treated	1609	Treated dimension lumber with nominal thickness greater than 2". Includes lumber and fasteners. Does not include labor.	Board Foot	$1.32	192	$253.44

Practice: 313 - Waste Storage Facility

Scenario: #18 - Drystack, Concrete floor, Concrete walls

Scenario Description:

This scenario consists of a small dry stack facility (1600 sqft or less) with a concrete floor and formed concrete side walls. This scenario is intended for sites that require the use of concrete walls due to roof loads or durability requirements. The availability of an experienced licensed contractor and/or its proximity to a certified concrete batching plant. This scenario is intended for situations where consistency of manure or geographical conditions prohibit earthen floors.The purpose of this practice is to properly store manure and other agricultural by-products until they can be hauled away from the site for proper disposal or utilization on land at agronomical rates. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.

Potential Associated practices: 342-Critical Area Planting, 362-Diversion, 561-Heavy Use Area Protection, 367-Roofs and Covers, 558-Roof Runoff Structure, 317-Composting Facility, 633-Waste Recycling, 634-Waste Transfer, 635-Vegetated Treatment Area

Before Situation:

Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmentally threat of excessive nutrients, organics, and pathogens being transported into surface and groundwaters, in addition to the use of excessive amounts of fertilizers.

After Situation:

The typical is 1,600 SqFt (40'x40''). The site will be prepared by stripping the top 1' of soil as needed, placing 6" of a sand/gravel base and pouring a 6" reinforced concrete slab. Walls are 4' high, 6" thick. Manure and other agricultural by-products are being controlled, by the collection at the source, and stored temporarily, at an environmentally suitable location, until such time that they are disposed of or utilized in a proper manner, typically in accordance with a nutrient management plan.
Volume=40x40x(4' average stacking height)= 6,400 cf

Scenario Feature Measure: Cubic foot of storage

Scenario Unit: Cubic Foot

Scenario Typical Size: 6,400

Scenario Cost: $17,804.28 **Scenario Cost/Unit:** $2.78

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$319.06	39	$12,443.34
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$506.66	9	$4,559.94
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$26.70	30	$801.00

Practice: 314 - Brush Management

Scenario: #1 - Hand Tools, Light

Scenario Description:

Using hand tools, such as chainsaws, axes, shovels, hoes, nippers, or brush pullers to remove or cut off woody plants at of below the root collar. This includes post-treatment pruning or lopping to adequately reduce woody species on the site. Typical areas have undesired woody species that are in the very early phases of succssion. In juniper encroachment situations, this would generally represent areas with very light tree densities often characterized by <5% juniper canopy cover.

Before Situation:

Area is in the very early phases of undesired woody species encroachment that that is only beginning to degrade rangeland health, productivity, habitat for desired wildlife species. If woody species are allowed to expand, future degradation of ecological site condition results in loss of key forage/browse species, habitat loss for species of concern, increased risk of catastrophic fire, increased noxious and invasive species, increased soil erosion, and altered hydrologic regimes.

After Situation:

Encroaching woody species are cut and/or removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site degradation is prevented and condition maintains an upward trend. Desired hydrology, wildlife habitat, and plant health, vigor, and productivity are sustained.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $3,075.55 **Scenario Cost/Unit:** $38.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	80	$505.60
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	6	$223.86
Pruning tools, hand tools	1318	Pruning tools, hand tools, shears, loppers, pole saw, handsaw. Material costs only. Labor not included.	Hour	$4.77	8	$38.16
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	3	$92.25
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	96	$2,215.68

Practice: 314 - Brush Management

Scenario: #2 - Hand Tools, Medium

Scenario Description:

Using hand tools, such as chainsaws, axes, shovels, hoes, nippers, or brush pullers to remove or cut off woody plants at of below the root collar. This includes post-treatment pruning or lopping to adequately reduce woody species on the site. Typical areas have undesired woody species that are in the early-to-mid phases of succssion. In juniper encroachment situations, this would generally represent areas with medium tree densities often characterized by 5-10% juniper canopy cover but could also include areas with less canopy cover comprised of many small trees. Typical unit is 80 acres.

Before Situation:

Area is in the early-to-mid phases of undesired woody species encroachment that degrades rangeland health, productivity, habitat for desired wildlife species. If woody species are allowed to expand, future degradation of ecological site condition results in loss of key forage/browse species, habitat loss for species of concern, increased risk of catastrophic fire, increased noxious and invasive species, increased soil erosion, and altered hydrologic regimes.

After Situation:

Encroaching woody species are cut and/or removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site degradation is reversed and condition continues progressing in an upward trend. Desired hydrology, wildlife habitat, and plant health, vigor, and productivity are sustained.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $13,020.50 **Scenario Cost/Unit:** $162.76

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	1142				13	
Equipment/Installation						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	320	$2,022.40
Pruning tools, hand tools	1318	Pruning tools, hand tools, shears, loppers, pole saw, handsaw. Material costs only. Labor not included.	Hour	$4.77	28	$133.56
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	13	$399.75
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	25	$932.75
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	413	$9,532.04

Practice: 314 - Brush Management

Scenario: #3 - Hand - Difficult or Adverse

Scenario Description:

Species such as English Ivy, clematis, or very large infestations of blackberry or Japanese-type knotweeds are well-established, causing degredation of ecological site condition. Control is by hand, and conditions are adverse because of size and density of target species, terrain, or degree of twining of vines into the tree canopy. Site needs multiple treatments. Payment is made on actual area of infestation and after all treatments are completed.

Before Situation:

On any landuse except active cropland, species such as English Ivy, clematis, or large infestations of blackberry or Japanese-type knotweeds are well-established, causing degredation of ecological site condition. Conditions are adverse because of size and density of target species, terrain, or degree of twining of vines into the tree canopy, and the need for multiple control treatments over a period of time.

After Situation:

Target weedy species are removed, and ecological site condition will improve as desirable species become dominant once again.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 3

Scenario Cost: $2,370.30 **Scenario Cost/Unit:** $790.10

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	5	$186.55
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$57.01	25	$1,425.25
Pruning tools, hand tools	1318	Pruning tools, hand tools, shears, loppers, pole saw, handsaw. Material costs only. Labor not included.	Hour	$4.77	25	$119.25
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.32	6	$7.92
Herbicide, Triclopyor	338	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$42.30	6	$253.80
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	3	$212.61

Practice: 314 - Brush Management

Scenario: #4 - Mechanical, Small Shrubs, Light Infestation

Scenario Description:

Removal of small woody vegetation of light density infestations. The practice entails the removal of brush typically by the use of mechanical cutter, chopper or other light equipment in order to reduce fuel loading and improve ecological site condition. Hand tools may also be used. Brush density has exceeded desired levels based on ecological site potential. It has been determined that the brush is at a light infestation, typically considered less than 10% canopy cover. Small shrubs are generally those less than 4 feet tall.

Before Situation:

Area consist of excessive stands of shrub species degrading health and vigor of native herbaceous species promoting noxious and invasive species and degrading wildlife habitat.

After Situation:

Woody species are removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, hydrology and plant health and vigor is returning to near normal levels, and improved wildlife habitat.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 120

Scenario Cost: $14,568.71 **Scenario Cost/Unit:** $121.41

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	10	$373.10
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$128.90	90	$11,601.00
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	90	$2,009.70
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	10	$412.30
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: 314 - Brush Management

Scenario: #5 - Mechanical, Small Shrubs, Medium Infestation

Scenario Description:

Removal of small woody vegetation of medium density infestations. The practice entails the removal of brush typically by the use of mechanical cutter, chopper or other light equipment in order to reduce fuel loading and improve ecological site condition. Brush density has exceeded desired levels based on ecological site potential. It has been determined that the brush is at a medium infestation, typically considered 11-30% canopy cover. Small shrubs are generally those less than 4 feet tall.

Before Situation:

Area consist of excessive stands of shrub species degrading health and vigor of native herbaceous species promoting noxious and invasive species and degrading wildlife habitat.

After Situation:

Woody species are removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, hydrology and plant health and vigor is returning to near normal levels, and improved wildlife habitat.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 120

Scenario Cost: $19,292.16 **Scenario Cost/Unit:** $160.77

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	15	$559.65
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$128.90	120	$15,468.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	10	$412.30
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	120	$2,679.60
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: 314 - Brush Management

Scenario: #6 - Mechanical, Small Shrubs, Heavy Infestation

Scenario Description:

Removal of small woody vegetation of heavy density infestations. The practice entails the removal of brush typically by the use of mechanical cutter, chopper or other light equipment in order to reduce fuel loading and improve ecological site condition. Brush density has exceeded desired levels based on ecological site potential. It has been determined that the brush is at a heavy infestation, typically considered greater than 30% canopy cover. Small shrubs are generally those less than 4 feet tall. This scenario also applies to medium density small shrub infestations on sites with difficult conditions such as limited access, steep slopes, or large rocks or rock outcrops.

Before Situation:

Area consist of excessive stands of shrub species degrading health and vigor of native herbaceous species promoting noxious and invasive species and degrading wildlife habitat.

After Situation:

Woody species are removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, hydrology and plant health and vigor is returning to near normal levels, and improved wildlife habitat.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 120

Scenario Cost: $37,253.21 **Scenario Cost/Unit:** $310.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$128.90	240	$30,936.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	10	$373.10
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	10	$412.30
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	240	$5,359.20
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: 314 - Brush Management

Scenario: #7 - Mechanical, Large Woody, Light Infestation

Scenario Description:

Removal of large woody vegetation of light density infestations. The practice entails the removal of brush and/or trees typically by pushing, grubbing, masticating, chaining and then raking or piling in order to reduce fuel loading and improve ecological site condition. Hand tools may also be used. Brush density has exceeded desired levels based on ecological site potential. It has been determined that the brush is at a light infestation, typically considered less than 10% canopy cover. Large shrubs are generally those greater than 4 feet tall.

Before Situation:

Area consist of excessive stands of shrub species degrading health and vigor of native herbaceous species promoting noxious and invasive species and degrading wildlife habitat.

After Situation:

Woody species are removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, hydrology and plant health and vigor is returning to near normal levels, and improved wildlife habitat.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 120

Scenario Cost: $28,538.51 **Scenario Cost/Unit:** $237.82

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	10	$373.10
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$187.13	120	$22,455.60
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	8	$305.12
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	120	$4,502.40
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	10	$412.30
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 314 - Brush Management

Scenario: #8 - Mechanical, Large Woody, Medium Infestation

Scenario Description:

Removal of large woody vegetation of medium density infestations. The practice entails the removal of brush and/or trees typically by pushing, grubbing, masticating, chaining and then raking or piling in order to reduce fuel loading and improve ecological site condition. Brush density has exceeded desired levels based on ecological site potential. It has been determined that the brush is at a medium infestation, typically considered less than 11-30% canopy cover. Large shrubs are generally those greater than 4 feet tall.

Before Situation:

Area consist of excessive stands of shrub species degrading health and vigor of native herbaceous species promoting noxious and invasive species and degrading wildlife habitat.

After Situation:

Woody species are removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, hydrology and plant health and vigor is returning to near normal levels, and improved wildlife habitat.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 120

Scenario Cost: $46,510.51 **Scenario Cost/Unit:** $387.59

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	10	$373.10
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$187.13	200	$37,426.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	10	$412.30
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	8	$305.12
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	200	$7,504.00
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 314 - Brush Management

Scenario: #9 - Mechanical, Large Woody, Heavy Infestation

Scenario Description:

Removal of large woody vegetation of heavy density infestations. The practice entails the removal of brush and/or trees typically by pushing, grubbing, masticating, chaining then raking or piling in order to reduce fuel loading and improve ecological site condition. Brush density has exceeded desired levels based on ecological site potential. It has been determined that the brush is at a heavy infestation, typically considered greater than 30% canopy cover. Large shrubs are generally those greater than 4 feet tall. This scenario also applies to medium density large woody infestations on sites with difficult conditions such as limited access, steep slopes, or large rocks or rock outcrops.

Before Situation:

Area consist of excessive stands of shrub species degrading health and vigor of native herbaceous species promoting noxious and invasive species and degrading wildlife habitat.

After Situation:

Woody species are removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, hydrology and plant health and vigor is returning to near normal levels, and improved wildlife habitat.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 120

Scenario Cost: $58,135.71 **Scenario Cost/Unit:** $484.46

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$187.13	250	$46,782.50
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	15	$559.65
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	15	$618.45
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	250	$9,380.00
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	8	$305.12
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 314 - Brush Management

Scenario: #10 - Two Treatments

Scenario Description:

The practice entails the control of woody vegetation by treating it twice during the treatment period in order to improve ecological site condition. The brush can be treated with the same method twice, or by a combination of methods. Woody vegetation needs to be treated at least twice in order to fully control it. Generally, the second treatment will kill resprouting stems or those which survived the first treatment or newly sprouted seedlings. Brush density has exceeded desired levels based on ecological site potential. The practice is not completed until both treatments are completed.

Before Situation:

Area has excessive stands of woody species degrading health and vigor of desireable species promoting noxious and invasive species and degrading wildlife habitat.

After Situation:

Woody species are removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, hydrology and plant health and vigor is returning to near normal levels, and improved wildlife habitat.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 120

Scenario Cost: $17,273.62 **Scenario Cost/Unit:** $143.95

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	10	$373.10
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$50.98	120	$6,117.60
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	120	$699.60
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	60	$1,411.80
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	10	$412.30
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	120	$2,679.60
Materials						
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.32	120	$158.40
Herbicide, Triclopyor	338	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$42.30	120	$5,076.00
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 314 - Brush Management

Scenario: #11 - Three Treatments

Scenario Description:

The practice entails the control of woody vegetation by treating it three times during the treatment period in order to improve ecological site condition. The brush can be treated with the same method repeatedly, or by a combination of methods. Woody vegetation needs to be treated at least three times in order to fully control it. Generally, the subsequent treatments will kill resprouting stems or those which survived the first treatments or newly sprouted seedlings. Brush density has exceeded desired levels based on ecological site potential. The practice is not completed until all treatments are completed.

Before Situation:

Area has excessive stands of woody species degrading health and vigor of native herbaceous species promoting noxious and invasive species and degrading wildlife habitat.

After Situation:

Woody species are removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, hydrology and plant health and vigor is returning to near normal levels, and improved wildlife habitat.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 120

Scenario Cost: $28,008.33 **Scenario Cost/Unit:** $233.40

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$50.98	120	$6,117.60
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	240	$1,399.20
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	15	$559.65
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	240	$5,647.20
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	120	$2,679.60
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	15	$618.45
Materials						
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.32	240	$316.80
Herbicide, Triclopyor	338	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$42.30	240	$10,152.00
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	3	$517.83

Practice: 314 - Brush Management

Scenario: #12 - Chemical, Aerial Applied

Scenario Description:

Apply brush management on rangeland, grazed forest, or pasture thru the use of broadcast aerial application of material with low cost chemical(s) to reduce or remove undesirable deciduous species (brush) in uplands and other areas not in or directly adjacent to streams, ponds, or wetlands.

Before Situation:

Plant, animal, or wildlife resource concerns associated with uplands and other areas not in or adjacent to stream, ponds, or wetland on grazed range, grazed forest, or pasture which are adversely affected by brush.

After Situation:

A 500 acre unit of pasture, grazed range, or grazed forest where reduction or removal of undesirable deciduous species have been accomplished by broadcast or spot treatment chemical application to address plant, animal, and wildlife resource concerns.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 500

Scenario Cost: $27,614.29 **Scenario Cost/Unit:** $55.23

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	1142				2	
Equipment/Installation						
Chemical, aerial application, fixed wing	947	Chemical application performed by fixed wing aircraft. Includes equipment, power unit and labor costs.	Acre	$8.92	500	$4,460.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	5	$186.55
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	20	$461.60
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	5	$206.15
Materials						
Herbicide, Triclopyor	338	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$42.30	500	$21,150.00
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.32	500	$660.00
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 314 - Brush Management

Scenario: #13 - Chemical, Spot Treatment

Scenario Description:

Land unit on which weed control using chemical spot treatment would be beneficial in order to to accomplish objects such as: set back the plant community succession, improve the ecological condition, control invasive plants or improve forage conditions for domestic livestock or wildlife. The practice entails the eradication of vegetation by use of weed treatment, either initial or retreatment using equipment (such as a backpack, hand-sprayer or ATV-mounted wand) to apply chemicals, in order to eliminate noxious weeds, promote forage productivity, and improve ecological condition.

Before Situation:

Area consists of excessive stands of woody plants degrading health and vigor of desirable plant species promoting noxious and invasive species and degrading wildlife habitat.

After Situation:

Woody plants are removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, hydrology or plant health and vigor is returning to near normal levels, and wildlife habitat is improved.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $2,192.27 **Scenario Cost/Unit:** $219.23

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	1142				4	
Equipment/Installation						
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$57.01	20	$1,140.20
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	18	$553.50
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	3	$123.69
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	4	$92.32
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	2.5	$39.08
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	1	$70.87

Practice: 314 - Brush Management

Scenario: #14 - Low Cost Chemical

Scenario Description:

Apply brush management through the use of broadcast application of herbicide to reduce or remove undesirable species of brush. A low cost chemical will adequately address the resource concern(s).

Before Situation:

Area consists of excessive stands of woody plants degrading health and vigor of desirable plant species promoting noxious and invasive species and degrading wildlife habitat.

After Situation:

Woody plants are removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, hydrology or plant health and vigor is returning to near normal levels, and wildlife habitat is improved.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 160

Scenario Cost: $6,451.32 **Scenario Cost/Unit:** $40.32

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	40	$941.20
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	160	$932.80
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	40	$893.20
Materials						
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.32	160	$211.20
Herbicide, Picloram	337	Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$19.12	160	$3,059.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 314 - Brush Management

Scenario: #15 - High Cost Chemical

Scenario Description:

Apply brush management through the use of broadcast application of herbicide to reduce or remove undesirable species of brush. A low cost chemical will not adequately address the resource concern(s), so a high cost chemical will need to be used.

Before Situation:

Area consists of excessive stands of woody plants degrading health and vigor of desirable plant species promoting noxious and invasive species and degrading wildlife habitat.

After Situation:

Woody plants are removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, hydrology or plant health and vigor is returning to near normal levels, and wildlife habitat is improved.

Scenario Feature Measure: Acres Treated

Scenario Unit: Acre

Scenario Typical Size: 160

Scenario Cost: $10,032.12 **Scenario Cost/Unit:** $62.70

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	40	$941.20
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	160	$932.80
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	40	$893.20
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Materials						
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.32	160	$211.20
Herbicide, Imazapyr	336	Pre and post-emergent, non-selective herbicide for control of undesirable vegetation in non-crop areas. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$41.50	160	$6,640.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 314 - Brush Management

Scenario: #16 - Mutiple treatment Complex

Scenario Description:

Using a combination of hand tools, such as chainsaws, axes, shovels, nippers, or brush pullers to remove or cut off woody plants at of below the root collar followed by herbicide application. This includes post-treatment pruning or lopping and chemical application to adequately reduce woody species on the site. Typical areas have undesired woody species such as Tamarix aphylla, Elaeagnus angustifolia or Ailanthus altissima, English Ivy, clematis, or very large infestations of blackberry or Japanese-type knotweedsthat are very difficult to eradicate. These species typically occur in riparian areas or the tranistion zone between riparian and upland. Typical unit is 20 acres.

Before Situation:

Area is in the early-to-mid phases of undesired woody species encroachment that degrades riparian condition, rangeland health, productivity, habitat for desired wildlife species. If woody species are allowed to expand, future degradation of ecological site condition results in loss of key forage/browse species, habitat loss for species of concern, increased noxious and invasive species, increased soil erosion, and altered hydrologic regimes.

After Situation:

Encroaching woody species are cut and/or removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site degradation is reversed and condition continues progressing in an upward trend. Desired hydrology, wildlife habitat, and plant health, vigor, and productivity are sustained.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $22,843.19 **Scenario Cost/Unit:** $1,142.16

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$44.18	1	$44.18
Equipment/Installation						
Chemical, precision application	949	Chemical application performed by light bar/GPS navigation system. Includes equipment, power unit and labor costs.	Acre	$9.27	160	$1,483.20
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	30	$922.50
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$128.90	80	$10,312.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	25	$932.75
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	160	$1,011.20
Pruning tools, hand tools	1318	Pruning tools, hand tools, shears, loppers, pole saw, handsaw. Material costs only. Labor not included.	Hour	$4.77	28	$133.56
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	24	$2,638.56
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	170	$3,923.60
Materials						
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.32	20	$26.40

Materials

Herbicide, Triclopyor	338	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$42.30	20	$846.00
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	20	$312.60

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 315 - Herbaceous Weed Control

Scenario: #1 - Hand Tools

Scenario Description:

Using hand tools, such as shovels, hoes, nippers, to remove or cut off herbaceous plants at of below the root collar. Typical area has herbaceous weed species that are in the early phases of invasions. Typical unit is 10 acres.

Before Situation:

Area is in the very early phases of herbaceous weed encroachment that degrades habitat for desired wildlife species. Future degradation of key forage species and ecological site condition promoting noxious and invasive species and increased soil erosion if woody species are allowed to expand.

After Situation:

Herbaceous weeds are removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition continues to progressing in an upward trend, hydrology and plant health and vigor are sustained.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $3,960.32 **Scenario Cost/Unit:** $396.03

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	32	$1,193.92
Pruning tools, hand tools	1318	Pruning tools, hand tools, shears, loppers, pole saw, handsaw. Material costs only. Labor not included.	Hour	$4.77	64	$305.28
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	32	$984.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	64	$1,477.12

Practice: 315 - Herbaceous Weed Control

Scenario: #2 - Mechanical

Scenario Description:

Removal of herbaceous weeds of light infestations. The practice entails the removal of herbaceous weeds by the use of mower, brush hog, or other light equipment in order to reduce fuel loading and improve ecological site condition. Weeds have exceeded desired levels based on ecological site potential. Typical unit is 40 acres.

Before Situation:

Area consist of excessive stands of herbaceous weeds degrading health and vigor of native herbaceous species promoting noxious and invasive species and degrading wildlife habitat.

After Situation:

Herbaceous weeds are removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, hydrology and plant health and vigor is returning to near normal levels, and improved wildlife habitat.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $3,957.33 **Scenario Cost/Unit:** $98.93

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$50.98	36	$1,835.28
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	8	$298.48
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	36	$847.08
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	36	$803.88
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: 315 - Herbaceous Weed Control

Scenario: #3 - Completing Vegetation Control

Scenario Description:

Treatment takes place in areas with moderate to high grass competition after planting trees or shrubs. Area is moderately to densely covered in very tall grass and other herbaceous weeds. Treatment is needed to ensure the successful establishment of the trees/shrubs. Areas to be treated tend to be small and isolated, resulting in high mobilization costs. Due to desirable species mixed with undesirable, caution is needed during treatment.

Before Situation:

Desirable vegetation is competing with grasses and other weedy species. The weedy species are competing with desirable vegetation moderately to severely, and high mortality of desireable species will occur without treatment of weedy species.

After Situation:

Desirable vegetation is released from competing vegetation. All undesirable vegetation is removed within at least 2 feet of desired plants.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 2

Scenario Cost: $2,174.13 **Scenario Cost/Unit:** $1,087.07

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$50.98	8	$407.84
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	8	$188.24
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$57.01	20	$1,140.20
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	8	$178.64
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	2	$31.26
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	1	$70.87

Practice: 315 - Herbaceous Weed Control

Scenario: #4 - Chemical, Spot Treatment

Scenario Description:

Land unit on which weed control using would be beneficial in order to to accomplish objects such as: set back the plant community succession, improve the ecological condition, control invasive plants or improve forage conditions for domestic livestock or wildlife. The practice entails the eradication of vegetation by use of weed treatment, either initial or retreatment using equipment (such as a backpack, hand-sprayer or ATV-mounted wand) to apply chemicals, in order to eliminate noxious weeds, promote forage productivity, and improve ecological condition.

Before Situation:

Area consists of excessive stands of herbaceous plants degrading health and vigor of native herbaceous species promoting noxious and invasive species and degrading wildlife habitat.

After Situation:

Herbaceous plants are removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, hydrology or plant health and vigor is returning to near normal levels, and wildlife habitat is improved.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $2,180.51 **Scenario Cost/Unit:** $218.05

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$57.01	20	$1,140.20
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	5	$186.55
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	20	$615.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	10	$156.30

Practice: 315 - Herbaceous Weed Control

Scenario: #5 - Chemical, Aerial

Scenario Description:

Land unit on which weed control would be beneficial in order to set back the plant community succession, improve the ecological condition, and improve forage conditions for domestic livestock or wildlife. The practice entails the eradication of vegetation by use of weed treatment using airplane or helicopter to apply chemicals, in order to eliminate noxious weeds, promote forage productivity, and improve ecological condition.

Before Situation:

Area consist of excessive stands of herbaceous weeds degrading health and vigor of native herbaceous species promoting noxious and invasive species and degrading wildlife habitat.

After Situation:

Herbaceous weeds are removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, hydrology and plant health and vigor is returning to near normal levels, and improved wildlife habitat.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 320

Scenario Cost: $16,812.84 **Scenario Cost/Unit:** $52.54

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	8	$298.48
Chemical, aerial application, fixed wing	947	Chemical application performed by fixed wing aircraft. Includes equipment, power unit and labor costs.	Acre	$8.92	320	$2,854.40
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.32	320	$422.40
Herbicide, Sulfometuron-methyl	340	Used for the control of annual and perennial grasses and broad leaved weeds in non-crop land. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$38.78	320	$12,409.60
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	1	$70.87

Practice: 315 - Herbaceous Weed Control

Scenario: #6 - Low Cost Chemical

Scenario Description:

Apply herbaceous weed management through the use of broadcast application of herbicide to reduce or remove undesirable species of brush. A low cost chemical will adequately address the resource concern(s). Typical unit is 160 acres.

Before Situation:

Area consists of excessive stands of undesirable herbaceous plants degrading health and vigor of desirable plant species promoting noxious and invasive species and degrading wildlife habitat.

After Situation:

Undesirable herbaceous plants are removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, hydrology or plant health and vigor is returning to near normal levels, and wildlife habitat is improved.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 160

Scenario Cost: $3,576.92 **Scenario Cost/Unit:** $22.36

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	160	$932.80
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Materials						
Herbicide, Imazapic	335	Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$12.62	160	$2,019.20
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.32	160	$211.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 315 - Herbaceous Weed Control

Scenario: #7 - High Cost Chemical

Scenario Description:

Apply herbaceous weed management through the use of broadcast application of herbicide to reduce or remove undesirable species of brush. A low cost chemical will not adequately address the resource concern(s), so a high cost chemical will need to be used. Typical unit is 160 acres.

Before Situation:

Area consists of excessive stands of undesirable herbaceous plants degrading health and vigor of desirable plant species promoting noxious and invasive species and degrading wildlife habitat.

After Situation:

Undesirable herbaceous plants are removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, hydrology or plant health and vigor is returning to near normal levels, and wildlife habitat is improved.

Scenario Feature Measure: Acre

Scenario Unit: Acre

Scenario Typical Size: 160

Scenario Cost: $8,197.72 **Scenario Cost/Unit:** $51.24

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	160	$932.80
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Materials						
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.32	160	$211.20
Herbicide, Imazapyr	336	Pre and post-emergent, non-selective herbicide for control of undesirable vegetation in non-crop areas. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$41.50	160	$6,640.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 315 - Herbaceous Weed Control

Scenario: #8 - Two Treatments

Scenario Description:

The practice entails the control of undesirable herbaceous vegetation by treating it twice during the treatment period in order to improve ecological site condition. The target species can be treated with the same method twice, or by a combination of methods. Weedy vegetation needs to be treated at least twice in order to fully control it. Generally, the second treatment will kill resprouting stems or those which survived the first treatment or newly sprouted seedlings. Undesirable species density has exceeded desired levels based on ecological site potential. Typical unit is 120 acres. The practice is not completed until both treatments are completed.

Before Situation:

Area has excessive stands of undesirable species degrading health and vigor of desireable species promoting noxious and invasive species and degrading wildlife habitat such as riparian areas and native grasslands.

After Situation:

Undesirable herbaceous species are removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, hydrology and plant health and vigor is returning to near normal levels, and improved wildlife habitat.

Scenario Feature Measure: Acre

Scenario Unit: Acre

Scenario Typical Size: 120

Scenario Cost: $18,275.26 **Scenario Cost/Unit:** $152.29

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	120	$699.60
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	120	$2,823.60
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$50.98	120	$6,117.60
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	6	$223.86
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	120	$2,679.60
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	6	$247.38
Materials						
Herbicide, Imazapyr	336	Pre and post-emergent, non-selective herbicide for control of undesirable vegetation in non-crop areas. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$41.50	120	$4,980.00
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.32	120	$158.40
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 315 - Herbaceous Weed Control

Scenario: #9 - Three Treatments

Scenario Description:

The practice entails the control of undesirable herbaceous vegetation by treating it three times during the treatment period in order to improve ecological site condition. The target species can be treated with the same method all three times, or by a combination of methods. Weedy vegetation needs to be treated at least three times in order to fully control it. Generally, the second and third treatments will kill resprouting stems, persistent vegetation, or newly sprouted seedlings. Undesireable species density has exceeded desired levels based on ecological site potential. Typical unit is 120 acres. The practice is not completed until all treatments are completed.

Before Situation:

Area has excessive stands of undesirable species degrading health and vigor of desireable species promoting noxious and invasive species and degrading wildlife habitat such as riparian areas and native grasslands.

After Situation:

Undesirable herbaceous species are removed to achieve the desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, hydrology and plant health and vigor is returning to near normal levels, and improved wildlife habitat.

Scenario Feature Measure: Acre

Scenario Unit: Acre

Scenario Typical Size: 120

Scenario Cost: $24,521.49 **Scenario Cost/Unit:** $204.35

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$50.98	120	$6,117.60
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	240	$1,399.20
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	120	$2,823.60
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	9	$335.79
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	9	$371.07
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	120	$2,679.60
Materials						
Herbicide, Imazapyr	336	Pre and post-emergent, non-selective herbicide for control of undesirable vegetation in non-crop areas. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$41.50	240	$9,960.00
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.32	240	$316.80
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	3	$517.83

Practice: 315 - Herbaceous Weed Control

Scenario: #10 - Complex, Chemical Control

Scenario Description:

Persistent Perennial Invasive - Chemical Control such as Arundo donax, Lepidium latifolium or other persistent perennial invasive (i.e. purple loosestrife) involves chemical treatment only, leaving dead stalks in place. Acres planned need to reflect actual area treated. Particular attention should be given to O&M with potential followup chemical treatments as needed when regrowth sprouting occurs. Resource Concerns: Habitat Degradation, Degraded Plant Condition, and Water Quantity.

Before Situation:

Stream corridors are impacted due increased density of Arundo donax and Lepidium latifolia or other persistent perennial invasive involves. Stream flow is inhibited due to excess vegetation. Habitat for plants and animals is degraded.

After Situation:

Arundo donax is controlled with chemical treatment. O&M Plan includes followup chemical spraying as needed to control resprouting. Plant commuity has improved, stream flows are less impeded, and fish and wildlife habitats are improved.

Scenario Feature Measure: Acres of Treatment

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $1,033.63 **Scenario Cost/Unit:** $1,033.63

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	1	$30.75
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$57.01	8	$456.08
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	8	$298.48
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	4	$152.56
Materials						
Herbicide, Glyphosate-ipa salt 4SL	346	Product is typically used for aquatic usage. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$5.06	2	$10.12
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.32	2	$2.64
Herbicide, Imazapyr	336	Pre and post-emergent, non-selective herbicide for control of undesirable vegetation in non-crop areas. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$41.50	2	$83.00

Practice: 315 - Herbaceous Weed Control

Scenario: #11 - Complex Chemical cut remove

Scenario Description:

Removal of Persistent Perennial Invasive such as Arundo donax, Lepidium latifolium or other perennial invasive vegetation from drainage-ways and riparian areas where stands are easily accessible and typically conversion to a single invasive species plant commuity. Treatment involves hand cutting stalks, chipping stalks and removing them from the site . A followup chemical treatment is needed several weeks later when regrowth sprouting occurs. The practice is not completed until both treatments are completed. Acres treated need to reflect actual area of removal.

Replanting, where needed, will be done using Critical Area Planting (342), Riparian Herbaceous Cover (390), Riparian Forest Buffer (391) or other appropriate Associated Practice.

Resource Concerns: Habitat Degradation, Degraded Plant Condition and Water Quantity

Before Situation:

Stream corridors are impacted due increased density of Arundo donax and/or Lepidium latafolium. Stream flow is inhibited due to excess vegetation. Habitat for plants and animals is degraded.

After Situation:

Arundo donax is removed using hand tools and follow-up chemical treatment to irradicate arundo resprouting. O&M Plan includes followup chemical spraying as needed to control resprouting. Plant commuity has improved, stream flows are less impeded, and fish and wildlife habitats are improved.

Scenario Feature Measure: Acres of Treatment

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $3,213.85 **Scenario Cost/Unit:** $3,213.85

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$57.01	4	$228.04
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	8	$298.48
Pruning tools, hand tools	1318	Pruning tools, hand tools, shears, loppers, pole saw, handsaw. Material costs only. Labor not included.	Hour	$4.77	60	$286.20
Brush Chipper, 6" capacity	938	Brush Chipper, 6" capacity, typically 35 HP. Includes chipper and power unit. Labor not included.	Hour	$22.18	8	$177.44
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	60	$1,384.80
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	8	$178.64
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	4	$439.76
Materials						
Herbicide, Imazapyr	336	Pre and post-emergent, non-selective herbicide for control of undesirable vegetation in non-crop areas. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$41.50	1	$41.50
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.32	1	$1.32

Materials

Herbicide, Glyphosate-ipa salt 4SL	346	Product is typically used for aquatic usage. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$5.06	1	$5.06

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: 315 - Herbaceous Weed Control

Scenario: #12 - Complex, difficult access, chemical, hand cut, chip

Scenario Description:

Removal of persistant perrenial invasive species such as Arundo donax, Lepidum latifoliumor other perennial invasive vegetation from areas where stands are difficult to access, very dense stands, and/or are a mixed in stands of desireable vegetation where particular attention to exclude treatment on desirable vegetation is needed. Treatment involves initial chemical spray of target species followed by hand cutting, working around desireable vegetation to cut invasive plants, hauling out, and stacking in piles out of the riparian/flood corridor. The practice is not completed until both treatments are completed. Acres treated need to reflect actual area of target species removal. Particular attention should be given to O&M with potential followup chemical treatments as needed when regrowth sprouting occurs.

Replanting, where needed, will be done using Critical Area Planting (342), Riparian Herbaceous Cover (390), Riparian Forest Buffer (391) or other appropriate Associated Practice.

Resource Concerns: Habitat Degradation, Degraded Plant Condition and Water Quantity.

Before Situation:

Stream corridors are impacted due heavy density of Arundo donax, Lepidium latifolium or other persistent perennial invasive species. Stream flow is inhibited due to excess vegetation. Habitat for plants and animals is degraded.

After Situation:

Target species is sprayed while growing to ensure transport of chemicals to root zone; After chemical takes effect, stalks are cut using hand tools and removed out of the riparian zone. O&M Plan includes followup chemical spraying as needed to control resprouting. Plant commuity has improved, stream flows are less impeded, and fish and wildlife habitats are improved.

Scenario Feature Measure: Acres of Treatment

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $7,953.69 **Scenario Cost/Unit:** $7,953.69

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Pruning tools, hand tools	1318	Pruning tools, hand tools, shears, loppers, pole saw, handsaw. Material costs only. Labor not included.	Hour	$4.77	96	$457.92
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$57.01	16	$912.16
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$128.90	16	$2,062.40
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	8	$298.48
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	4	$439.76
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	96	$2,215.68
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	16	$357.28
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	24	$989.52
Materials						
Herbicide, Imazapyr	336	Pre and post-emergent, non-selective herbicide for control of undesirable vegetation in non-crop areas. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$41.50	1	$41.50

Materials

Herbicide, Glyphosate-ipa salt 4SL	346	Product is typically used for aquatic usage. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$5.06	1	$5.06
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.32	1	$1.32

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: 315 - Herbaceous Weed Control

Scenario: #13 - Biological Control - Insects

Scenario Description:

Management of invasive, noxious, or prohibited plant species through the establishment of populations of species specific biological control insect agents released into the target plant population, or the collection and transfer of agents from one unit to another. Typical area is at least five acres of open rangeland or pasture, level to steeply sloping, on shallow to deep soils, and may include both upland and lowland sites.

Before Situation:

The noxious and invasive herbaceous species is naturalized on the unit, is not suitable for the intended use, is competing for establishment, water and nutrients with suitable plant species, and has negatively impacted ecologic functions at the site. Suitable vegetation for the intended use is in low vigor with limited reproductive capability diminishing available forage for livestock. Changes in plant community composition and structure have resulted in degraded wildlife habitat. The site is at risk of increased soil erosion and further degradation by invasive or noxious species.

After Situation:

An established population of biological control insect agents reduces seed production, competitiveness, and populations of the target invasive plant species. Health and vigor of desirable vegetation increases as a result of reduced competition and proper management. Wildlife habitat and forage values return to the site, ecologic functions improve and conditions trend upward. The risk of increased soil erosion and further degradation of the site have been reduced.

Scenario Feature Measure: Acre

Scenario Unit: Acre

Scenario Typical Size: 5

Scenario Cost: $719.44 **Scenario Cost/Unit:** $143.89

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	2	$61.50
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	8	$298.48
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Materials						
Stem Mining Weevil (Ceutorhynchus litura)	303	Stem Mining Weevil. Includes all support necessary to ensure adequate release of insects. Labor not included. Includes materials and shipping only.	Each	$1.71	100	$171.00
Stem Gall Fly (Urophora cardui)	302	Stem Gal Fly. Includes all support necessary to ensure adequate release of insects. Labor not included. Includes materials and shipping only.	Each	$1.06	100	$106.00

Practice: 316 - Animal Mortality Facility

Scenario: #2 - Static pile, Concrete Pad

Scenario Description:

This scenario consists of installing a concrete pad over permeable soils, karst topography, frequently accessed sites or sites with regulatory requirements. Typically associated with large dairy (1,000 cows plus heifers) or beef animal mortality with an average daily mortality of 175 lbs/day. Area sized to compost animal mortality as a static pile or windrow with equipment around materials. Sufficient carbon based bulking material added to allow natural aeration and a proper C:N ratio. Piles typically turned at least once to go into another heat cycle prior to final disposal, typically land application. Site to be located out of drainage areas, off-site water diverted and any runoff to spread out into a grassed area or vegetated treatment area as per regulations. Concrete apron or approach should be contracted under Waste Transfer or Heavy Use Area Protection.

Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Access Road (560), Structure for Water Control (587), Diversion (362), Subsurface Drain (606), Underground Outlet (620), Heavy Use Area Protection (561), Waste Transfer (634)

Before Situation:

Animal mortality is done in a manner that results in non-point source pollution of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources. Improper operation results in odors and spread of pathogens from incomplete composting, incineration, or interaction with predators. No plan was formulated for both normal and catastrophic mortality events.

After Situation:

Animal mortality is being done in a manner that prevents non-point source pollution of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources. Proper operation results in little to no odors, complete composting, and protection from predators to minimize pathogen survival or spreading. An overall plan covers normal and catastrophic mortality events.
Construct a 60'x95' concrete surface to process mortality. Concrete 6" thick with reinforcement, curbs or speed bumps are installed on all sides. Typical layout is 18' wide piles with 8' wide access area is around each pile or windrow. Site preparation includes topsoil removal, minimal regrading and compaction, installing gravel or sand subbase and then concrete.

Scenario Feature Measure: Pad Area

Scenario Unit: Square Foot

Scenario Typical Size: 5,700

Scenario Cost: $22,078.54 **Scenario Cost/Unit:** $3.87

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	215	$509.55
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	108.5	$17,457.65
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	105.5	$4,111.34

Practice: 316 - Animal Mortality Facility

Scenario: #3 - Static pile, Wood Bin(s)

Scenario Description:

This scenario consists of installing a group of small bins along one side and a long narrow bin on the backside of a concrete pad to compost poultry or small swine mortality in static pile(s) that have sufficient bulking material to allow natural aeration. Piles are turned to go through a second heat cycle prior to final land application. The roofed portion of the facility is addressed with Roofs and Covers (367). Size of facility based on daily mortality and sizing procedures accepted in particular state. Organic sites will require more frequent replacement of lumber. Concrete apron or approach should be contracted under Waste Transfer or Heavy Use Area Protection.

Potential Associated Practices: Roofs and Covers (367), Heavy Use Area Protection (561), Critical Area Planting (342), Nutrient Management (590), Access Road (560), Structure for Water Control (587), Roof Runoff Structure (558), Diversion (362), Subsurface Drain (606), and Underground Outlet (620), Heavy Use Area Protection (561), Waste Transfer (634)

Before Situation:

Animal mortality is done in a manner that results in non-point source pollution of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources. Improper operation results in odors and spread of pathogens from incomplete composting, incineration, or interaction with predators. No plan was formulated for both normal and catastrophic mortality events.

After Situation:

Animal mortality is being done in a manner that prevents non-point source pollution of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources. Proper operation results in little to no odors, complete composting, and protection from predators to minimize pathogen survival or spreading. An overall plan covers normal and catastrophic mortality events. Selected method for carcass treatment and disposal meet or are permitted by federal, state, and local laws, rules, regulation.
Install facility on a 18' x 40' concrete pad with 4 bins (5' H x 10' W x 6' Length) along the front side and one 8'w by 40' long secondary bin. Bin wall consists of a 1' concrete curb and 4' of treated lumber. Roofed portion is addressed under Roofs and Covers (367). Site preparation includes topsoil removal, installing 6" of gravel, setting posts , installing concrete slab and installing wooden walls and doors. Piles turned to go through a second heat cycle prior to final land application.

Scenario Feature Measure: Total Bin Area

Scenario Unit: Square Foot

Scenario Typical Size: 720

Scenario Cost: $8,897.43 **Scenario Cost/Unit:** $12.36

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	27	$63.99
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	3	$1,525.11
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	13.5	$2,172.15
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	80	$3,051.20
Materials						
Lumber, planks, posts and timbers, treated	1609	Treated dimension lumber with nominal thickness greater than 2". Includes lumber and fasteners. Does not include labor.	Board Foot	$1.81	448	$810.88
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.85	880	$748.00

Materials

Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	13.5	$526.10

Practice: 316 - Animal Mortality Facility

Scenario: #4 - Static pile, Concrete Bin(s)

Scenario Description:

This scenario consists of installing two or more concrete bins, open on one end on a concrete pad to compost larger quantities of poultry or mature swine mortality in static pile(s) that have sufficient bulking material to allow natural aeration. Piles are turned to go through a second heat cycle prior to final land application. This scenario is to be used when site restrictions such as wall height, available space, roof type/layout or other site features are not appropriate for the use of concrete block walls. The roofed portion of the facility is addressed in Cover and Roofs (367). Size of facility based on daily mortality and sizing procedures accepted in particular state. Concrete apron or approach should be contracted under Waste Transfer or Heavy Use Area
Protection.

Potential Associated Practices: Roofs and Cover (367), Heavy Use Area Protection (561), Critical Area Planting (342), Nutrient Management (590), Access Road (560), Structure for Water Control (587), Roof Runoff Structure (558), Diversion (362), Subsurface Drain (606), Underground Outlet (620), Waste Transfer (634)

Before Situation:

Animal mortality is done in a manner that results in non-point source pollution of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources. Improper operation results in odors and spread of pathogens from incomplete composting, incineration, or interaction with predators. No plan was formulated for both normal and catastrophic mortality events.

After Situation:

Animal mortality is being done in a manner that prevents non-point source pollution of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources. Proper operation results in little to no odors, complete composting, and protection from predators to minimize pathogen survival or spreading. An overall plan covers normal and catastrophic mortality events. Selected method for carcass treatment and disposal meet or are permitted by federal, state, and local laws, rules, regulation.
Install a 20' wide by 48' long pad with four bins with 4' high walls and one end open. Roofed portion is addressed under Roofs and Covers (367). Site preparation includes topsoil removal, installing 6" of gravel, installing concrete slab and installing 4' high concrete cast-in-place walls. Piles are turned by moving to adjacent bin to go through a second heat cycle prior to final land application.

Scenario Feature Measure: Total Bin Area

Scenario Unit: Square Foot

Scenario Typical Size: 960

Scenario Cost: $11,308.53 **Scenario Cost/Unit:** $11.78

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	36	$85.32
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	15	$7,625.55
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	18	$2,896.20
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	18	$701.46

Practice: 317 - Composting Facility

Scenario: #4 - Compost Pad, Non-reinforced concrete floor, No walls

Scenario Description:

This scenario consists of a compost facility with a non-reinforced concrete floor without side walls. This scenario is intended for storing manure capable of being stacked in an area where water tight floors are not needed or required. The purpose of this practice is to properly store manure and other agricultural by-products until they can be hauled away from the site for proper disposal or utilization on land at agronomical rates. Concrete is to be used when required by state regulation or when a compacted earth floor is not adequatre to address the resource concern. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.

Potential Associated practices: 342-Critical Area Planting, 362-Diversion, 561-Heavy Use Area Protection, 367-Roofs and Covers, 558-Roof Runoff Structure, 317-Composting Facility, 633-Waste Recycling, 634-Waste Transfer, 635-Vegetated Treatment Area

Before Situation:

Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmentally threat of excessive nutrients, organics, and pathogens being transported into surface and groundwaters, in addition to the use of excessive amounts of fertilizers.

After Situation:

The typical is 1,600 SqFt (40'x40'). The sitefloor will be prepared by stripping the top 1' of soil as needed, placing 6" of a sand/gravel base and pouring a 6" reinforced concrete slab with 1 foot footing on all four sides. Manure and other agricultural by-products are being controlled, by the collection at the source, and stored temporarily, at an environmentally suitable location, until such time that they are disposed of or utilized in a proper manner, typically in accordance with a nutrient management plan.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 1,600

Scenario Cost: $5,496.90 **Scenario Cost/Unit:** $3.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formless, non reinforced	36	Non reinforced concrete cast-in-placed without forms by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$156.53	30	$4,695.90
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$26.70	30	$801.00

Practice: 317 - Composting Facility

Scenario: #5 - Compost Pad, Concrete floor, No walls

Scenario Description:

This scenario consists of a compost facility with a reinforced concrete floor without side walls. This scenario is intended for situations where consistency of manure or geographical conditions prohibit earthen floors. This scenario is required when a slab is designated as water tight or when the subgrade requires steel reinforcing. The purpose of this practice is to properly store manure and other agricultural by-products until they can be hauled away from the site for proper disposal or utilization on land at agronomical rates. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.

Potential Associated practices: 342-Critical Area Planting, 362-Diversion, 561-Heavy Use Area Protection, 367-Roofs and Covers, 558-Roof Runoff Structure, 317-Composting Facility, 633-Waste Recycling, 634-Waste Transfer, 635-Vegetated Treatment Area

Before Situation:

Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmentally threat of excessive nutrients, organics, and pathogens being transported into surface and groundwaters, in addition to the use of excessive amounts of fertilizers.

After Situation:

The typical is 1,600 SqFt (40'x40'). The sitefloor will be prepared by stripping the top 1' of soil as needed, placing 6" of a sand/gravel base and pouring a 6" reinforced concrete slab with 1 foot footing on all four sides. Manure and other agricultural by-products are being controlled, by the collection at the source, and stored temporarily, at an environmentally suitable location, until such time that they are disposed of or utilized in a proper manner, typically in accordance with a nutrient management plan.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 1,600

Scenario Cost: $10,372.80 **Scenario Cost/Unit:** $6.48

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$319.06	30	$9,571.80
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$26.70	30	$801.00

Practice: 317 - Composting Facility

Scenario: #7 - Compost Pad,large, concrete floor and concrete walls

Scenario Description:

This scenario consists of a compost facility with a concrete floor and formed concrete side walls. This scenario is intended for sites that require the use of concrete walls due to roof loads or durability requirements. The availability of an experienced licensed contractor and/or its proximity to a certified concrete batching plant. This scenario is intended for situations where consistency of manure or geographical conditions prohibit earthen floors.The purpose of this practice is to properly store manure and other agricultural by-products until they can be hauled away from the site for proper disposal or utilization on land at agronomical rates. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.

Potential Associated practices: 342-Critical Area Planting, 362-Diversion, 561-Heavy Use Area Protection, 367-Roofs and Covers, 558-Roof Runoff Structure, 633-Waste Recycling, 634-Waste Transfer, 635-Vegetated Treatment Area

Before Situation:

Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmentally threat of excessive nutrients, organics, and pathogens being transported into surface and groundwaters, in addition to the use of excessive amounts of fertilizers.

After Situation:

The typical is 1,600 SqFt (40'x40'). The site will be prepared by stripping the top 1' of soil as needed, placing 6" of a sand/gravel base and pouring a 6" reinforced concrete slab. Walls are 4' high, 6" thick. The structure has 3 bays with 2 interior walls. All walls are constructed of reinforced concrete. Manure and other agricultural by-products are being controlled, by the collection at the source, and stored temporarily, at an environmentally suitable location, until such time that they are disposed of or utilized in a proper manner, typically in accordance with a nutrient management plan.
Volume=40x40x(4' average stacking height)= 6,400 cf

Scenario Feature Measure: Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 6,400

Scenario Cost: $17,972.70 **Scenario Cost/Unit:** $2.81

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$506.66	15	$7,599.90
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$319.06	30	$9,571.80
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$26.70	30	$801.00

Practice: 318 - Short Term Storage of Animal Waste and By Products

Scenario: #1 - Poly Cover, Earthen Pad

Scenario Description:

A compacted earthen pad is constructed to store wastes on a short-term basis between collection and utilization as part of an agricultural waste management system. This practice will address soil and water quality by reducing the pollution potential for surface water and groundwater quality degradation.

Potential Associated Practices: Nutrient Management (590), Waste Recycling (633)

Before Situation:

Operator presently has a confined animal feeding operation and daily manure spreading operations are not possible due to weather. Manure and other agricultural waste by-products are not being managed in an environmentally safe manner. The wastes are either accumulating at the source, or are being stockpiled in environmentally vulnerable areas and not properly managed. This situation poses an environmental threat of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources.

After Situation:

Using a compacted earthen pad with a cover provides an environmentally safe meaure for temporarily managing manure and other agricultural waste by-products. This facility provides the landowner a means of storing waste until it can be utilized in a proper manner in accordance with a nutrient management plan. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water. Typical design: volume of material temporarily stored 12,576 ft3, pad area 6,000 ft2 (60' X 100'); 4' width around edge of manure stack to properly anchor and cover the manure; footprint of manure pile: 52' X 92", 6' manure stack height on 4:1 slopes; cover is a 6 mil poly film; 15" x 1/2" dia auger anchors on 2' centers.

Scenario Feature Measure: Volume of stored manure solids

Scenario Unit: Cubic Foot

Scenario Typical Size: 12,576

Scenario Cost: $7,088.53 **Scenario Cost/Unit:** $0.56

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	222	$976.80
Materials						
Anchor, earthen, auger, 15"	2571	Very Low disturbance, galvanized or aluminum alloy earthen anchors (set of 6) with holding power of 500 pounds or less in normal soil. Includes materials and shipping only.	Each	$5.59	160	$894.40
One Species, Cool Season, Introduced Perennial Grass	2313	Introduced, cool season perennial grass. Includes material and shipping only.	Acre	$32.72	0.18	$5.89
Poly film, 6 mil.	245	6 mil, polyethylene, black	Square Foot	$0.08	6324	$505.92
Earthfill Material, purchased, common	2060	Purchased earthfill materials includes both silt or clay. Material only.	Cubic Yard	$20.04	222	$4,448.88
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 319 - On-Farm Secondary Containment Facility

Scenario: #2 - Earthen Containment

Scenario Description:

This practice scenario includes the construction of an earthen containment wall with a flexible membrane liner around an existing storage tank. The containment will not have a roof.
The purpose of the practice is to address resource concerns related to water quality degradation due to the excessive release of organics into ground and surface waters or excessive sediment and turbidity in surface waters.
Associated practices: Heavy Use Area Protection (561).

Before Situation:

The agricultural operation has a single walled fuel/oil storage tank(s) without any spill prevention protection. The producer has developed an SPCC plan in accordance with EPA requirements, which requires an above ground secondary containment facility for on-farm oil products.

After Situation:

This scenario is based on containment for a 10,000 gallon tank. The containment will be lined with a flexible membrane liner. The containment volume is designed for 125% of the tank volume (10,000 gallons X 125% = 12,500 gallons). The bottom dimensions of the containment are 40 ft x 24 ft. The wall is 2.5 feet high with a 2 ft top width and 2:1 sideslopes. The total volume of earthfill = 114 CY. The flexible liner size = 1,872 SF. Tanks will be moved or raised to install base materials. Hauled in earthfill will be used to construct the dike. The flexible liner will be installed in conformance with the design and specifications. The completed structure will provide an environmentally safe facility for handling and storage of oil products stored on the farm. Any accidental spills will be contained.

Scenario Feature Measure: Cubic Yard of compacted earthen wall

Scenario Unit: Cubic Yard

Scenario Typical Size: 114

Scenario Cost: $14,555.16 **Scenario Cost/Unit:** $127.68

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Crane, truck mounted, hydraulic, 12 ton	1734	12 ton capacity truck mounted hydraulic crane. Equipment cost only.	Hour	$87.43	2	$174.86
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.51	114	$400.14
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.27	126	$538.02
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.48	2	$76.96
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	4	$99.84
Materials						
Geotextile, non-woven, heavy weight	1210	Non-woven greater than 8 ounce/square yard geotextile with staple anchoring. Materials and shipping only.	Square Yard	$3.84	208	$798.72
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.03	18	$684.54
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.32	50	$66.00
Fuel Containment Facility, Gate valve 2 inch diameter	1735	Metal 2 inch diameter gate valve. Materials only.	Each	$95.26	1	$95.26
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Yard	$5.65	1872	$10,576.80
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$476.26	1	$476.26

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$249.44	2	$498.88
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$68.88	1	$68.88

Practice: 319 - On-Farm Secondary Containment Facility

Scenario: #4 - Concrete Containment Wall

Scenario Description:

This practice scenario includes the installation of a reinforced concrete wall containment with a concrete slab around an existing storage tank. The purpose of the practice is to address resource concerns related to water quality degradation due to the excessive release of organics into ground and surface waters or excessive sediment and turbidity in surface waters. Due to topography, limited site space and/or geological conditions a fabricated structure is needed. Structure will provide an environmentally safe facility for handling and storage of these products. Associated practices may include: Heavy Use Area Protection (561).

Before Situation:

Existing agricultural operation that has single walled fuel/oil storage tank(s) not protected. The producer has developed an SPCC plan in accordance with EPA requirements, that requires an above ground secondary containment facility for on-farm oil products, in order to control the excessive release of organics into ground and surface waters, or to control the excessive sediment and turbidity in surface water.

After Situation:

This scenario is based on containment for a 4,700 gallon tank. The containment volume is designed for 125% of the tank volume (4,700 gallons X 125% = 5,875 gallons). Structure will provide an environmentally safe facility for handling and storage of these products. Typical containment dimensions are 196 sqft bottom x 6" thick slab with 6" thick x 4' tall formed sidewalls. Tanks will be moved or raised to install base materials. The fabricated containment structure will be installed in conformance with the design and specifications. The on-farm oil products stored on the farm have secondary containment of accidental release that controls the excessive release of organics, suspended sediments, and turbidity. Structure will provide an environmentally safe facility for handling and storage of these products.

Scenario Feature Measure: Volume of concrete in the wall

Scenario Unit: Cubic Yard

Scenario Typical Size: 4

Scenario Cost: $4,371.43 **Scenario Cost/Unit:** $1,092.86

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$229.71	4.2	$964.78
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$494.12	4.3	$2,124.72
Crane, truck mounted, hydraulic, 12 ton	1734	12 ton capacity truck mounted hydraulic crane. Equipment cost only.	Hour	$87.43	2	$174.86
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.48	2	$76.96
Materials						
Fuel Containment Facility, Gate valve 2 inch diameter	1735	Metal 2 inch diameter gate valve. Materials only.	Each	$95.26	1	$95.26
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.03	4.2	$159.73
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.32	30	$39.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$249.44	2	$498.88
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$167.77	1	$167.77

Mobilization

Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$68.88	1	$68.88

Practice: **320 - Irrigation Canal or Lateral**

Scenario: **#1 - Irrigation Canal**

Scenario Description:

This scenario is the construction of an Irrigation Canal or Lateral. Typical construction dimensions are 4' wide bottom x 3' deep x 1320' length with a side slope of 2:1.
Resource concerns: Excess/Insufficient Water - Inefficient Use of Irrigation Water.
Associated Conservation Practices: 388-Irrigation Field Ditch; 443-Irrigation System, Surface or Subsurface; 533-Pumping Plant; 430-Irrigation Pipeline; 587 - Structure for Water Control; 449 - Irrigation Water Management

Before Situation:

Water supply for an area is inadequate for crop production and irrigation water application is inefficient.

After Situation:

An earthen canal that has adequate capacity to convey sufficient irrigation water to meet the demands of the system and make irrigation practical for the crops being grown.

Scenario Feature Measure: Volume of earth excavated

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,467

Scenario Cost: $3,822.01 **Scenario Cost/Unit:** $2.61

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	1467	$3,476.79
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 324 - Deep Tillage

Scenario: #1 - Depth, 36 inches or less

Scenario Description:

Deep ripping to a depth of 3 feet or less is necessary on fields (typically about 80 acres) with adverse soils conditions that restrict plant growth such as compacted layers caused by tillage operations or restrictive layers such as hardpans (duripans) in the root zone. Soil compaction is measured with a penetrometer and visual observation of limiting root growth. This practice does not apply to normal tillage practices to prepare a seedbed but is meant to fracture the compacted zone below the restrictive soil layer.

Before Situation:

In this geographic area, crop plants are observed as having reduced yield, water is not infiltrating into the soil. Soil layers have been compacted by shallow tillage operations, or soils have a hardpan (duripan) layer that is restricting root growth. Typical field size is 80 acres with crop rotations consisting of annual row crops or small grains with conventional tillage or when the harvesting of crops use heavy trucks to assist with the harvest. Compaction has been caused when soil moisture is to wet for normal field operations or by excessive shallow tillage or field harvest haul traffic throughout the entire field. Soil structure has been reduced, aggregate strength is weak and soil biological activity is low. Soil organic matter is not adequate and the water holding capacity of the soil is limited for the desired root zone.

After Situation:

Soil compaction is measured with a penetrometer and visual observation of limiting root growth. Deep tillage operations such as subsoiling, paratilling or ripping are performed not as a part of the normal tillage operation for seedbed preparation, but used to relieve compaction at depths of 36 inches or less. Soil moisture is less than 30 percent when deep tillage is used. The fractured zone will be sufficient to permit root penetration below the restrictive soil layer. Penetrometers are used to identify the severity (psi) of the compaction and the depth of the restrictive layer. Deep tillage is generally performed in the fall after crop harvest when soil conditions are dry. When possible, harvest operations should be avoided when soil moisture is greater than 50% of field capacity. Field harvest haul traffic should be limited to end rows or haul roads. Using dual tires or tracts beneath tractors or grain wagons can help spread the weight load.

Scenario Feature Measure: Acres

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $1,817.75 **Scenario Cost/Unit:** $22.72

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	1	$37.31
Ripper or subsoiler, 16 to 36 inch depth	1235	Deep ripper or subsoiler, (16-36 inches depth) includes tillage implement, power unit and labor.	Acre	$18.93	80	$1,514.40
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	2	$46.16
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	2	$219.88

Practice: 324 - Deep Tillage

Scenario: #2 - Depth, Greater than 36 inches

Scenario Description:

Perform two deep tillage, also called "ripping", passes perpendicular to each other to a depth 37 - 60 inches using a slip plow or similar implement on fields with heavy clay soils and high salinity or other adverse condition. Very deep, two-pass tillage provides better infiltration and prevents heavy clay soils with high shrink/swell properties from closing the tillage channels after irrigation. Irrigation can be managed to allow for deep percolation and leaching to control salt buildup in the soils. This practice does not apply to normal tillage practices to prepare a seedbed.

Before Situation:

In this geographic area, crop plants are observed as having reduced yield, water is not infiltrating into the soil. Soil layers have been compacted by shallow tillage operations, and salts have been building up in the root zone due to limited ability to leach them out with deep percolation. Typical field size is 80 acres with crop rotations consisting of annual row crops, orchard /vineyards or small grains with conventional tillage or when the harvesting of row crops use heavy trucks to assist with the harvest. Compaction has been caused when soil moisture is too wet for normal field operations or by excessive shallow tillage or field harvest haul traffic throughout the entire field. Salinity in the soils has built up over time. Soil structure has been reduced, aggregate strength is weak and the water holding capacity of the soil is limited for the desired root zone. Soil organic matter is not adequate and soil biological activity is low.

After Situation:

Salinity levels can be controlled through leaching, and root growth is less limited. Soil moisture is less than 30 percent when deep tillage is used. The fractured zone will be sufficient to permit root and water penetration below the restrictive soil layer. Penetrometers are used to identify the severity (psi) of the compaction and the depth of the restrictive layer. Deep tillage is generally performed in the fall after crop harvest when soil conditions are dry. When possible, harvest operations should be avoided when soil moisture is greater than 50% of field capacity. Field harvest haul traffic should be limited to end rows or haul roads. Using dual tires or tracts beneath tractors or grain wagons can help spread the weight load.

Scenario Feature Measure: Acres

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $10,398.53 **Scenario Cost/Unit:** $129.98

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	1	$37.31
Ripper or subsoiler, > 36 inch depth	1236	Deep ripper or subsoiler, (>36 inches depth) includes tillage implement, power unit and labor.	Acre	$56.97	160	$9,115.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	2	$46.16
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	2	$219.88
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 326 - Clearing and Snagging

Scenario: #1 - Vegetation Removal

Scenario Description:

Removal of vegetation, logs, or other material that impedes the proper functioning of a stream channel or water course to restore flow capacity; prevent bank erosion by eddies; reduce the formation of sediment bars; and/or minimize blockages by debris. Addresses resource concerns such as water quantity and soil erosion-streambanks.

Before Situation:

Vegetation, logs, or other material provide a flow restriction or divert flowing water against the streambank causing excess erosion. Approximately one-half of the channel flow capacity is obstructed. The flow blockage may encourage depostion in the main channel and may alter the established flow channel.

After Situation:

Vegetation, logs, or other material have been removed to allow unrestricted flow in the channel and appurtenant structures. Material that poses no blockage threat is left in place to enhance aquatic habitat. Channel bed and banks are in equillibrium with the flow. Typical scenario is for the removal of vegetation, logs and other in stream removal on 300' of channel.

Scenario Feature Measure: Length of Channel Clearing

Scenario Unit: Linear Foot

Scenario Typical Size: 300

Scenario Cost: $4,512.88 **Scenario Cost/Unit:** $15.04

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, dump, 8 CY	1401	Dump truck for moving bulk material. Typically capacity is 12 ton or 8 cubic yards. Includes equipment only.	Hour	$44.06	10	$440.60
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$5.38	20	$107.60
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$100.82	10	$1,008.20
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$92.34	10	$923.40
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.46	10	$414.60
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.10	32	$707.20
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.69	16	$395.04
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.12	2	$516.24

Practice: 326 - Clearing and Snagging

Scenario: #2 - Rock Removal

Scenario Description:

Removal and disposal of rock debris, cobbles and small boulders from river or stream course impedes the proper functioning of a stream channel or water course to restore flow capacity; prevent bank erosion by eddies; reduce the formation of sediment bars; and/or minimize blockages by debris. This scenario is appropraite in setting that is easily accessible with tradition construction equipment. Assoicated practices may include 580 Streambank and Shoreline Protection, 584 Channel Stabilization and 342 Critical Area Planting

Before Situation:

Rock debris, cobbles and small boulders causes a flow restriction or divert flowing water against the streambank causing excess erosion or fish passage restrictions. Approximately two-thirds of the channel flow capacity is obstructed. The flow blockage may encourage depostion in the main channel and may alter the established flow channel.

After Situation:

Rock debris, cobbles and small boulder have been removed to allow unrestricted flow in the channel and appurtenant structures. Material that poses no blockage threat is left in place to enhance aquatic habitat. Channel bed and banks are in equillibrium with the flow.
Typical sceanrio is for a project area that is along or immediately adjacent to a paved road. No special setup is required for excavating equipment. Construction would typically include specialized equipment such as excavators and loaders. The typical scenario is for a channel requiring 3 cy of rock removal per LF of channel on 50' of channel. Assumes materail is moved from the site and disposed of at an adjacent site. Activities would include excavation of rock or boulder debris, off site disposal of materials and creation of a stable channel reach.

Scenario Feature Measure: Length of Channel Clearing

Scenario Unit: Linear Foot

Scenario Typical Size: 125

Scenario Cost: $3,477.20 **Scenario Cost/Unit:** $27.82

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	$73.79	8	$590.32
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$154.50	8	$1,236.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.46	8	$331.68
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.10	16	$353.60
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$482.80	2	$965.60

Practice: 326 - Clearing and Snagging

Scenario: #3 - Rock Removal, Offsite Disposal

Scenario Description:

Removal and disposal of rock debris, cobbles and small boulder on sites that require that the rock be hauled off site to a stable disposal area from river or stream course impedes the proper functioning of a stream channel or water course to restore flow capacity; prevent bank erosion by eddies; reduce the formation of sediment bars; and/or minimize blockages by debris. This scenario is appropraite in setting that is easily accessible with tradition construction equipment. Assoicated practices may include 580 Streambank and Shoreline Protection, 584 Channel Stabilization and 342 Critical Area Planting

Before Situation:

Rock debris, cobbles and small boulder provide a flow restriction or divert flowing water against the streambank causing excess erosion or fish passage restrictions on a site requiring removal of the debris to an off site location. Approximately two-thirds of the channel flow capacity is obstructed. The flow blockage may encourage depostion in the main channel and may alter the established flow channel.

After Situation:

Rock debris, cobbles and small boulder have been removed and disposed of off sie to allow unrestricted flow in the channel and appurtenant structures. Material that poses no blockage threat is left in place to enhance aquatic habitat. Channel bed and banks are in equillibrium with the flow. Typical sceanrio is for a project area that requires removal of the rock and debris to an off site location. No special setup is required for excavating equipment. Construction would typically include specialized equipment such as cranes, track hoes haul trucks. The typical scenario is for a channel requiring 3 cy of rock removal per LF of channel on 125' of channel. Assumes materail is loaded into a dump truck and hauled 5 mile off site for disposal. Activities would include excavation of rock or boulder debris, off site disposal of materials and creation of a stable channel reach.

Scenario Feature Measure: Length of Channel Clearing

Scenario Unit: Linear Foot

Scenario Typical Size: 125

Scenario Cost: $5,301.04 **Scenario Cost/Unit:** $42.41

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$154.50	8	$1,236.00
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	$73.79	8	$590.32
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$91.89	16	$1,470.24
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.10	32	$707.20
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.46	8	$331.68
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$482.80	2	$965.60

Practice: 326 - Clearing and Snagging

Scenario: #4 - Boulder and Concrete Structure Removal

Scenario Description:

Drilling, blasting, removal and disposal of boulders from river or stream course that require blasting or similar method on sites where the structures impedes the proper functioning of a stream channel or water course to restore flow capacity; prevent bank erosion by eddies; reduce the formation of sediment bars; and/or minimize blockages by debris. This scenario is appropraite for sites that are very difficult to access with tradition construction equipment and require blasting of rock or concrete structures prior to removal. Assoicated practices may include 580 Streambank and Shoreline Protection, 584 Channel Stabilization and 342 Critical Area Planting

Before Situation:

Large boulders and/or a concrete structure provides a flow restriction or divert flowing water against the streambank causing excess erosion or fish passage restrictions. Approximately two-thirds of the channel flow capacity is obstructed. The flow blockage may encourage depostion in the main channel and may alter the established flow channel. Structure or rock cannot be removed with standard equipment and requires blasting or similar measures before removing.

After Situation:

Large boulders or large concrete in stream structures have been removed to allow unrestricted flow in the channel and appurtenant structures. Material that poses no blockage threat is left in place to enhance aquatic habitat. Channel bed and banks are in equillibrium with the flow. Typical sceanrio is for a project area that is difficult to access and not near a paved road. Construction would typically require blasting of the structure or rock and would include specialized equipment such as excavators, track hoes haul trucks. The typical scenario is for a channel requiring 4 cy of rock removal per LF of channel on 200' of channel. Assumes materail is moved from the site and disposed of at an approved disposal site 5 miles away. Activities would include blasting of instream material, excavation of concrete or boulder debris, off site disposal of materials and creation of a stable channel reach.

Scenario Feature Measure: Length of Channel Clearing

Scenario Unit: Linear Foot

Scenario Typical Size: 200

Scenario Cost: $11,285.60 **Scenario Cost/Unit:** $56.43

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$54.56	8	$436.48
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	$73.79	16	$1,180.64
Drilling & Blasting Rock, Open Face.	1396	Open Face drilling & blasting of rock (typically a min. 225 CY, Max 1500 CY). Includes all equipment, labor and supplies to complete the blast.	Cubic Yard	$13.53	200	$2,706.00
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.28	4000	$1,120.00
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$154.50	20	$3,090.00
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.10	44	$972.40
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.46	8	$331.68
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$482.80	3	$1,448.40

Practice: 326 - Clearing and Snagging

Scenario: #5 - Instream Structure Removal

Scenario Description:

Removal and disposal of an instream structure (culvert, hardened instream crossing, etc) that is currently causing impairment to fish and/or aquatic organism passage and/or impedes the proper functioning of a stream channel or water course to restore flow capacity; prevent bank erosion by eddies; reduce the formation of sediment bars. Structure is part of single land gravel surfaced forest or farm road. The structure and associated fill is removed and hauled off site to an appropriate off site disposal location. Typical structure to be removed is a 36" cmp, 50 ft long, placed in stream with bankfull width of 18 ft. Typical structure height is 10 ft. Project area is difficult to access and generally not near a paved road. Activities would include excavation of rock or boulder debris, off site disposal of materials and creation of a stable channel reach. Associated practices may include 580 Streambank and Shoreline Protection, 584 Channel Stabilization and 342 Critical Area Planting.

Before Situation:

Culverts, rock debris, cobbles and small boulder provide a flow restriction or divert flowing water against the streambank causing excess erosion or fish passage restrictions. Approximately two-thirds of the channel flow capacity is obstructed. The flow blockage may encourage depostion in the main channel and may alter the established flow channel. In this stream reach the structure/material is creating sub-optimal habitat for fish, aquatic insects and/or other stream species.

After Situation:

Artifical structure and associated fill removed, allowing unrestricted flow and natural stream channel forming processess to continue. Channel bed and banks are in equillibrium with the flow. The stream reach has improved habitat connectivity for desired species as determined by the NRCS Stream Visual Assessment (SVAP2) or equivalent assessment. Material that poses no blockage threat may be left in place to enhance aquatic habitat. Scenario size is Structure height (including fill) X stream bankfull width X structure length = 10' X 18' x 50' = 9000cf=333 cy.

Scenario Feature Measure: Volume of material removed

Scenario Unit: Cubic Yard

Scenario Typical Size: 333

Scenario Cost: $6,739.24 **Scenario Cost/Unit:** $20.24

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$72.11	28	$2,019.08
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$154.50	14	$2,163.00
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.10	42	$928.20
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.46	16	$663.36
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$482.80	2	$965.60

Practice: 326 - Clearing and Snagging

Scenario: #6 - Debris Plug Removal

Scenario Description:

Removal of a large sediment or debris plug from river or stream course that impedes the proper functioning of a stream channel or water course to restore flow capacity; prevent bank erosion by eddies; reduce the formation of sediment bars; and/or minimize blockages by debris. Assoicated practices may include 580 Streambank and Shoreline Protection, 584 Channel Stabilization and 342 Critical Area Planting

Before Situation:

Sediment, gravel or wood provide a flow restriction or divert flowing water against the streambank causing excess erosion or fish passage restrictions. The full channel prism is obstructed. The flow blockage may encourage depostion in the main channel and may alter the established flow channel.

After Situation:

Sediment, gravel and wood debris have been removed to allow unrestricted flow in the channel and appurtenant structures. Material that poses no blockage threat is left in place to enhance aquatic habitat. Channel bed and banks are in equillibrium with the flow. Typical sceanrio is for a project area that is realitively easy to access. Construction would typically include specialized equipment such as excavators, track hoes haul trucks. The typical scenario is for a channel requiring 1 cy of rock removal per LF of channel on 50' of channel. Assumes materail is removed from the channel and disposed of at an adjacent site.

Scenario Feature Measure: Length of Debris Plug(s) in Channel

Scenario Unit: Linear Foot

Scenario Typical Size: 50

Scenario Cost: $1,189.20 **Scenario Cost/Unit:** $23.78

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$154.50	4	$618.00
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.10	4	$88.40
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$482.80	1	$482.80

Practice: 326 - Clearing and Snagging

Scenario: #7 - Fence Removal and Disposal

Scenario Description:

Remove and disposal of all existing fences in a stream channel by demolition, excavation or other means required for removal. Dispose of all fence materials from the site so that it does not impede subsequent work or cause onsite or offsite damage. Dispose of all materials by removal to an approved landfill, wood chipping and land distribution, or recycling center, burial at an approved location or burning. If burning is used, implement appropriate smoke management to protect public health and safety. Fence removal will address the resource concerns of the prevention or hindrance to the installation of conservation practices or present a hazard to their use and enjoyment and reduce hazards to wildlife.

Before Situation:

In stream channels where existing fence causes a flow restriction or divert flowing water against the streambank causing excess erosion or fish passage restrictions or interferes with the intended use of the reach.

After Situation:

The typical fence will be 200 linear feet. The removal of the fence will be performed with the use of equipment and hand labor. Dispose of all debris from the fence removal so that it does not impede subsequent work or cause onsite or offsite damage. Revegetate or otherwise protect from erosion disturbed areas as soon as possible. Refer to NRCS Conservation Practice Standard 342, Critical Area Planting for seedbed preparation, seeding, fertilizing, and mulching requirements.

Scenario Feature Measure: Length of Fence

Scenario Unit: Linear Foot

Scenario Typical Size: 200

Scenario Cost: $688.12 **Scenario Cost/Unit:** $3.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$34.68	4	$138.72
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$26.03	4	$104.12
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.10	4	$88.40
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.69	4	$98.76
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.12	1	$258.12

Practice: 327 - Conservation Cover

Scenario: #1 - Introduced Species

Scenario Description:

This practice involves establishment of permanent vegetative cover using a mixture of introduced species. The typical size of the practice is 50 acres. This practice scenario is typically used to reduce soil erosion, reduce soil quality degradation, improve water quality, and develop wildlife habitit. Amount contracted is calculated on actual acres planted.

Before Situation:

Field is bare soil, or has a cover of annual species or weeds. Soil erosion occurs with visible rills present, sediment may be moving offsite into surface water degrading water quality. Soil quality (soil organic matter) declines over time as a result of low residue, and long periods of bare soil. \The system provides little to no wildlife habitat.

After Situation:

Land covered with permanent introduced vegetation has reduced soil erosion, reduced water/sediment runoff, Plants sown for conservation cover may provide cover for beneficial insects and wildlife. This scenario does not apply to plantings for forage production or to critical area plantings.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 50

Scenario Cost: $7,489.50 **Scenario Cost/Unit:** $149.79

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	50	$788.50
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	100	$583.00
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	50	$1,014.50
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	100	$1,058.00
Materials						
Four Species Mix, Cool Season, Introduced Perennial (2 grasses, 2 legumes)	2317	Cool season grass and legume mix. Includes material and shipping only.	Acre	$49.65	50	$2,482.50
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	100	$1,563.00

Practice: 327 - Conservation Cover

Scenario: #2 - Introduced Species, with FI

Scenario Description:

Land is taken out of production and permanent vegetative cover is established using a mixture of introduced species. The typical size of the practice is 50 acres. This practice scenario is typically used to reduce soil erosion, reduce soil quality degradation, improve water quality, and develop wildlife habitit. Amount contracted is calculated on actual acres planted.

Before Situation:

Field is in production, but soils are erosive or otherwise marginal land. Soil erosion occurs with visible rills present, sediment may be moving offsite into surface water degrading water quality. Soil quality (soil organic matter) declines over time as a result of low residue. The system provides little to no wildlife habitat.

After Situation:

Land covered with permanent introduced vegetation has reduced soil erosion, reduced water/sediment runoff, Plants sown for conservation cover may provide cover for beneficial insects and wildlife. This scenario does not apply to plantings for forage production or to critical area plantings. Field is taken out of production.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 50

Scenario Cost: $16,021.00 **Scenario Cost/Unit:** $320.42

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	50	$788.50
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	100	$583.00
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	100	$1,058.00
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	50	$1,014.50
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$170.63	50	$8,531.50
Materials						
Four Species Mix, Cool Season, Introduced Perennial (2 grasses, 2 legumes)	2317	Cool season grass and legume mix. Includes material and shipping only.	Acre	$49.65	50	$2,482.50
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	100	$1,563.00

Practice: 327 - Conservation Cover

Scenario: #3 - Introduced Species, High

Scenario Description:

This practice involves establishment of permanent vegetative cover using a mixture of introduced species in areas of high precipitation, excessive pest competion, or shrubs are added. The typical size of the practice is 50 acres. This practice scenario is typically used to reduce soil erosion, reduce soil quality degradation, improve water quality, and develop wildlife habitit. Amount contracted is calculated on actual acres planted. This should only be contracted with approval from state agronomist, biologist, or range conservationist or their designated representative.

Before Situation:

Field is bare soil, or has a cover of annual species or weeds. Soil erosion occurs with visible rills present, sediment may be moving offsite into surface water degrading water quality. Soil quality (soil organic matter) declines over time as a result of low residue, and long periods of bare soil. \The system provides little to no wildlife habitat.

After Situation:

Land covered with permanent introduced vegetation has reduced soil erosion, reduced water/sediment runoff, Plants sown for conservation cover may provide cover for beneficial insects and wildlife. This scenario does not apply to plantings for forage production or to critical area plantings.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 50

Scenario Cost: $9,969.50 **Scenario Cost/Unit:** $199.39

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	150	$1,587.00
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$19.51	100	$1,951.00
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	50	$1,014.50
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	50	$788.50
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	100	$583.00
Materials						
Four Species Mix, Cool Season, Introduced Perennial (2 grasses, 2 legumes)	2317	Cool season grass and legume mix. Includes material and shipping only.	Acre	$49.65	50	$2,482.50
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	100	$1,563.00

Practice: 327 - Conservation Cover

Scenario: #4 - Introduced Species, High

Scenario Description:

Land is taken out of production and permanent vegetation is established using introduced species where seeding density needs to be much higher to complete with invasive plant pressures or in areas of very high precipitation, or where cost of seed mixture is higher, or some shrubs are added. The typical size of the practice is 50 acres. This practice scenario is typically used to reduce soil erosion, reduce soil quality degradation, improve water quality, and develop wildlife habitit. Amount contracted is calculated on actual acres planted. This should only be contracted with approval from state agronomist, biologist, or range conservationist or their designated representative.

Before Situation:

Field is iin production, but soils are erosive or otherwise marginal land. Soil erosion occurs with visible rills present, sediment may be moving offsite into surface water degrading water quality. Soil quality (soil organic matter) declines over time as a result of low residue, and long periods of bare soil. \The system provides little to no wildlife habitat.

After Situation:

Land covered with permanent introduced vegetation has reduced soil erosion, reduced water/sediment runoff, Plants sown for conservation cover may provide cover for beneficial insects and wildlife. This scenario does not apply to plantings for forage production or to critical area plantings. Field is taken out of production.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 50

Scenario Cost: $18,501.00 **Scenario Cost/Unit:** $370.02

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	150	$1,587.00
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	50	$788.50
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	100	$583.00
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$19.51	100	$1,951.00
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	50	$1,014.50
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$170.63	50	$8,531.50
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	100	$1,563.00
Four Species Mix, Cool Season, Introduced Perennial (2 grasses, 2 legumes)	2317	Cool season grass and legume mix. Includes material and shipping only.	Acre	$49.65	50	$2,482.50

Practice: 327 - Conservation Cover

Scenario: #5 - Organic

Scenario Description:

This practice applies on organically managed land needing permanent protective cover on areas adjacent to organically operated fields. Use of Organically certified seed is required. Seeding rate is typically much greater than standard operations to provide thick stand to combat weeds and seed predation. The typical size of the practice is 2 acres. This practice scenario is typically used to reduce soil erosion, improve soil quality, improve water quality, develop wildlife habitit, and reduce potential of chemical drift from adjacent operations. Amount contracted is calculated on actual acres planted.

Before Situation:

Crops such as vegetables and small fruit crops are organically grown on adjacent fields. Soil erosion occurs with visible rills present, sediment may be moving offsite into surface water degrading water quality. The system provides little to no wildlife habitat.

After Situation:

Organically managed land covered with permanent herbaceous vegetation has reduced soil erosion, reduced water/sediment runoff, and significant dust emissions are eliminated therefore, air quality is improved. Plants sown for conservation cover may provide cover for beneficial insects and wildlife. This scenario does not apply to plantings for forage production or to critical area plantings.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 2

Scenario Cost: $469.75 **Scenario Cost/Unit:** $234.88

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	1	$20.29
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	4	$42.32
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	2	$31.54
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$19.51	4	$78.04
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	4	$92.32
Materials						
Nitrogen, Organic	266	ORGANIC Nitrogen	Pound	$0.30	60	$18.00
Phosphorus, Organic	267	ORGANIC Phosphorus	Pound	$0.30	100	$30.00
Potassium, Organic	268	ORGANIC Potassium	Pound	$0.30	60	$18.00
Certified Organic, Three Species Mix, Cool Season, Perennial Grasses and Legumes	2340	Certified organic cool season perennial grass and legume mix. Includes material and shipping only.	Acre	$69.62	2	$139.24

Practice: 327 - Conservation Cover

Scenario: #6 - Organic, with FI

Scenario Description:

This practice applies on organically managed land needing permanent protective cover on organically operated fields. Land is taken out of production. Use of Organically certified seed is required. Seeding rate is typically much greater than standard operations to provide thick stand to combat weeds and seed predation. The typical size of the practice is 2 acres. This practice scenario is typically used to reduce soil erosion, improve soil quality, improve water quality, develop wildlife habitit, and reduce potential of chemical drift from adjacent operations. Amount contracted is calculated on actual acres planted.

Before Situation:

Crops such as vegetables and small fruit crops are organically grown on adjacent fields. Soil erosion occurs with visible rills present, sediment may be moving offsite into surface water degrading water quality. The system provides little to no wildlife habitat.

After Situation:

Organically managed land covered with permanent herbaceous vegetation has reduced soil erosion, reduced water/sediment runoff, and significant dust emissions are eliminated therefore, air quality is improved. Plants sown for conservation cover may provide cover for beneficial insects and wildlife. This scenario does not apply to plantings for forage production or to critical area plantings. Field is taken out of production.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 2

Scenario Cost: $871.47 **Scenario Cost/Unit:** $435.74

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$19.51	4	$78.04
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	2	$31.54
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	4	$42.32
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	1	$20.29
Foregone Income						
FI, Organic, Wheat Dryland	2236	Organic Dryland Wheat is Primary Crop	Acre	$200.86	2	$401.72
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	4	$92.32
Materials						
Potassium, Organic	268	ORGANIC Potassium	Pound	$0.30	60	$18.00
Phosphorus, Organic	267	ORGANIC Phosphorus	Pound	$0.30	100	$30.00
Nitrogen, Organic	266	ORGANIC Nitrogen	Pound	$0.30	60	$18.00
Certified Organic, Three Species Mix, Cool Season, Perennial Grasses and Legumes	2340	Certified organic cool season perennial grass and legume mix. Includes material and shipping only.	Acre	$69.62	2	$139.24

Practice: 327 - Conservation Cover

Scenario: #7 - Native Species

Scenario Description:

This practice involves establishment of permanent native vegetation using lower cost native seed at typical seeding rates. The typical size of the practice is 10 acres. This practice scenario is typically used to reduce soil erosion, reduce soil quality degradation, improve water quality, develop wildlife habitat, and reduce air quality impacts. Amount contracted is calculated on actual acres planted.

Before Situation:

Field is bare soil, or has a cover of annual species or weeds. Soil erosion occurs with visible rills present, sediment may be moving offsite into surface water degrading water quality. Soil quality (soil organic matter) declines over time as a result of low residue, and long periods of bare soil. Air quality may be impacted by the creation of particulates. The system provides little to no wildlife habitat.

After Situation:

Land covered with permanent native vegetation has reduced soil erosion, reduced water/sediment runoff. Plants sown for conservation cover may provide cover for beneficial insects and wildlife. This scenario does not apply to plantings for forage production or to critical area plantings.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $3,211.20 **Scenario Cost/Unit:** $321.12

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	10	$157.70
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	20	$116.60
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	20	$211.60
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	10	$202.90
Materials						
Three plus Species Mix, Warm Season, Native Perennial	2327	Native, warm season perennial grass. Includes material and shipping only.	Acre	$220.98	10	$2,209.80
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	20	$312.60

Practice: 327 - Conservation Cover

Scenario: #8 - Native Species, with FI

Scenario Description:

Land is taken out of production and permanent native vegetation is established using lower cost native seed at typical seeding rates. The typical size of the practice is 10 acres. This practice scenario is typically used to reduce soil erosion, reduce soil quality degradation, improve water quality, develop wildlife habitat, and reduce air quality impacts. Amount contracted is calculated on actual acres planted.

Before Situation:

Field is bare soil, or has a cover of annual species or weeds. Soil erosion occurs with visible rills present, sediment may be moving offsite into surface water degrading water quality. Soil quality (soil organic matter) declines over time as a result of low residue, and long periods of bare soil. Air quality may be impacted during field operations by the creation of particulates. The system provides little to no wildlife habitat.

After Situation:

Land covered with permanent native vegetation has reduced soil erosion, reduced water/sediment runoff. Plants sown for conservation cover may provide cover for beneficial insects and wildlife. This scenario does not apply to plantings for forage production or to critical area plantings. Field is taken out of production.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $4,917.50 **Scenario Cost/Unit:** $491.75

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	20	$211.60
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	10	$157.70
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	20	$116.60
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	10	$202.90
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$170.63	10	$1,706.30
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	20	$312.60
Three plus Species Mix, Warm Season, Native Perennial	2327	Native, warm season perennial grass. Includes material and shipping only.	Acre	$220.98	10	$2,209.80

Practice: 327 - Conservation Cover

Scenario: #9 - Native Species, High

Scenario Description:

This practice involves establishment of permanent native vegetation using a higher cost native seed mix, in areas of high precipitation or excessive pest competion. The typical size of the practice is 5 acres. This practice scenario is typically used to reduce soil erosion, reduce soil quality degradation, improve water quality, develop wildlife habitat, improve plant condition, or reduce air quality impacts. This scenario can also be used for plant pollinator seedings. Amount contracted is calculated on actual acres planted. This should only be contracted with approval from state agronomist, biologist, or range conservationist or their designated representative.

Before Situation:

Field is bare soil, or has a cover of annual species or weeds. Soil erosion occurs with visible rills present, sediment may be moving offsite into surface water degrading water quality. Soil quality (soil organic matter) declines over time as a result of low residue, and long periods of bare soil. Air quality may be impacted during field operations by the creation of particulates. The system provides little to no wildlife habitat.

After Situation:

Land covered with permanent native vegetation has reduced soil erosion, reduced water/sediment runoff. Plants sown for conservation cover may provide cover for beneficial insects and wildlife. This scenario does not apply to plantings for forage production or to critical area plantings.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 5

Scenario Cost: $2,869.18 **Scenario Cost/Unit:** $573.84

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	5	$78.85
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	10	$58.30
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$19.51	10	$195.10
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	5	$101.45
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	15	$158.70
Materials						
Three Species Mix, Native Forb	2333	Native forb mix. Includes material and shipping only.	Acre	$586.90	2.5	$1,467.25
Native Grass and Forb Mix, for Wildlife (including pollinators) or Ecosystem Restoration	2335	Native grass and forb/legume mix, including specialized species. Includes material and shipping only.	Acre	$261.29	2.5	$653.23
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	10	$156.30

Practice: 327 - Conservation Cover

Scenario: #10 - Native Species, High, FI

Scenario Description:

Land is taken out of production and permanent native vegetation is established using a higher cost native seed mix, in areas of high precipitation or excessive pest competion. The typical size of the practice is 5 acres. This practice scenario is typically used to reduce soil erosion, reduce soil quality degradation, improve water quality, develop wildlife habitat, improve plant condition, or reduce air quality impacts. This scenario can also be used for plant pollinator seedings. Amount contracted is calculated on actual acres planted. This should only be contracted with approval from state agronomist, biologist, or range conservationist or their designated representative.

Before Situation:

Field is bare soil, or has a cover of annual species or weeds. Soil erosion occurs with visible rills present, sediment may be moving offsite into surface water degrading water quality. Soil quality (soil organic matter) declines over time as a result of low residue, and long periods of bare soil. Air quality may be impacted during field operations by the creation of particulates. The system provides little to no wildlife habitat.

After Situation:

Land covered with permanent native vegetation has reduced soil erosion, reduced water/sediment runoff. Plants sown for conservation cover may provide cover for beneficial insects and wildlife. This scenario does not apply to plantings for forage production or to critical area plantings. Field is taken out of production.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 5

Scenario Cost: $3,722.33 **Scenario Cost/Unit:** $744.47

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	5	$101.45
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$19.51	10	$195.10
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	10	$58.30
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	5	$78.85
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	15	$158.70
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$170.63	5	$853.15
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	10	$156.30
Three Species Mix, Native Forb	2333	Native forb mix. Includes material and shipping only.	Acre	$586.90	2.5	$1,467.25
Native Grass and Forb Mix, for Wildlife (including pollinators) or Ecosystem Restoration	2335	Native grass and forb/legume mix, including specialized species. Includes material and shipping only.	Acre	$261.29	2.5	$653.23

Practice: 327 - Conservation Cover

Scenario: #11 - Special Ecotypes, Wildlife, or Pollinators

Scenario Description:

Permanent vegetation with a mix of native grasses, legumes, forbs, and/or shrubs is established to address: 1) Local ecotypes or tribal needs requiring specific species that are higher cost; 2) Provide additional vegetative structure for food, and cover specifically for wildlife; and/or 3) Providing essential habitat elements preferred by beneficial insects, pollinators or other wildlife by selecting specific plants that are identified in a state-approved specification that are much higher priced than typical choices for native seed. Pollinator habitat often include some shrubs and a high percentage of flowering forbs to ensure continuous bloom throughout the growing season. Pollinator mixes have a minimum of 5 flowering species, often incorporating 9 species. Seeding rates may also be higher to complete with invasive plant pressures or in areas of very high precipitation.

The typical size of the practice is 5 acres. Resource Concerns addressed are to improve wildlife habitat and plant condition, with additional benefits to reduce soil erosion, reduce soil quality degradation, improve water quality, and/or reduce air quality impacts. Amount contracted is calculated on actual acres planted.

Before Situation:

Field is bare soil, or has a cover of annual species or weeds. The system provides little to no wildlife habitat. Often Soil erosion occurs with visible rills present, sediment may be moving offsite into surface water degrading water quality. Soil quality (soil organic matter) declines over time as a result of low residue, and long periods of bare soil. Air quality may be impacted during field operations by the creation of particulates.

After Situation:

Plants sown for conservation cover provide cover for pollinators, beneficial insects and wildlife. Land covered with permanent native vegetation has reduced soil erosion, reduced water/sediment runoff. This scenario does not apply to plantings for forage production or to critical area plantings.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 5

Scenario Cost: $6,284.77 **Scenario Cost/Unit:** $1,256.95

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	5	$101.45
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	5	$32.35
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	10	$58.30
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	5	$78.85
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	10	$105.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	4	$92.32
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	10	$156.30
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.82	30	$24.60
Shrub, seedling or transplant, potted, 1 qt.	1524	Potted shrub, 1 quart. Includes materials and shipping only.	Each	$3.12	220	$686.40

Materials

Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.51	30	$15.30
Six Species Mix, Native Forb	2334	Native forb mix. Includes material and shipping only.	Acre	$986.62	5	$4,933.10

Practice: 327 - Conservation Cover

Scenario: #12 - Special Ecotypes, Wildlife, or Pollinators, with FI

Scenario Description:

Land is taken out of production and permanent native vegetation with a mix of grasses, legumes, forbs, and/or shrubs is established to address: 1) Local ecotypes or tribal needs requiring specific species that are higher cost; 2) Establishing shrubs to provide additional vegetative structure, food, and cover specifically for wildlife; and/or 3) Providing essential habitat elements preferred by beneficial insects, pollinators or other wildlife by selecting specific plants that are identified in a state-approved specification that are much higher priced than typical choices for native seed. Pollinator habitat often include some shrubs and a high percentage of flowering forbs to ensure continuous bloom throughout the growing season. Pollinator mixes have a minimum of 5 flowering species, often incorporating 9 species. Seeding rates may also be higher to complete with invasive plant pressures or in areas of very high precipitation. The typical size of the practice is 5 acres. Resource Concerns addressed are to improve wildlife habitat and plant condition, with additional benefits to reduce soil erosion, reduce soil quality degradation, improve water quality, and/or reduce air quality impacts. Amount contracted is calculated on actual acres planted.

Before Situation:

Field is bare soil, or has a cover of annual species or weeds. The system provides little to no wildlife habitat. Often Soil erosion occurs with visible rills present, sediment may be moving offsite into surface water degrading water quality. Soil quality (soil organic matter) declines over time as a result of low residue, and long periods of bare soil. Air quality may be impacted during field operations by the creation of particulates.

After Situation:

Plants sown for conservation cover provide cover for pollinators, beneficial insects and wildlife. Land covered with permanent native vegetation has reduced soil erosion, reduced water/sediment runoff. This scenario does not apply to plantings for forage production or to critical area plantings. Field is taken out of production.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 5

Scenario Cost: $7,137.92 **Scenario Cost/Unit:** $1,427.58

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	10	$58.30
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	5	$78.85
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	5	$32.35
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	10	$105.80
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	5	$101.45
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$170.63	5	$853.15
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	4	$92.32
Materials						
Six Species Mix, Native Forb	2334	Native forb mix. Includes material and shipping only.	Acre	$986.62	5	$4,933.10
Shrub, seedling or transplant, potted, 1 qt.	1524	Potted shrub, 1 quart. Includes materials and shipping only.	Each	$3.12	220	$686.40
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	10	$156.30

Materials

Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.51	30	$15.30
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.82	30	$24.60

Practice: 327 - Conservation Cover

Scenario: #13 - Plug Combination, <=0.5 ac.

Scenario Description:

Establishment of permanent native aquatic and emergent herbacious vegetation established on 0.5 acres or less to restore the characteristic wetland plant community to the site. Plug planting is typically applied in sensitive areas or when planting species that have a low success rate when planted as seed. Prepare a firm, weed free seedbed so that proper germination and stand establishment are ensured. Once the seedbed has been prepared, plugs of native species are planted by hand on 2-4' spacings; rhyzome sprigs or broadcast seed may also be used to fill between plug plantings. Practice applicable on riparian areas, lacustrine fringes, palustrine depressional areas, wet areas in cropland, and other areas where wetland hydrology exists or will be restored.
Resource concerns addressed include wildlife habitat, water quality, excess water-ponding or flooding, soil degradation and soil erosion. Associated practices often includes Mulching (484). This scenario may only be contracted with approval of the state/area biologist or their representive.

Before Situation:

Areas that are void or nearly void of vegetation, resulting in bare soil being exposed to erosive processes. The exposed areas may be caused from recent natural occurrences (fire, flood, wind, etc.), newly constructed conservation practices, or degraded plant condition. Runoff from the area may flow into water courses causing degradation to the receiving waters. Soil surface residue amounts average 10% or less. Soil quality (soil organic matter) declines over time as a result of tillage practices, low residue, or long periods of bare soil. Air quality may be impacted during field operations by the creation of particulates. The system provides little to no wildlife or pollinator habitat.

After Situation:

This typical 0.5 acre is established to permanent aquatic native vegetation to restore wetland sites. Land restored to natural wetland habitat including a mix of native aquatic and/or emergent wetland plants adapted to living in saturated and inundated soils with seasonal inundation. Wetland habitat conservation cover is benfited. This practice may also have reduced high nutrient levels in water in the wetland may have reduced other water pollutants. This scenario does not apply to critical area plantings.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 0

Scenario Cost: $3,634.59 **Scenario Cost/Unit:** #Div/0!

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80
Materials						
Native Aquatic Plants, Emergent or Submerged	2336	Native aquatic emergent or submerged. All required materials for establishing vegetation. Includes material and shipping.	Each	$1.37	2420	$3,315.40
Three plus Species Mix, Warm Season, Native Perennial	2327	Native, warm season perennial grass. Includes material and shipping only.	Acre	$220.98	0.4	$88.39

Practice: 327 - Conservation Cover

Scenario: #14 - Plug Planting, <=0.5 ac.

Scenario Description:

Establishment of permanent native and herbacious vegetation established on 0.5 acres or less to restore the characteristic plant community to the site. Plug planting is typically applied in sensitive areas or when planting species that have a low success rate when planted as seed. Prepare a firm, weed free seedbed so that proper stand establishment is ensured. Once the seedbed has been prepared, plugs of native species are planted by hand on 1.5' spacings. Practice applicable on native prairies, or on riparian areas, lacustrine fringes, palustrine depressional areas, wet areas on cropland, and other areas where wetland hydrology exists or will be restored.
Resource concerns addressed include wildlife habitat, inadequate structure or composition of plants, water quality, excess water-ponding or flooding, soil degradation and soil erosion. Associated practices often includes Mulching (484). This scenario may only be contracted with approval of the state/area biologist or their representive.

Before Situation:

Areas that are void or nearly void of vegetation, resulting in bare soil being exposed to erosive processes. The exposed areas may be caused from recent natural occurrences (fire, flood, wind, etc.), newly constructed conservation practices, or degraded plant condition. Runoff from the area may flow into water courses causing degradation to the receiving waters. Soil surface residue amounts average 10% or less. Soil quality (soil organic matter) declines over time as a result of tillage practices, low residue, or long periods of bare soil. Air quality may be impacted during field operations by the creation of particulates. The system provides little to no wildlife or pollinator habitat.

After Situation:

This typical 0.5 acre is established to permanent native vegetation to restore wetland. Land restored to natural wetland habitat including a mix of native and/or plants adapted to living in saturated and inundated soils with seasonal inundation. Wetland habitat conservation cover is benfited. This practice may also have reduced high nutrient levels in water in the wetland may have reduced other water pollutants. This scenario does not apply to critical area plantings.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 0

Scenario Cost: $13,792.44 **Scenario Cost/Unit:** #Div/0!

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	23	$530.84
Materials						
Native Aquatic Plants, Emergent or Submerged	2336	Native aquatic emergent or submerged. All required materials for establishing vegetation. Includes material and shipping.	Each	$1.37	9680	$13,261.60

Practice: 328 - Conservation Crop Rotation

Scenario: #1 - Basic, > 80 acres

Scenario Description:

Implement a conservation crop rotation for conventional, non-organic, producers primaily to increase crop residues. Typical operations rotate 2-4 crops on 160 acres. Scenario selection based on total acres of this practice under contract, not on individual field size.

Additional resource benefits may include: reduce soil erosion, maintain or improve soil organic matter and soil quality, manage plant pests (weeds, insects, and diseases), manage the balance of plant nutrients, and/or improve water use efficiency.

Before Situation:

The current rotation consists primarily of low residue producing crops on a wide range of slopes. Soil quality is decreasing based on SCI scores. Pest management and erosion are also concerns.

After Situation:

Technical knowledge and skills have been acquired and decisions made to effectively implement a crop rotation to achieve the desired resource conservation purposes such as: high residue and/or perennial crops that reduce erosion, improve soil quality, and break pest cycles.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 160

Scenario Cost: $1,236.90 **Scenario Cost/Unit:** $7.73

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	30	$1,236.90

Practice: 328 - Conservation Crop Rotation

Scenario: #2 - Basic Rotation, 80 acres or less

Scenario Description:

Implement a conservation crop rotation for conventional, non-organic, producers primaily to increase crop residues. Typical operations rotate 2-4 crops on 80 acres or less. Scenario selection based on total acres of this practice under contract, not on individual field size.

Additional resource benefits may include: reduce soil erosion, maintain or improve soil organic matter and soil quality, manage plant pests (weeds, insects, and diseases), manage the balance of plant nutrients, and/or improve water use efficiency.

Before Situation:

The current rotation consists primarily of low residue producing crops on a wide range of slopes. Soil quality is decreasing based on SCI scores. Pest management and erosion are also concerns.

After Situation:

Technical knowledge and skills have been acquired and decisions made to effectively implement a crop rotation to achieve the desired resource conservation purposes such as: high residue and/or perennial crops that reduce erosion, improve soil quality, and break pest cycles.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 60

Scenario Cost: $824.60 **Scenario Cost/Unit:** $13.74

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	20	$824.60

Practice: 328 - Conservation Crop Rotation

Scenario: #3 - Complex, > 50 ac

Scenario Description:

Implement a conservation crop rotation for organic or conventional producers primaily to increase crop diversity, break pest cycles, and improve soil quality. Typical operations developed will rotate more than four(4) crops on operations of over 50 acres. Scenario selection based on total acres of this practice under contract, not on individual field size.
Additional resource benefits may include: reduce soil erosion, manage the balance of plant nutrients, and improve water use efficiency.

Before Situation:

Soil quality has been degrading due to tillage operation used for pest and weed control. Producer has a low level of knowledge about pest control, local marketing, and other crop rotation issues.

After Situation:

Technical knowledge and skills have been acquired and decisions made to effectively implement a crop rotation to achieve the desired resource conservation purposes such as: high residue and/or perennial crops that reduce erosion, improve soil quality, and break pest cycles.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 50

Scenario Cost: $824.60 **Scenario Cost/Unit:** $16.49

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	20	$824.60

Practice: 328 - Conservation Crop Rotation

Scenario: #4 - Complex, >15 - 50 ac

Scenario Description:

Implement a conservation crop rotation for organic or conventional producers primaily to increase crop diversity, break pest cycles, and improve soil quality. Typical operations developed will rotate more than four (4) crops on operations of about 20 acres. Scenario selection based on total acres of this practice under contract, not on individual field size.
Additional resource benefits may include: reduce soil erosion, manage the balance of plant nutrients, and improve water use efficiency.

Before Situation:

Soil quality has been degrading due to tillage operation used for pest and weed control. Producer has a low level of knowledge about pest control, local marketing, and other crop rotation issues.

After Situation:

Technical knowledge and skills have been acquired and decisions made to effectively implement a crop rotation to achieve the desired resource conservation purposes such as: high residue and/or perennial crops that reduce erosion, improve soil quality, and break pest cycles.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $824.60 **Scenario Cost/Unit:** $41.23

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	20	$824.60

Practice: 328 - Conservation Crop Rotation

Scenario: #5 - Complex, >5 - 15 acres

Scenario Description:

Implement a conservation crop rotation for organic or conventional producers primaily to increase crop diversity, break pest cycles, and improve soil quality. Typical operations rotate a wide variety of crops on field operations of >5-15 acres but typically around 10 acres. Scenario selection based on total acres of this practice under contract, not on individual field size.
Additional resource benefits may include: reduce soil erosion, manage the balance of plant nutrients, and improve water use efficiency.

Before Situation:

Soil quality has been degrading due to tillage operations used for pest and weed control. Producer has a low level of knowledge about potential pest control, local marketing, and other crop rotation issues.

After Situation:

Technical knowledge and skills have been acquired and decisions made to effectively implement a crop rotation to achieve the desired resource conservation purposes such as: high residue and/or perennial crops that reduce erosion, improve soil quality, and break pest cycles.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $618.45 **Scenario Cost/Unit:** $61.85

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	15	$618.45

Practice: 328 - Conservation Crop Rotation

Scenario: #6 - Complex, 3 - 5 acres

Scenario Description:

Implement a conservation crop rotation for organic or conventional producers primaily to increase crop diversity, break pest cycles, and improve soil quality. Typical operations rotate a wide variety of crops catering to Local Farmers Markets on operations covering >3-5 acres. Scenario selection based on total acres of this practice under contract, not on individual field size.
Additional resource benefits may include: reduce soil erosion, manage the balance of plant nutrients, and improve water use efficiency.

Before Situation:

Soil quality has been degrading due to tillage operations used for pest and weed control. Producer has a low level of knowledge about potential pest control, local marketing, and other crop rotation issues.

After Situation:

Technical knowledge and skills have been acquired and decisions made to effectively implement a crop rotation to achieve the desired resource conservation purposes such as: high residue and/or crops that reduce erosion, improve soil quality, and break pest cycles.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 4

Scenario Cost: $494.76 **Scenario Cost/Unit:** $123.69

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	12	$494.76

Practice: 328 - Conservation Crop Rotation

Scenario: #7 - Complex, 3 acres or less

Scenario Description:

Implement a conservation crop rotation for organic or conventional producers primaily to increase crop diversity, break pest cycles, and improve soil quality. Typical operations rotate a wide variety of crops catering to Local Farmers Markets on operations 3 acres or less.
Scenario selection based on total acres of this practice under contract, not on individual field size.
Additional resource benefits may include: reduce soil erosion, manage the balance of plant nutrients, and improve water use efficiency.

Before Situation:

Soil quality has been degrading due to tillage operations used for pest and weed control. Producer has a low level of knowledge about potential pest control, local marketing, and other crop rotation issues.

After Situation:

Technical knowledge and skills have been acquired and decisions made to effectively implement a crop rotation to achieve the desired resource conservation purposes such as: high residue and/or crops that reduce erosion, improve soil quality, and break pest cycles.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 2

Scenario Cost: $494.76 **Scenario Cost/Unit:** $247.38

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	12	$494.76

Practice: 329 - Residue and Tillage Management - No-Till

Scenario: #1 - No-Till

Scenario Description:

This practice typically involves conversion from a conventional tilled system to no-till system on 100 acres of cropland. This involves managing the amount, orientation and distribution of crop and other plant residue on the soil surface year round while limiting soil-disturbing activities used to grow and harvest crops in systems. The practice is used to reduce sheet and rill erosion, reduce wind erosion, improve soil quality, reduce CO2 losses from the soil, reduce energy use, increase plant available moisture and provide food and escape cover for wildlife. This typical scenario is applicable in both irrigated and non-irrigated fields.

Before Situation:

Row crops or small grains are grown and harvested. Full width tillage is performed prior to planting and weed control during crop production is typically cultivation and chemical application. Fields are disked immediately following harvest, with additional operations in some fields to facilitate drainage or additional weed control. Residue amounts after tillage operations average 10% or less, resulting in bare soil being exposed to wind erosion and/or intense rainfall during the fall, winter, and early spring. Any crop residue that is present degrades and sediment/nutrient runoff from fields increases during rainfall events. Sheet and rill erosion occurs with visible rills by spring. Soil health (soil organic matter) declines over time as a result of tillage practices, low residue, and long periods of bare soil. This system will typically have a negative Soil Conditioning Index (SCI) and a high Soil Tillage Intensity Rating (STIR).

After Situation:

Managing crop residue on the surface of a field (typical 80 acre) year around according to the 329 practice plan while limiting soil disturbing activities to those which place nutrients, and plant crops that meet the minimum criteria in the 329 practice standard. All crops are seeded/planted with a no-till drill or no-till/strip-till planter, which minimizes soil disturbance while establishing good seed-soil contact. All residues are maintained on the soil surface in a uniform distribution over the entire field and not burned or removed. Crop residues provide soil surface cover throughout the year. Runoff and erosion are reduced and no rills are visible on the soil surface. Wind erosion is reduced by standing residues and surface cover. Over time, soil health is improved due to the additional biomass (crop residues), ground cover, and soil infiltration. Crop residues and/or cover crop residues left on the soil surface may maximize weed control by increasing allelopathic and mulching effect, and provides cover for wildlife. The practice would require reducing soil disturbance and erosion and increasing biomass returned to the soil in sufficient amounts to achieve increased SCI and decreased STIR. STIR value shall be no greater than the 329 standard for that purpose.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $1,956.00 **Scenario Cost/Unit:** $19.56

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$19.56	100	$1,956.00

Practice: 329 - Residue and Tillage Management - No-Till

Scenario: #2 - Adaptive Management, Replicated Plots

Scenario Description:

The practice scenario is for the implementation of no till in small replicated plots covering about 10 acres to allow the producer to learn how to manage no till on their operation. Scenario includes implementing replicated strip trials on a field plot to evaluate, identify and implement a particular no till management strategy (e.g., no till vs conventional till, drill vs planter, strip till vs no till, residue row cleaners, vs no row cleaners, etc.) This will be repeated over 3 years following the interim guidance for no till adaptive management to be issued to all field offices for FY15.

Before Situation:

The producer is considering using no till technology, but is unsure how to manage on their operation or needs to improve the management of no till to be successful. Row crops or small grains are grown and harvested. Full width tillage is performed prior to planting and weed control during crop production is typically cultivation and chemical application. Fields are disked immediately following harvest, with additional operations in some fields to facilitate drainage or additional weed control. Residue amounts after tillage operations average 10% or less, resulting in bare soil being exposed to wind erosion and/or intense rainfall during the fall, winter, and early spring. Any crop residue that is present degrades and sediment/nutrient runoff from fields increases during rainfall events. Sheet and rill erosion occurs with visible rills by spring. Soil health (soil organic matter) declines over time as a result of tillage practices, low residue, and long periods of bare soil. This system will typically have a negative Soil Conditioning Index (SCI) and a high Soil Tillage Intensity Rating (STIR).

After Situation:

Installation of this scenario will result in establishment of no till replicated plots to compare to different management strategies for no till and other residue management strategies following the guidance in the Agronomy Technical Note 11 - Adaptive Management and the Interim Guidance for No Till Adaptive Management to be issued to all field offices for FY15. Implementation involves establishing the replicated plots to evaluate one or more no till management strategies. The plot will consist of at least 4 replicated plots designed, laid out, managed and evaluated with the assistance of a consultant knowledgeable in no till management. Results are used to make no till management decisions to address erosion, soil health, and water quality issues. Yields will be measured and statistically summarized following the procedures in Agronomy Technical Note 11 - Adaptive Management. The yields for each plot will be adjusted to the appropriate moisture content. This would be repeated for 3 years.

Scenario Feature Measure: One set of Test Plots

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $4,190.95 **Scenario Cost/Unit:** $4,190.95

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$19.56	5	$97.80
Seeding Operation, No Till/Strip Till Planter	1230	No Till/Strip Till row planters for seeding. Includes all costs for equipment, power unit, and labor.	Acre	$17.27	5	$86.35
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$108.60	30	$3,258.00
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	30	$748.80

Practice: **330 - Contour Farming**

Scenario: **#1 - Contour Farming**

Scenario Description:

This scenario meets the specifications of the NRCS Contour Farming Standard and applies to fields typically ranging from 5-50 acres on 2-10% slopes. Payment reflects extra labor and initial supervision costs in setting a contour line and minor earth moving to establish permanent row markers to ensure that contours are maintained for the five-year life of this practice. More time is usually needed when following contour operations due to more equipment time in shorter rows and more equipment turning. Annual erosion rates for the rotation exceeds tolerance levels. Excessive runoff leads to sedimentation of waterways.

Before Situation:

The typical field size in this geographical region for this scenario.is 30 acres. The field slope averages 6% while the slope length averages 160 feet. Farming operations on this cropland field including disking, bedding, planting, and cultivation generally run up and down the slope. This row arrangement usually results in longer rows with less time used for turning. Annual erosion rates for the rotation exceeds tolerance levels. Excessive runoff leads to sedimentation of waterways.

After Situation:

This practice is installed on the entire field. A survey is completed by trained and certified Federal, State, local personnel or consultant to determine and "stake" contour row arrangement. Permanent row markers are established to ensure that this practice is maintained for the life of this practice All field operations including: disking, bedding, planting, and cultivation are performed on the contour which is near perpendicular to the field slope. The farm manager is initially on site to ensure that equipment operator is properly following contour methods. Soil erosion rates are reduced by nearly half and may be below tolerance depending on the rotation. Likewise, sedimentation has be significantly reduced.

Scenario Feature Measure: acre

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $274.31 **Scenario Cost/Unit:** $9.14

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$35.97	1	$35.97
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	3	$126.69
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	5	$111.65

Practice: 331 - Contour Orchard and Other Perennial Crops

Scenario: #1 - Contour Orchards/Vineyards

Scenario Description:

This scenario meets the specifications of the NRCS 331 Contour Orchards and Perennial Crops Standard. This scenario applies to fields typically ranging from 5-50 acres on 5-10% slopes. Payment reflects extra labor and initial supervision costs in setting a contour line as orchards or vineyards are being established. It also includes some minor earth moving as needed on eroded areas or at ends of rows to create planting bench. After establishment, the plants themselves will serve as a guide-line for contour field operations. More time is usually needed when following contour operations due to more equipment time in shorter rows and more equipment turning. Annual erosion rates for the rotation exceeds tolerance levels. Excessive runoff leads to sedimentation of waterways.

Before Situation:

The typical field size in this geographical region range from 5 to 50 acres. The field slope averages 6% while the slope length averages 160 feet. Farming operations are performed up and down the slope. Annual erosion rates for the rotation exceeds tolerance levels. Excessive runoff leads to sedimentation of waterways.

After Situation:

This practice is installed on the entire field. A survey is completed by trained and certified Federal, State, local personnel or consultant to determine and "stake" contour row arrangement. All field operations including: harvesting, disking, bedding, and planting are performed on the contour which is near perpendicular to the field slope. The farm manager is initially on site to ensure that equipment operator is properly following contour methods. Soil erosion rates are reduced to tolerable soil loss levels. Likewise, sedimentation has be significantly reduced.

Scenario Feature Measure: acre

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $272.65 **Scenario Cost/Unit:** $9.09

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	1	$37.31
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	3	$123.69
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	5	$111.65

Practice: 332 - Contour Buffer Strips

Scenario: #1 - Introduced, Inc Forgone

Scenario Description:

Narrow strips of permanent, herbaceous vegetative cover established around the hill slope and alternated down the slope with wider cropped strips in between that are farmed on the contour. This practice applies to all cropland. Practice includes seedbed prep and planting of mainly introduced species. The area of the field border is taken out of production.

Before Situation:

Water Erosion Calculator (e.g. RUSLE2) indicates that there is a significant amount of sheet and rill erosion and/or a significant amount of sediment potenially delivered to the downslope edge of the field. A secondary concern is that there may not be enough wildlife/pollinator habitat, food source or refugia in the field or farm.

After Situation:

Introduced grasses and legumes will be established in strips in the field to meet the resource needs and producer objectives. Minimum widths shall be based on NRCS local design criteria specific to the purpose for installing the practice. Introduced species shall be selected that do not function as a host for diseases of a field crop and have physical charactaristics necessary to control water erosion to tolerable levels in the cropped area of the field.

Scenario Feature Measure: Number of acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $377.05 **Scenario Cost/Unit:** $377.05

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$19.56	1	$19.56
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.62	1	$5.62
Foregone Income						
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$344.34	0.5	$172.17
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$165.06	0.5	$82.53
Materials						
Sulfate of Potash	263	Approved for Organic Systems - Muriate of Potash	Pound	$0.93	20	$18.60
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.83	1	$15.83
One Species, Cool Season, Introduced Perennial Grass	2313	Introduced, cool season perennial grass. Includes material and shipping only.	Acre	$30.44	1	$30.44
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.43	20	$8.60
Nitrogen (N), Urea	71	Price per pound of N supplied by Urea. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.79	30	$23.70

Practice: 332 - Contour Buffer Strips

Scenario: #2 - Native, Inc Forgone

Scenario Description:

Narrow strips of permanent, herbaceous vegetative cover established around the hill slope and alternated down the slope with wider cropped strips in between that are farmed on the contour. This practice applies to all cropland. Practice includes seedbed prep and planting of native species. The area of the field border is taken out of production.

Before Situation:

Water Erosion Calculator (e.g. RUSLE2) indicates that there is a significant amount of sheet and rill erosion and/or a significant amount of sediment potenially delivered to the downslope edge of the field. A secondary concern is that there may not be enough wildlife/pollinator habitat, food source or refugia in the field or farm.

After Situation:

Native grasses, legumes and forbs will be established in strips in the field to meet the resource needs and producer objectives. Minimum widths shall be based on NRCS local design criteria specific to the purpose for installing the practice. Native species shall be selected that do not function as a host for diseases of a field crop and have physical charactaristics necessary to control water erosion to tolerable levels in the cropped area of the field.

Scenario Feature Measure: number of acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $539.17 **Scenario Cost/Unit:** $539.17

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$19.56	1	$19.56
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.62	1	$5.62
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$165.06	0.5	$82.53
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$344.34	0.5	$172.17
Materials						
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.28	20	$5.60
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.83	1	$15.83
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.43	20	$8.60
Nitrogen (N), Urea	71	Price per pound of N supplied by Urea. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.79	30	$23.70
Three plus Species Mix, Warm Season, Native Perennial	2327	Native, warm season perennial grass. Includes material and shipping only.	Acre	$205.56	1	$205.56

Practice: 332 - Contour Buffer Strips

Scenario: #3 - Organic Seed, Inc Forgone

Scenario Description:

Narrow strips of permanent, herbaceous vegetative cover established around the hill slope and alternated down the slope with wider cropped strips in between that are farmed on the contour. This practice applies to all cropland. Practice includes seedbed prep and planting of certified organic seed and using organic approved fertilizers. The area of the field border is taken out of production.

Before Situation:

Water Erosion Calculator (e.g. RUSLE2) indicates that there is a significant amount of sheet and rill erosion and/or a significant amount of sediment potenially delivered to the downslope edge of the field. A secondary concern is that there may not be enough wildlife/pollinator habitat, food source or refugia in the field or farm.

After Situation:

Certified organic grass and legume seed will be planted in strips in the field to meet the resource needs and producer objectives. Minimum widths shall be based on NRCS local design criteria specific to the purpose for installing the practice. Species shall be selected that do not function as a host for diseases of a field crop and have physical charactaristics necessary to control water erosion to tolerable levels in the cropped area of the field.

Scenario Feature Measure: Number of Acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $475.70 **Scenario Cost/Unit:** $475.70

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$19.56	1	$19.56
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.20	1	$15.20
Site Preparation, Mechanical	944	Aerator, rolling drum chopper, etc. Includes equipment, power unit and labor costs.	Acre	$64.36	1	$64.36
Foregone Income						
FI, Organic, Soybeans Dryland	2234	Organic Dryland Soybeans is Primary Crop	Acre	$396.00	0.5	$198.00
FI, Organic, Wheat Dryland	2236	Organic Dryland Wheat is Primary Crop	Acre	$189.82	0.5	$94.91
Materials						
Certified Organic, Three Species Mix, Cool Season, Perennial Grasses and Legumes	2340	Certified organic cool season perennial grass and legume mix. Includes material and shipping only.	Acre	$64.77	1	$64.77
Potassium, Organic	268	ORGANIC Potassium	Pound	$0.27	20	$5.40
Phosphorus, Organic	267	ORGANIC Phosphorus	Pound	$0.27	20	$5.40
Nitrogen, Organic	266	ORGANIC Nitrogen	Pound	$0.27	30	$8.10

Practice: 332 - Contour Buffer Strips

Scenario: #4 - Wildlife/Pollinator, Inc Forgone

Scenario Description:

Narrow strips of permanent, herbaceous vegetative cover established around the hill slope and alternated down the slope with wider cropped strips in between that are farmed on the contour. This practice applies to all cropland. Practice includes seedbed prep and planting of mainly pollinator friendly species. The area of the field border is taken out of production.

Before Situation:

Water Erosion Calculator (e.g. RUSLE2) indicates that there is a significant amount of sheet and rill erosion and/or a significant amount of sediment potenially delivered to the downslope edge of the field. A secondary concern is that there may not be enough wildlife/pollinator habitat, food source or refugia in the field or farm.

After Situation:

Plant species will be established in strips in the field to meet the water erosion resource needs AND provide the targeted wildlife/pollinators the necessary food and/or cover AND any other producer objectives. Minimum widths shall be based on NRCS local design criteria specific to the purpose for installing the practice. Species selected shall meet the wildlife/pollinator habitat requirements of the state and be adapted to site; not function as a host for diseases of a field crop and; have physical charactaristics necessary to control sheet and rill erosion to tolerable levels on the cropped area of the field.

Scenario Feature Measure: Number of acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $744.73 **Scenario Cost/Unit:** $744.73

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$19.56	1	$19.56
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.62	1	$5.62
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$165.06	0.5	$82.53
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$344.34	0.5	$172.17
Materials						
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.28	20	$5.60
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.43	20	$8.60
Nitrogen (N), Urea	71	Price per pound of N supplied by Urea. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.79	30	$23.70
Three plus Species Mix, Warm Season, Native Perennial	2327	Native, warm season perennial grass. Includes material and shipping only.	Acre	$205.56	2	$411.12
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.83	1	$15.83

Practice: 338 - Prescribed Burning

Scenario: #1 - Understory Burn

Scenario Description:

Applying a prescribed burn according to designed burn plan and NRCS Prescribed Burning (338) standard and specifications. An Understory burn can consume debris or leaf litter under controlled conditions that otherwise could burn uncontrollably and devastatingly. Prior to burning unit may need to be treated to reduce slash height and quantities. Burn should be cool enough to not cause mortality to residual stand but also must reduce litter and debris. Burned firebreaks used to achieve total firebreak width are part of these burns. (Constructed firebreak cost is not included in cost of burn. Refer to Firebreak (394) standard and cost scenarios)

Before Situation:

Light slash accumulation in a open forest stand. Leaf litter and debris throughout stand. Small seedlings of various quantities may be present.

After Situation:

Litter, debris and slash are consumed, small seedlings may be killed during active burning. Residual larger trees have little to no scorching. Post treatment fire danger is significantly reduced.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 320

Scenario Cost: $4,127.74 **Scenario Cost/Unit:** $12.90

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Water tank, portable	1602	Portable water tank transported in a pick up truck. Typically with 200 gallon capacity includes tank with pump, hose and sprayer. Does not include the pickup truck. Equipment only.	Hour	$2.59	8	$20.72
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	8	$246.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	4	$149.24
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	16	$1,759.04
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	12	$494.76
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	32	$1,220.48
Materials						
Fuel, ignition fuel mixture	1596	Mixture of gasoline and diesel for ignition of prescribed burns. Materials only.	Gallon	$3.99	24	$95.76
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	2	$141.74

Practice: 338 - Prescribed Burning

Scenario: #2 - Site Preparation

Scenario Description:

Treating areas to encourage natural seeding or to permit reforestation by planting or direct seeding. Burning is utilized to eliminate existing competition and debris, reduce forest fuel and to prepare the site for planting or seeding. Burning a cutover site helps prepare the site for replanting. Burn should expose a portions of bare soil for planting. Objectives of a site preparation burn may dictate timing and burn intensity.

Before Situation:

Area to be burned has had a portion of the over story removed. Slash, brush and grasses dominate the site.

After Situation:

Area to be planted has been burned to remove grass, reduce competing brush and remove downed slash leftover from forestry activities. Some bare ground is exposed.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $4,296.40 **Scenario Cost/Unit:** $53.71

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Water tank, portable	1602	Portable water tank transported in a pick up truck. Typically with 200 gallon capacity includes tank with pump, hose and sprayer. Does not include the pickup truck. Equipment only.	Hour	$2.59	8	$20.72
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	2	$61.50
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	8	$298.48
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	18	$1,978.92
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	12	$494.76
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	32	$1,220.48
Materials						
Fuel, ignition fuel mixture	1596	Mixture of gasoline and diesel for ignition of prescribed burns. Materials only.	Gallon	$3.99	20	$79.80
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	2	$141.74

Practice: 338 - Prescribed Burning

Scenario: #3 - Level Terrain, Tall Herbaceous Fuel, < 640 ac.

Scenario Description:

Applying a prescribed burn according to designed burn plan and NRCS Prescribed Burning (338) standard and specifications in order to control undesirable species, improve wildlife habitat, improve plant productivity and/or quality, facilitate grazing distribution and maintain ecological processes. This scenario is based on a burn area of less than 640 acres and applies under the following conditions: where the terrain of the majority of the area to be burned <15% slopes with herbaceous and/or low volatile woody fuel with no high volatile fuels. Fuels are typically > 3 feet in height. Burned firebreaks used to achieve total firebreak width are part of these burns. (Constructed firebreak cost is not included in cost of burn. Refer to Firebreak (394) standard and cost scenarios)

Before Situation:

Desirable plant composition is lacking due to reduced plant vigor, invasive species or improper livestock distribution.

After Situation:

Desirable plant composition is restored, plant vigor improved and invasive species reduced. Forage production and quality for livestock and /or wildlife is improved.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 250

Scenario Cost: $15,003.50 **Scenario Cost/Unit:** $60.01

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$44.18	1	$44.18
Equipment/Installation						
Water tank, portable	1602	Portable water tank transported in a pick up truck. Typically with 200 gallon capacity includes tank with pump, hose and sprayer. Does not include the pickup truck. Equipment only.	Hour	$2.59	48	$124.32
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	48	$1,476.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	48	$1,790.88
Trailer, water tank	1598	Mobile 5,000 gal water tank mounted on a trailer. Equipment only. Does not include towing equipment.	Hour	$20.10	12	$241.20
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	16	$659.68
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	256	$9,763.84
Materials						
Fuel, ignition fuel mixture	1596	Mixture of gasoline and diesel for ignition of prescribed burns. Materials only.	Gallon	$3.99	20	$79.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	8	$566.96

Practice: 338 - Prescribed Burning

Scenario: #4 - Level Terrain, Volatile fuels < 4 ft tall, <640 ac

Scenario Description:

Applying a prescribed burn according to designed burn plan and NRCS Prescribed Burning (338) standard and specifications in order to control undesirable species, improve wildlife habitat, improve plant productivity and/or quality, facilitate grazing distribution and maintain ecological processes. This scenario is based on a burn area of less than 640 acres and applies under the following conditions: where the terrain of the majority of the area to be burned <15% slopes with herbaceous and low volatile woody fuel with high volatile woody fuels less than 4ft tall. Burned firebreaks used to achieve total firebreak width are part of these burns. (Constructed firebreak cost is not included in cost of burn. Refer to Firebreak (394) standard and cost scenarios)

Before Situation:

Desirable plant composition is lacking due to reduced plant vigor, invasive species or improper livestock distribution.

After Situation:

Desirable plant composition is restored, plant vigor improved and invasive species reduced. Forage production and quality for livestock and /or wildlife is improved.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 320

Scenario Cost: $3,910.92 **Scenario Cost/Unit:** $12.22

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$44.18	1	$44.18
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	4	$149.24
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	12	$369.00
Water tank, portable	1602	Portable water tank transported in a pick up truck. Typically with 200 gallon capacity includes tank with pump, hose and sprayer. Does not include the pickup truck. Equipment only.	Hour	$2.59	4	$10.36
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	64	$2,440.96
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	16	$659.68
Materials						
Fuel, ignition fuel mixture	1596	Mixture of gasoline and diesel for ignition of prescribed burns. Materials only.	Gallon	$3.99	24	$95.76
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	2	$141.74

Practice: 338 - Prescribed Burning

Scenario: #6 - Steep Terrain, Volatile Fuels <4 ft tall

Scenario Description:

Applying a prescribed burn according to designed burn plan and NRCS Prescribed Burning (338) standard and specifications in order to control undesirable species, improve wildlife habitat, improve plant productivity and/or quality, facilitate grazing distribution and maintain ecological processes. This scenario is based on a burn area of 640 acres and applies under the following conditions: where the terrain of the majority of the area to be burned >15% slopes with herbaceous and low volatile woody fuel with high volatile woody fuels less than 4ft tall. Burned firebreaks used to achieve total firebreak width are part of these burns. (Constructed firebreak cost is not included in cost of burn. Refer to Firebreak (394) standard and cost scenarios)

Before Situation:

Desirable plant composition is lacking due to reduced plant vigor, invasive species or improper livestock distribution.

After Situation:

Desirable plant composition is restored, plant vigor improved and invasive species reduced. Forage production and quality for livestock and /or wildlife is improved.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 640

Scenario Cost: $7,152.40 **Scenario Cost/Unit:** $11.18

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$44.18	1	$44.18
Equipment/Installation						
Water tank, portable	1602	Portable water tank transported in a pick up truck. Typically with 200 gallon capacity includes tank with pump, hose and sprayer. Does not include the pickup truck. Equipment only.	Hour	$2.59	16	$41.44
Trailer, water tank	1598	Mobile 5,000 gal water tank mounted on a trailer. Equipment only. Does not include towing equipment.	Hour	$20.10	8	$160.80
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	40	$1,230.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	16	$596.96
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	80	$3,051.20
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	28	$1,154.44
Materials						
Fuel, ignition fuel mixture	1596	Mixture of gasoline and diesel for ignition of prescribed burns. Materials only.	Gallon	$3.99	48	$191.52
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	6	$425.22
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 338 - Prescribed Burning

Scenario: #7 - Steep Terrain, Volatile fuels >4 ft tall, <10% Canopy Cover

Scenario Description:

Applying a prescribed burn according to designed burn plan and NRCS Prescribed Burning (338) standard and specifications in order to control undesirable species, improve wildlife habitat, improve plant productivity and/or quality, facilitate grazing distribution and maintain ecological processes. This scenario is based on a burn area of 320 acres and applies under the following conditions: where the terrain of the majority of the area to be burned >15% slopes with herbaceous and low volatile woody fuel with high volatile woody fuels greater than 4ft tall, but fire is still a ground fire carried by fine fuel. Tree canopy cover is < 10%. Burned firebreaks used to achieve total firebreak width are part of these burns. (Constructed firebreak cost is not included in cost of burn. Refer to Firebreak (394) standard and cost scenarios)

Before Situation:

Desirable plant composition is lacking due to reduced plant vigor, invasive species or improper livestock distribution.

After Situation:

Desirable plant composition is restored, plant vigor improved and invasive species reduced. Forage production and quality for livestock and /or wildlife is improved.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 320

Scenario Cost: $24,297.16 **Scenario Cost/Unit:** $75.93

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$44.18	2	$88.36
Equipment/Installation						
Water tank, portable	1602	Portable water tank transported in a pick up truck. Typically with 200 gallon capacity includes tank with pump, hose and sprayer. Does not include the pickup truck. Equipment only.	Hour	$2.59	72	$186.48
Trailer, water tank	1598	Mobile 5,000 gal water tank mounted on a trailer. Equipment only. Does not include towing equipment.	Hour	$20.10	24	$482.40
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	72	$2,214.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	72	$2,686.32
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	12	$276.96
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	384	$14,645.76
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	8	$879.52
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	28	$1,154.44
Materials						
Fuel, ignition fuel mixture	1596	Mixture of gasoline and diesel for ignition of prescribed burns. Materials only.	Gallon	$3.99	80	$319.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Mobilization

Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	12	$850.44

Practice: 338 - Prescribed Burning

Scenario: #8 - Steep Terrain, Volatile fuels >4 ft tall, >10% Canopy Cover

Scenario Description:

Applying a prescribed burn according to designed burn plan and NRCS Prescribed Burning (338) standard and specifications in order to control undesirable species, improve wildlife habitat, improve plant productivity and/or quality, facilitate grazing distribution and maintain ecological processes. This scenario is based on a burn area of 160 acres and applies under the following conditions: where the terrain of the majority of the area to be burned >15% slopes with herbaceous and low volatile woody fuel with high volatile woody fuels greater than 4ft tall, but fire is still a ground fire carried by fine fuel. Tree canopy cover is > 10%. Burned firebreaks used to achieve total firebreak width are part of these burns. (Constructed firebreak cost is not included in cost of burn. Refer to Firebreak (394) standard and cost scenarios)

Before Situation:

Desirable plant composition is lacking due to reduced plant vigor, invasive species or improper livestock distribution.

After Situation:

Desirable plant composition is restored, plant vigor improved and invasive species reduced. Forage production and quality for livestock and /or wildlife is improved.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 160

Scenario Cost: $24,137.56 **Scenario Cost/Unit:** $150.86

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$44.18	2	$88.36
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	72	$2,686.32
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	72	$2,214.00
Trailer, water tank	1598	Mobile 5,000 gal water tank mounted on a trailer. Equipment only. Does not include towing equipment.	Hour	$20.10	24	$482.40
Water tank, portable	1602	Portable water tank transported in a pick up truck. Typically with 200 gallon capacity includes tank with pump, hose and sprayer. Does not include the pickup truck. Equipment only.	Hour	$2.59	72	$186.48
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	384	$14,645.76
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	12	$276.96
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	28	$1,154.44
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	8	$879.52
Materials						
Fuel, ignition fuel mixture	1596	Mixture of gasoline and diesel for ignition of prescribed burns. Materials only.	Gallon	$3.99	40	$159.60
Mobilization						

Mobilization

Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	12	$850.44
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 340 - Cover Crop

Scenario: #1 - General Purpose

Scenario Description:

Typically a small grain or small grain-legume mix (may also use forage sorghum, annual grasses, radishes, turnips, buckwheat, etc) will be planted as a cover crop immediately after harvest of a crop. The cover crop should be allowed to generate as much biomass as possible, without delaying management of the field for the following crop. The cover crop will be terminated in adequate time prior to field management activities for the subsequent crop. Termination may be by methods such as chemical or mechanical. Where cover crop is used on portions of a field such as in orchard/vineyard strips or row crop / specialty crop situations, the actual acres planted will be calculated for planned/applied acres, program payments and contracting. Resource concerns addressed include soil erosion, weed suppression, and managing soil moisture.

Before Situation:

Fields may lack adequate cover during the critical erosion or runoff season(s), or have poor or declining soil quality. Bare soils or fallow fields in hot, arid climates lose more soil moisture through evaporation than a cover crop, established and terminated but left on the soil surface, loses through evapo-transpiration. Also includes areas of excessive soil moisture where a cover crop could utilize excess water.

After Situation:

A typical situation might include: after harvest of row crop, fields are planted with a small grain-legume mix cover crop, such as rye and clover. The average field size is 40 acres. No additional fertilizer is applied with the cover crop. The cover crop provides soil cover throughout the critical erosion period. Runoff and erosion are reduced and no rills are visible on the soil surface. Wind erosion is reduced by standing vegetation. Soil moisture is conserved if plant residues are left on the surface . The cover crop is terminated with an approved herbicide or mechanical operation, prior to preparation of the field for the next crop, as late as feasible to maximize plant biomass production. Over time, soil health is improved due to the additional biomass, ground cover, soil infiltration, and plant diversity introduced to the cropping system. Cover crop residues left on the surface may maximize weed control by increasing allelopathic and mulching effect.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $5,397.20 **Scenario Cost/Unit:** $134.93

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	40	$423.20
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	80	$466.40
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	40	$811.60
Materials						
Three Species Mix, Warm Season, Annual Grasses and Legumes	2326	Warm season annual grass and legume mix. Includes material and shipping only.	Acre	$61.14	40	$2,445.60
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	80	$1,250.40

Practice: 340 - Cover Crop

Scenario: #2 - General Purpose, Organic

Scenario Description:

Certified Organic Seed is used in this typical scenario. A typical description is small grain or small grain-legume mix (might also be forage sorghum, annual grasses, radishes, turnips, buckwheat, etc) which is planted as a cover crop immediately after harvest of a crop. The cover crop should be allowed to generate as much biomass as possible, without delaying management of the field for the following crop. The cover crop will be terminated using a mechnical kill method such as mowing, rolling, undercutting, etc., in adequate time prior to field management activities for the subsequent crop. Where cover crop is used on portions of a field such as in orchard/vineyard strips or row crop / specialty crop situations, the actual acres planted will be calculated for planned/applied acres, program payments and contracting. Resource concerns addressed include soil erosion, soil quality, weed suppression and soil moisture management.

Before Situation:

Fields may lack adequate cover during the critical erosion or runoff season(s), or have poor or declining soil quality. Bare soils or fallow fields in hot, arid climates lose more soil moisture through evaporation than a cover crop, established and terminated but left on the soil surface, loses through evapo-transpiration. Also includes areas of excessive soil moisture where a cover crop could utilize excess water.

After Situation:

A typical situation might include: after harvest of row crop, fields are planted with a small grain-legume mix cover crop, such as rye and clover. The average field size is 25 acres. No additional fertilizer is applied with the cover crop. The cover crop provides soil cover throughout the critical erosion period. Runoff and erosion are reduced and no rills are visible on the soil surface. Wind erosion is reduced by standing vegetation. Soil moisture is conserved if plant residues are left on the surface . The cover crop is terminated with an approved herbicide or mechanical operation, prior to preparation of the field for the next crop, as late as feasible to maximize plant biomass production. Over time, soil health is improved due to the additional biomass, ground cover, soil infiltration, and plant diversity introduced to the cropping system. Cover crop residues left on the surface may maximize weed control by increasing allelopathic and mulching effect.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 25

Scenario Cost: $4,485.75 **Scenario Cost/Unit:** $179.43

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	50	$529.00
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$19.51	50	$975.50
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	25	$507.25
Materials						
Certified Organic, Two Species Mix, Cool Season, Annual Grasses and Legumes	2339	Certified organic cool season annual grass and legume mix. Includes material and shipping only.	Acre	$98.96	25	$2,474.00

Practice: 340 - Cover Crop

Scenario: #3 - Legume-N Fixation

Scenario Description:

A legume (or legume mix) will be planted as a cover crop immediately after harvest of a crop, and will be followed by a crop that will utilize fixed nitrogen. Legume seeds must be inoculated with the proper inoculant prior to planting. The cover crop should be allowed to reach early to mid-bloom before it is terminated. The cover crop will be terminated in adequate time prior to field management activities for the subsequent crop. Termination may be by methods such as chemical or mechanical. The legume will promote biological nitrogen fixation and reduce energy use by reducing the need for commercial nitrogen fertilizer. Where cover crop is used on portions of a field such as in orchard/vineyard strips or row crop / specialty crop situations, the actual acres planted will be calculated for planned/applied acres, program payments and contracting. Resource concerns addressed include soil erosion, soil quality, weed suppression, and reduced energy use.

Before Situation:

Only commericial nitrogen fertilizer is used. Fields may lack adequate cover during the critical erosion or runoff season(s), or have poor or declining soil quality. Soil health (soil organic matter) declines over time as a result of tillage practices and long periods of bare soil. Bare soils or fallow fields in hot, arid climates lose more soil moisture through evaporation than a cover crop, established and terminated but left on the soil surface, loses through evapo-transpiration. Also includes areas of excessive soil moisture where a cover crop could utilize excess water.

After Situation:

A typical situation might include: after harvest of row crop, fields are planted with a legume cover crop, typically a clover or vetch species. The average field size is 40 acres. No additional fertilizer is applied with the cover crop. The cover crop provides soil cover throughout the critical erosion period. Runoff and erosion are reduced and no rills are visible on the soil surface. Wind erosion is reduced by standing vegetation. Soil moisture is conserved if mulch is left on the soil surface. The cover crop is terminated with an approved herbicide or mechanical operation, prior to preparation of the field for the next crop, as late as feasible to maximize plant biomass production. Over time, soil health is improved due to the additional biomass, ground cover, soil infiltration, and plant diversity introduced to the cropping system. Cover crop residues left on the surface may maximize weed control by increasing allelopathic and mulching effect. By utilizing the nitrogen that is fixed by the legume cover crop, the amount of energy is reduced by reducing the amount of commercial fertilizer that will be needed for the following crop.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $4,523.20 **Scenario Cost/Unit:** $113.08

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	40	$423.20
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	40	$811.60
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	80	$466.40
Materials						
One Species, Cool Season, Annual Grass or Legume	2311	Cool season annual grass or legume. Includes material and shipping only.	Acre	$39.29	40	$1,571.60
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	80	$1,250.40

Practice: 340 - Cover Crop

Scenario: #4 - Legume-N Fixation, Organic

Scenario Description:

A legume (or legume mix) using Certified Organic Seed will be planted as a cover crop immediately after harvest of a crop, and will be followed by a crop that will utilize fixed nitrogen and the residue. Legume seeds must be inoculated with the proper inoculant prior to planting. The cover crop should be allowed to reach early to mid-bloom before it is terminated. The cover crop will be terminated in adequate time prior to field management activities for the subsequent crop. The cover crop will be terminated using a mechnical kill method such as (mowing, rolling, undercutting, etc.). Legumes will promote biological nitrogen fixation and reduce energy use by reducing the need for commercial nitrogen fertilizer. Where cover crop is used on portions of a field such as in orchard/vineyard strips or row crop/specialty crop situations, the actual acres planted will be calculated for planned/applied acres, program payments and contracting. Resource concerns addressed include soil erosion, soil quality, weed suppression, and reduced energy use.

Before Situation:

Only commericial nitrogen fertilizer is used. Fields may lack adequate cover during the critical erosion or runoff season(s), or have poor or declining soil quality. Soil health (soil organic matter) declines over time as a result of tillage practices and long periods of bare soil. Bare soils or fallow fields in hot, arid climates lose more soil moisture through evaporation than a cover crop, established and terminated but left on the soil surface, loses through evapo-transpiration. Also includes areas of excessive soil moisture where a cover crop could utilize excess water.

After Situation:

A typical situation might include: after harvest of row crop, fields are planted with a legume cover crop, typically a clover or vetch species. The average field size is 40 acres. No additional fertilizer is applied with the cover crop. The cover crop provides soil cover throughout the critical erosion period. Runoff and erosion are reduced and no rills are visible on the soil surface. Wind erosion is reduced by standing vegetation. Soil moisture is conserved when residue is left on the soil surface. The cover crop is typically terminated with a mechanical operation, prior to preparation of the field for the next crop, as late as feasible to maximize plant biomass production. Over time, soil health is improved due to the additional biomass, ground cover, soil infiltration, and plant diversity introduced to the cropping system. Cover crop residues left on the surface may maximize weed control by increasing allelopathic and mulching effect. Legumes will increase soil nutrients through fixation of biological nitrogen.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $7,676.00 **Scenario Cost/Unit:** $191.90

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	40	$423.20
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$19.51	80	$1,560.80
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	40	$811.60
Materials						
Certified Organic, One Species, Cool Season, Annual Legume	2337	Certified organic cool season annual legume. Includes material and shipping only.	Acre	$122.01	40	$4,880.40

Practice: 340 - Cover Crop

Scenario: #5 - Relay Crop

Scenario Description:

Typically annual ryegrass will be planted as a cover crop during the last cultivation operation in a crop such as corn, and will establish as the corn is maturing. After crop harvest, the annual ryegrass is left in place overwinter to act as a "catch crop" for nutrients left in the soil profile, and as surface cover to reduce erosion and runoff of surface material. The cover crop should be allowed to generate as much biomass as possible, without delaying management of the field for the following crop. To optimize the uptake and utilization of nutrients the crop should be harvested or grazed. The cover crop will be terminated in adequate time prior to field management activities for the subsequent crop. Termination may be by methods such as chemical or mechanical. Resource concerns include soil erosion, weed suppression, nutrient capture and/or soil quality.

Before Situation:

Fields lack adequate cover during the critical erosion or runoff season(s), need growing vegetation during that period to act as a "catch crop" for nutrients, or have poor or declining soil quality. Typical resource concerns may include erosion, nutrient capture and/or soil health.

After Situation:

A typical situation might include: during the final cultivation between the rows, fields are overseeded with a crop such as annual ryegrass. The average field size is 40 acres. The cover crop provides soil cover throughout the critical erosion period, and acts as a "catch crop" to keep soil nutrients from leaving the site. Runoff and erosion are reduced and no rills are visible on the soil surface. Wind erosion is reduced by standing vegetation. Soil moisture is conserved. The cover crop is terminated with an approved herbicide or mechanical operation, prior to preparation of the field for the next crop, as late as feasible to maximize plant biomass production. Over time, water quality is improved, and soil health is improved due to the additional biomass, ground cover, soil infiltration, and plant diversity introduced to the cropping system. To optimize the uptake and utilization of nutrients the crop should be harvested or grazed. The cover crop will be terminated in adequate time prior to field management activities for the subsequent crop. Cover crop residues left on the surface may maximize weed control by increasing allelopathic and mulching effect.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $2,909.60 **Scenario Cost/Unit:** $72.74

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.99	40	$479.60
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	40	$233.20
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	40	$625.20
One Species, Cool Season, Annual Grass or Legume	2311	Cool season annual grass or legume. Includes material and shipping only.	Acre	$39.29	40	$1,571.60

Practice:

Scenario:

Scenario Description:

Before Situation:

After Situation:

Scenario Feature Measure:

Scenario Unit:

Scenario Typical Size:

Scenario Cost: $0.00 **Scenario Cost/Unit:**

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost

Practice: 345 - Residue and Tillage Management, Reduced Till

Scenario: #1 - Basic

Scenario Description:

The basic option is for use in operations switching from conventional tillage to reduced tillage. All residue shall be uniformly distributed on the surface throughout critical wind erosion period and not burned or removed. The RUSLE2 model will be used to review the farming operation and determine if enough residue is being retained, throughout the rotation, to keep soil loss below T. The producer will then adjust operations, to reduce erosion below T by leaving at least 50% residue cover. Final STIR value shall be 80 or less.

Before Situation:

Fields are disked immediately following harvest, with rows in some fields being hipped for drainage. Residue amounts after harvest average 30% or less, resulting in bare soil being exposed to wind erosion and/or intense rainfall during the fall, winter, and early spring. Over the winter residue degrades and sediment/nutrient runoff from fields increases. Sheet and rill erosion may occur with visible rills by spring. Spring tillage and seedbed preparation activities occur as early as possible in the late winter and early spring. Weed control is accomplished primarily through tillage, requiring multiple operations. Runoff from the fields flows into streams, water courses or other water bodies causing degradation to the receiving waters. Soil health (soil organic matter) declines over time as a result of tillage practices, low residue monocultures, and long periods of bare soil. STIR is greater than 80 and/or residue is less than 50%.

After Situation:

Tillage may occur after harvest or immediately prior to planting of next crop. Weeds or cover crops may be growing throughout the time between cash crops. The residue that remains on the soil surface provides soil cover during late fall, throughout the winter, and into the early spring. Runoff and erosion are reduced. Wind erosion is reduced by standing residues. Winter weeds or the cover crop is terminated with tillage, a roller-crimper, shredding, or a combination of these methods prior to spring planting as late as feasible. Over time, soil health is improved due to reduced disturbance and increased residue cover. STIR is 80 or less and residue is greater than 50%, and SCI is zero or positive.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $3,606.00 **Scenario Cost/Unit:** $36.06

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	100	$2,029.00
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	100	$1,577.00

Practice: 345 - Residue and Tillage Management, Reduced Till

Scenario: #2 - High Residue

Scenario Description:

The "high residue" option is for use in operations switching from conventional tillage to reduced tillage, but allows for an additional pass to manage very high residue resulting from high residue crops or multiple crops. All residue shall be uniformly distributed on the surface throughout critical wind erosion period and not burned or removed. The RUSLE2 model will be used to review the farming operation and determine if enough residue is being retained, throughout the rotation, to keep soil loss below T. The producer will then adjust operations, to reduce erosion below T by leaving at least 50% residue cover. Final STIR value shall be 40 or less.

Before Situation:

Fields are disked immediately following harvest, with rows in some fields being hipped for drainage. Residue amounts after harvest average 30% or less, resulting in bare soil being exposed to wind erosion and/or intense rainfall during the fall, winter, and early spring. Over the winter residue degrades and sediment/nutrient runoff from fields increases. Sheet and rill erosion may occur with visible rills by spring. Spring tillage and seedbed preparation activities occur as early as possible in the late winter and early spring. Weed control is accomplished primarily through tillage, requiring multiple operations. Runoff from the fields flows into streams, water courses or other water bodies causing degradation to the receiving waters. Soil health (soil organic matter) declines over time as a result of tillage practices, low residue monocultures, and long periods of bare soil. STIR is greater than 80 and/or residue is less than 50%.

After Situation:

Reduced tillage applies to all cropland and other lands where crops are planted. It applies to stubble mulching on summer fallowed land and to tillage for annually planted crops or tillage for planting perennial crops. It includes some planting operations such as hoe drill, air seeder and no-till drill that disturb a large percentage of soil surface using the planting operation. Tillage occurs after crop harvest. In warmer areas, winter weeds or cover crops grow throughout the winter months. The residue that remains on the soil surface provides soil cover during late fall, throughout the winter, and into the early spring. Runoff and erosion are reduced and no rills are visible on the soil surface in the spring. Wind erosion is reduced by standing residues. Winter weeds or the cover crop is terminated with a harrow or roller-crimper, or a combination of these methods prior to spring planting as late as feasible. Over time, soil health is improved due to the additional biomass, ground cover, soil infiltration, and plant diversity in the cropping system. STIR is 40 or less and residue is greater than 50%, and SCI is zero or positive.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $5,722.00 **Scenario Cost/Unit:** $57.22

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	100	$2,029.00
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	100	$1,577.00
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	200	$2,116.00

Practice: 345 - Residue and Tillage Management, Reduced Till

Scenario: #3 - Adaptive Management, Trial Field

Scenario Description:

The practice scenario is for the implementation of reduced till in one field as a trial to allow the producer to learn how to manage reduced tillage on their operation. Scenario includes implementing a reduced-till method to evaluate, identify and implement a particular reduced till management strategy (e.g., offset to single disk, reduced number of primary or secondary tillage passes, using a no-till drill with row cleaners and double disk openers etc.). This would be repeated for 3 years. Typical size is about 20 acres.

Before Situation:

The producer is considering using no till technology, but is unsure how to manage on their operation or needs to improve the management of no till to be successful. In the existing system, fields are disked immediately following harvest, with rows in some fields being hipped for drainage. Residue amounts after harvest average 30% or less, resulting in bare soil being exposed to wind erosion and/or intense rainfall during the fall, winter, and early spring. Over the winter residue degrades and sediment/nutrient runoff from fields increases. Sheet and rill erosion may occur with visible rills by spring. Spring tillage and seedbed preparation activities occur as early as possible in the late winter and early spring. Weed control is accomplished primarily through tillage, requiring multiple operations. Runoff from the fields flows into streams, water courses or other water bodies causing degradation to the receiving waters. Soil health (soil organic matter) declines over time as a result of tillage practices, low residue monocultures, and long periods of bare soil. STIR is greater than 80 and/or residue is less than 50%.

After Situation:

Installation of this scenario will utilize a reduced tillage system in a field and compare results with a conventionally tilled field regarding the tillage/residue management strategies and yield results. The fields are managed and evaluated with the assistance of a consultant knowledgeable in no till management. Results are used to make tillage management decisions to address erosion, soil health, and water quality issues. Yields will be measured and summarized. The yields will be adjusted to the appropriate moisture content. This would be repeated for 3 years.

Scenario Feature Measure: One Field

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $3,338.60 **Scenario Cost/Unit:** $3,338.60

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	10	$202.90
Seeding Operation, No Till/Strip Till Planter	1230	No Till/Strip Till row planters for seeding. Includes all costs for equipment, power unit, and labor.	Acre	$17.91	10	$179.10
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	20	$211.60
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	20	$315.40
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	20	$2,198.80
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80

Practice: 348 - Dam Diversion

Scenario: #2 - Earth Fill

Scenario Description:

An earth fill built to divert all or part of the water from a waterway or a stream to provide water in such a manner that it can be controlled and used beneficially for irrigation, livestock water, fire control, municipal or industrial uses, develop renewable energy systems, or recreation, to divert periodic damaging flows from one watercourse to another watercourse thereby reducing the damage potential of the flows. This structure will address the resource concerns of inefficient water use on Irrigated Land, inadequate water for livestock, and inadequate water supply for other beneficial uses.

Before Situation:

This practice applies where a diversion dam is needed as an integral part of an irrigation system or a water-spreading system designed to facilitate the conservation use of soil and water resources, Diversion of water from an unstable watercourse to a stable watercourse is desirable, The water supply available is adequate for the purpose for which it is to be diverted, Adverse environmental impacts resulting from the installation of the practice can be overcome. This standard applies to structures of a permanent nature, constructed of materials having an expected life span consistent with the purpose for which the structure is designed. It does not apply where conservation practice standard Diversion (362), Floodwater Diversion (400), Dam (402), or Grade Stabilization Structure (410) would be used. This practice will provide beneficial uses for irrigation, livestock water, fire control, municipal or industrial uses, renewable energy systems, recreation, or to divert periodic damaging flows from one watercourse to another watercourse thereby reducing the damage potential of the flows.

After Situation:

An earth fill structure of approximately 1500 cubic yards is built to divert all or part of the water from a waterway or a stream. This standard applies to structures of a permanent nature, constructed of materials having an expected life span consistent with the purpose for which the structure is designed. This structure will be an integral part of an irrigation system or a water-spreading system designed to facilitate the conservation use of soil and water resources, or diversion of water from an unstable watercourse to a stable watercourse as needed. The water supply available is adequate for the purpose for which it is to be diverted. Adverse environmental impacts resulting from the installation of the practice must be overcome. The sheet pile structure provides beneficial uses for irrigation, livestock water, fire control, municipal or industrial uses, renewable energy systems, recreation, or to divert periodic damaging flows from one watercourse to another watercourse thereby reducing the damage potential of the flows. Any needed vegetation of disturbed areas must use Critical Area Planting (342). Other associated practices such as Channel Vegetation (322), Stream Habitat Improvement and Management (395), Channel Stabilization (584) will be as appropriate. Any needed head gates or flap gates to control the quantity of water being diverted must use Structure for Water Control (587).

Scenario Feature Measure: Volume of Earth Fill

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,500

Scenario Cost: $12,373.94 **Scenario Cost/Unit:** $8.25

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Scraper, self propelled, 21 CY	1208	Self propelled earthmoving scraper with 21 CY capacity. Does not include labor.	Hour	$366.39	30	$10,991.70
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	30	$1,125.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 348 - Dam Diversion

Scenario: #3 - Earth Fill-Grouted Rock

Scenario Description:

An earth fill and grouted rock structure built to divert all or part of the water from a waterway or a stream to provide water in such a manner that it can be controlled and used beneficially for irrigation, livestock water, fire control, municipal or industrial uses, develop renewable energy systems, or recreation, to divert periodic damaging flows from one watercourse to another watercourse thereby reducing the damage potential of the flows. This structure will address the resource concerns of inefficient water use on Irrigated Land, inadequate water for livestock, and inadequate water supply for other beneficial uses.

Before Situation:

This practice applies where a diversion dam is needed as an integral part of an irrigation system or a water-spreading system designed to facilitate the conservation use of soil and water resources, Diversion of water from an unstable watercourse to a stable watercourse is desirable, The water supply available is adequate for the purpose for which it is to be diverted, Adverse environmental impacts resulting from the installation of the practice can be overcome. This standard applies to structures of a permanent nature, constructed of materials having an expected life span consistent with the purpose for which the structure is designed. It does not apply where conservation practice standard Diversion (362), Floodwater Diversion (400), Dam (402), or Grade Stabilization Structure (410) would be used. This practice will provide beneficial uses for irrigation, livestock water, fire control, municipal or industrial uses, renewable energy systems, recreation, or to divert periodic damaging flows from one watercourse to another watercourse thereby reducing the damage potential of the flows.

After Situation:

An earth fill and grouted rock structure of approximately 1050 cubic yards of earth fill with 450 cubic yards of grouted rock is built to divert all or part of the water from a waterway or a stream. This standard applies to structures of a permanent nature, constructed of materials having an expected life span consistent with the purpose for which the structure is designed. This structure will be an integral part of an irrigation system or a water-spreading system designed to facilitate the conservation use of soil and water resources, or diversion of water from an unstable watercourse to a stable watercourse as needed. The water supply available is adequate for the purpose for which it is to be diverted. Adverse environmental impacts resulting from the installation of the practice must be overcome. The sheet pile structure provides beneficial uses for irrigation, livestock water, fire control, municipal or industrial uses, renewable energy systems, recreation, or to divert periodic damaging flows from one watercourse to another watercourse thereby reducing the damage potential of the flows. Any needed vegetation of disturbed areas must use Critical Area Planting (342). Other associated practices such as Channel Vegetation (322), Stream Habitat Improvement and Management (395), Channel Stabilization (584) will be as appropriate. Any needed head gates or flap gates to control the quantity of water being diverted must use Structure for Water Control (587).

Scenario Feature Measure: Volume of Total Fill

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,500

Scenario Cost: $70,069.25 **Scenario Cost/Unit:** $46.71

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Scraper, self propelled, 21 CY	1208	Self propelled earthmoving scraper with 21 CY capacity. Does not include labor.	Hour	$366.39	21	$7,694.19
Rock Riprap, grouted	1757	Grouted Rock Riprap, placed, includes materials, equipment and labor to transport and place.	Cubic Yard	$136.29	450	$61,330.50
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	21	$787.92
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 348 - Dam Diversion

Scenario: #4 - Sheet Pile Structure

Scenario Description:

A sheet pile structure with rock, built to divert all or part of the water from a waterway or a stream to provide water in such a manner that it can be controlled and used beneficially for irrigation, livestock water, fire control, municipal or industrial uses, develop renewable energy systems, or recreation, to divert periodic damaging flows from one watercourse to another watercourse thereby reducing the damage potential of the flows. This structure will address the resource concerns of inefficient water use on Irrigated Land, inadequate water for livestock, and inadequate water supply for other beneficial uses.

Before Situation:

This practice applies where a diversion dam is needed as an integral part of an irrigation system or a water-spreading system designed to facilitate the conservation use of soil and water resources, Diversion of water from an unstable watercourse to a stable watercourse is desirable, The water supply available is adequate for the purpose for which it is to be diverted, Adverse environmental impacts resulting from the installation of the practice can be overcome. This standard applies to structures of a permanent nature, constructed of materials having an expected life span consistent with the purpose for which the structure is designed. It does not apply where conservation practice standard Diversion (362), Floodwater Diversion (400), Dam (402), or Grade Stabilization Structure (410) would be used. This practice will provide beneficial uses for irrigation, livestock water, fire control, municipal or industrial uses, renewable energy systems, recreation, or to divert periodic damaging flows from one watercourse to another watercourse thereby reducing the damage potential of the flows.

After Situation:

A sheet pile structure of approximately 3000 square feet with approximately 660 cubic yards of riprap is built to divert all or part of the water from a waterway or a stream. This standard applies to structures of a permanent nature, constructed of materials having an expected life span consistent with the purpose for which the structure is designed. This structure will be an integral part of an irrigation system or a water-spreading system designed to facilitate the conservation use of soil and water resources, or diversion of water from an unstable watercourse to a stable watercourse as needed. The water supply available is adequate for the purpose for which it is to be diverted. Adverse environmental impacts resulting from the installation of the practice must be overcome. The sheet pile structure provides beneficial uses for irrigation, livestock water, fire control, municipal or industrial uses, renewable energy systems, recreation, or to divert periodic damaging flows from one watercourse to another watercourse thereby reducing the damage potential of the flows. Any needed vegetation of disturbed areas must use Critical Area Planting (342). Other associated practices such as Channel Vegetation (322), Stream Habitat Improvement and Management (395), Channel Stabilization (584) will be as appropriate. Any needed head gates or flap gates to control the quantity of water being diverted must use Structure for Water Control (587).

Scenario Feature Measure: Area of sheet pile

Scenario Unit: Square Foot

Scenario Typical Size: 3,000

Scenario Cost: $127,408.04 **Scenario Cost/Unit:** $42.47

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Sheet piling, steel, 15'	1337	Steel sheet pile, panels or barrier driven up to 15 feet and left in place. Includes materials, equipment and labor.	Square Foot	$27.54	3000	$82,620.00
Portable Welder	1407	Portable field welder. Equipment only. Labor not included.	Hour	$20.21	24	$485.04
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	24	$915.36
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	660	$43,131.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 348 - Dam Diversion

Scenario: #5 - Reinforced Concrete Dam Diversion

Scenario Description:

A reinforced concrete dam diversion structure built to divert all or part of the water from a waterway or a stream to provide water in such a manner that it can be controlled and used beneficially for irrigation, livestock water, fire control, municipal or industrial uses, develop renewable energy systems, or recreation, to divert periodic damaging flows from one watercourse to another watercourse thereby reducing the damage potential of the flows. This structure will address the resource concerns of inefficient water use on Irrigated Land, inadequate water for livestock, and inadequate water supply for other beneficial uses.

Before Situation:

This practice applies where a diversion dam is needed as an integral part of an irrigation system or a water-spreading system designed to facilitate the conservation use of soil and water resources, Diversion of water from an unstable watercourse to a stable watercourse is desirable, The water supply available is adequate for the purpose for which it is to be diverted, Adverse environmental impacts resulting from the installation of the practice can be overcome. This standard applies to structures of a permanent nature, constructed of materials having an expected life span consistent with the purpose for which the structure is designed. It does not apply where conservation practice standard Diversion (362), Floodwater Diversion (400), Dam (402), or Grade Stabilization Structure (410) would be used. This practice will provide beneficial uses for irrigation, livestock water, fire control, municipal or industrial uses, renewable energy systems, recreation, or to divert periodic damaging flows from one watercourse to another watercourse thereby reducing the damage potential of the flows.

After Situation:

A reinforced concrete dam diversion structure of approximately 1500 cubic yards of concrete is built to divert all or part of the water from a waterway or a stream. This standard applies to structures of a permanent nature, constructed of materials having an expected life span consistent with the purpose for which the structure is designed. This structure will be an integral part of an irrigation system or a water-spreading system designed to facilitate the conservation use of soil and water resources, or diversion of water from an unstable watercourse to a stable watercourse as needed. The water supply available is adequate for the purpose for which it is to be diverted. Adverse environmental impacts resulting from the installation of the practice must be overcome. The sheet pile structure provides beneficial uses for irrigation, livestock water, fire control, municipal or industrial uses, renewable energy systems, recreation, or to divert periodic damaging flows from one watercourse to another watercourse thereby reducing the damage potential of the flows. Any needed vegetation of disturbed areas must use Critical Area Planting (342). Other associated practices such as Channel Vegetation (322), Stream Habitat Improvement and Management (395), Channel Stabilization (584) will be as appropriate. Any needed head gates or flap gates to control the quantity of water being diverted must use Structure for Water Control (587).

Scenario Feature Measure: Volume of Total Fill

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,500

Scenario Cost: $765,291.49 **Scenario Cost/Unit:** $510.19

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	1500	$762,555.00
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$187.13	10	$1,871.30
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	10	$375.20
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 350 - Sediment Basin

Scenario: #1 - Excavated basin

Scenario Description:

An excavated sediment basin in an existing drainage way on a farm for purpose of trapping sediment and preserving the capacity of reservoirs, ditches, canals, diversions, waterways and streams and to prevent undesirable deposition on bottom lands and other developed lands. The sediment basin is created solely by excavation. Excavated material is spoiled, not placed in a designed embankment. Earthen spillway is constructed as needed. Resource concerns addressed include excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition. Surface water causes the sediment (and potentially pesticides and nutrients) to be transported into the riparian areas and water bodies downstream.

Before Situation:

Disturbed areas on all land uses that have excessive erosion lead to deterioration of receiving waters due to excessive sedimentation.

After Situation:

The typical sediment basin is constructed by excavating 1200 cubic yards and spreading the spoil outside the pool area using a dozer or similar excavation equipment. The sediment storage capacity is about 700 cubic feet per acre of disturbed area and the detention storage is about 3000 cubic feet per acre of drainage area. Associated practice(s): Other practices that may need to be implemented along with sediment basin to address all of the site specific resource concerns include: Critical Area Planting (342) and Mulching (484) where necessary to prevent erosion following construction activities, Structure for Water Control (587) if using a dewatering device, Pond Sealing or Lining (521A,521B,521C,521D).

Scenario Feature Measure: Excavated volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,200

Scenario Cost: $5,457.32 **Scenario Cost/Unit:** $4.55

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	30	$3,743.40
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	32	$1,200.64
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: **350 - Sediment Basin**

Scenario: **#2 - Embankment earthen basin with no pipe**

Scenario Description:

An low hazard class embankment earthen sediment basin in an existing drainage way on a farm for purpose of trapping sediment and preserving the capacity of reservoirs, ditches, canals, diversions, waterways and streams and to prevent undesirable deposition on bottom lands and other developed lands. An earthen embankment will be constructed using the material that is excavated for the basin, creating a balanced cut and fill with no export or import. The basin will have an open auxiliary spillway, as designed. Resource concerns addressed include excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition. Surface water causes the sediment (and potentially pesticides and nutrients) to be transported into the riparian areas and water bodies downstream.

Before Situation:

Disturbed areas on all land uses that have excessive erosion lead to deterioration of receiving waters due to excessive sedimentation.

After Situation:

The typical sediment basin is constructed by excavating the pool area, constructing the auxiliary spillway, preparing the foundation as designed, and using 1500 cubic yards to create an embankment. The product of the storage times the effective height of the dam is less than 3,000. The effective height of the dam is 35 feet or less. The sediment storage capacity has a minimum of 900 cubic feet per acre of disturbed area. The detention storage has a minimum of 3600 cubic feet per acre of drainage area. The earthen auxiliary spillway will be constructed as designed based on Pond standard (378). No principal spillway will be used. Associated practice(s): Other practices that may need to be implemented along with sediment basin to address all of the site specific resource concerns include: Critical Area Planting (342) and Mulching (484) where necessary to prevent erosion following construction activities, Structure for Water Control (587) if using a dewatering device, Pond Sealing or Lining (521A,521B,521C,521D).

Scenario Feature Measure: Embankment volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,500

Scenario Cost: $7,080.32 **Scenario Cost/Unit:** $4.72

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	40	$4,991.20
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	42	$1,575.84
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 350 - Sediment Basin

Scenario: #3 - Embankment earthen basin with pipe

Scenario Description:

A low hazard class embankment earthen sediment basin in an existing drainage way on a farm for purpose of trapping sediment and preserving the capacity of reservoirs, ditches, canals, diversions, waterways and streams and to prevent undesirable deposition on bottom lands and other developed lands. An earthen embankment will be constructed from material excavated from the basin area with no import or export. The basin will have a principal spillway conduit and earthen auxiliary spillway, as designed. Resource concerns addressed include excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition. Surface water causes the sediment (and potentially pesticides and nutrients) to be transported into the riparian areas and water bodies downstream.

Before Situation:

Disturbed areas on all land uses that have excessive erosion lead to deterioration of receiving waters due to excessive sedimentation.

After Situation:

The typical sediment basin is constructed by excavating the pool area, constructing the auxiliary spillway, preparing the foundation as designed, and using 1500 cubic yards to create an embankment. The embankment will be designed and constructed according the Pond standard (378). The product of the storage times the effective height of the dam is less than 3,000. The effective height of the dam is 35 feet or less. The sediment storage capacity should have an approximate minimom of 900 cubic feet per acre of disturbed area. The detention storage should be a minimum of 3600 cubic feet per acre of drainage area. The principal spillway is created using an approved conduit material and filter diaphragm. The earthen auxiliary spillway will be constructed as designed based on Pond standard (378). Associated practice(s): Other practices that may need to be implemented along with sediment basin to address all of the site specific resource concerns include: Critical Area Planting (342) and Mulching (484) where necessary to prevent erosion following construction activities, Structure for Water Control (587) if using a dewatering device, Pond Sealing or Lining (521A,521B,521C,521D).

Scenario Feature Measure: Embankment volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,500

Scenario Cost: $12,174.12 **Scenario Cost/Unit:** $8.12

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	40	$4,991.20
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	3	$1,525.11
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	42	$1,575.84
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	10	$381.40
Materials						
Trash Guard, metal	1608	Trash Guard, fabricated-steel, includes materials, equipment, and labor to transport and place Conical shaped trash guard for drop inlet spillway. Typically fabricated of CMP and steel. Includes materials, equipment, and labor to fabricate and transport	Pound	$2.49	118	$293.82
Pipe, CMP, 18-16 gauge, weight priced	1322	18 & 16 gauge galvanized helical corrugated metal pipe priced by the weight of the pipe materials. Materials only.	Pound	$1.25	1662	$2,077.50
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	1.6	$62.35
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	19.6	$753.62

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 351 - Water Well Decommissioning

Scenario: #1 - Shallow Well, 20ft deep or less

Scenario Description:

This scenario applied to a shallow, wide diameter water well 20' deep or less. A licensed well driller will seal and permanently close an inactive, abandoned, or unusable water well to prevent excess nutrients in surface and groundwater and to eliminate pesticides transported to surface and ground water.

Before Situation:

Shallow well or hand dug well that is 20 feet deep or less has been abandoned or is no longer in use. Well provides conduit for nutrients & pesticides to contaminate surface and groundwater.

After Situation:

Well will be cleared of all equipment and materials. Residual water column must be treated with chlorine concentration of >50 ppm or according to local, State, Tribal, or Federal regulations. Procedures and sealing materials shall conform to ASTM D5299 and be compatible with all local, State, Tribal, and Federal requirements. Backfill shall be placed and compacted in a manner that minimizes segregation and bulking to prevent surface subsidence. Associated practices: 342 Critical Area Seeding. Typical well dimensions for this scenarios is 42" diameter, 15' deep = 5.3CuYds. The bottom 10' is sealed with grout; earth fill is placed in the top 5'.

Scenario Feature Measure: Well volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 5

Scenario Cost: $4,639.38 **Scenario Cost/Unit:** $927.88

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	2	$112.42
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	3	$111.93
Grout pump	1334	Grout pump with tremie pipe. Equipment and power unit costs. Labor not included.	Hour	$14.78	1	$14.78
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	15	$572.10
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	5	$115.40
Materials						
Grout, cement	1333	Cement grout meeting ASTM specifications for well sealing. Includes both neat-cement grout and bentonite gout mixtures. Includes materials, equipment and labor to place.	Cubic Yard	$960.03	3.6	$3,456.11
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 351 - Water Well Decommissioning

Scenario: #2 - Shallow Well, >20ft deep

Scenario Description:

This scenario applied to a shallow, wide diameter water well greater than 20' deep. A licensed well driller will seal and permanently close an inactive, abandoned, or unusable water well to prevent excess nutrients in surface and groundwater and to eliminate pesticides transported to surface and ground water.

Before Situation:

Shallow well or hand dug well that is more than 20 feet has been abandoned or is no longer in use. Well provides conduit for nutrients & pesticides to contaminate surface and groundwater.

After Situation:

Well will be cleared of all equipment and materials. Residual water column must be treated with chlorine concentration of >50 ppm or according to local, State, Tribal, or Federal regulations. Procedures and sealing materials shall conform to ASTM D5299 and be compatible with all local, State, Tribal, and Federal requirements. Backfill shall be placed and compacted in a manner that minimizes segregation and bulking to prevent surface subsidence. Associated practices: 342 Critical Area Seeding. Typical well dimensions for this scenarios is 36" diameter, 30' deep = 7.9CuYds. Grout-sealed in bottom 20 ft.; earth fill in top 10'.

Scenario Feature Measure: Well Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 8

Scenario Cost: $7,502.17 **Scenario Cost/Unit:** $937.77

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	2	$112.42
Grout pump	1334	Grout pump with tremie pipe. Equipment and power unit costs. Labor not included.	Hour	$14.78	1	$14.78
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	5	$186.55
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$56.21	2	$112.42
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	11	$419.54
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	7	$161.56
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	9	$989.46
Materials						
Grout, cement	1333	Cement grout meeting ASTM specifications for well sealing. Includes both neat-cement grout and bentonite gout mixtures. Includes materials, equipment and labor to place.	Cubic Yard	$960.03	5.2	$4,992.16
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 351 - Water Well Decommissioning

Scenario: #3 - Drilled Well, 300ft deep or less

Scenario Description:

This scenario applied to a drilled water well 300' deep or less and typically 6 or 8" diameter. A licensed well driller will seal and permanently close an inactive, abandoned, or unusable water well to prevent excess nutrients in surface and groundwater and to eliminate pesticides transported to surface and ground water.

Before Situation:

Drilled well that is less than 300 feet deep and 8" diameter (older wells are typically larger than 6" diameter) has been abandoned or is no longer in use. Well provides conduit for nutrients & pesticides to contaminate surface and groundwater.

After Situation:

Well will be cleared of all equipment and materials. Residual water column must be treated with chlorine concentration of >50 ppm or according to local, State, Tribal, or Federal regulations. Procedures and sealing materials shall conform to ASTM D5299 and be compatible with all local, State, Tribal, and Federal requirements. Backfill shall be placed and compacted in a manner that minimizes segregation and bulking to prevent surface subsidense. Associated practices: 342 Critical Area Seeding. Typical well dimensions for this scenarios is 8" diameter, 200' deep. Grout-sealed in bottom 150 ft.; earth fill in top 50'.

Scenario Feature Measure: Depth of Well

Scenario Unit: Linear Feet

Scenario Typical Size: 200

Scenario Cost: $7,869.40 **Scenario Cost/Unit:** $39.35

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	3	$168.63
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$56.21	3	$168.63
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	8	$298.48
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	14	$533.96
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	38	$4,177.72
Materials						
Grout, cement	1333	Cement grout meeting ASTM specifications for well sealing. Includes both neat-cement grout and bentonite gout mixtures. Includes materials, equipment and labor to place.	Cubic Yard	$960.03	1.9	$1,824.06
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 351 - Water Well Decommissioning

Scenario: #4 - Drilled Well, >300ft deep

Scenario Description:

This scenario applied to a drilled water well greater than 300' deep and typically 6 or 8" diameter. A licensed well driller will seal and permanently close inactive, abandoned, or unusable water well to prevent excess nutrients in surface and groundwater and to eliminate pesticides transported to surface and ground water.

Before Situation:

Drilled well that is greater than 300 feet deep, 6-8" diameter has been abandoned or is no longer in use. Well provides conduit for nutrients & pesticides to contaminate surface and groundwater.

After Situation:

Well will be cleared of all equipment and materials. Residual water column must be treated with chlorine concentration of >50 ppm or according to local, State, Tribal, or Federal regulations. Procedures and sealing materials shall conform to ASTM D5299 and be compatible with all local, State, Tribal, and Federal requirements. Backfill shall be placed and compacted in a manner that minimizes segregation and bulking to prevent surface subsidense. Associated practices: 342 Critical Area Seeding. Typical well dimensions for this scenarios is 8" diameter, 500' deep. Grout-sealed in bottom 250 ft.; earth fill in top 250'.

Scenario Feature Measure: Depth of Well

Scenario Unit: Linear Feet

Scenario Typical Size: 500

Scenario Cost: $10,401.13 **Scenario Cost/Unit:** $20.80

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	12	$447.72
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$56.21	4	$224.84
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	3	$168.63
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	18	$686.52
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	46	$5,057.24
Materials						
Grout, cement	1333	Cement grout meeting ASTM specifications for well sealing. Includes both neat-cement grout and bentonite gout mixtures. Includes materials, equipment and labor to place.	Cubic Yard	$960.03	3.2	$3,072.10
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 355 - Well Water Testing

Scenario: #1 - Basic Water Test

Scenario Description:

Typical scenario includes the professional testing for nitrates, nitrites, and coliform to confirm well water meets basic water quality standards for consumption by livestock or use in irrigation. Water samples are sent to an EPA or state certified laboratory for testing. This scenario is recommended when water quality is suspected to be acceptable.

Before Situation:

There are no known contaminants of the well, however, neighboring wells have known issues with nitrates, or coliform, and confirmation of acceptable water quality is desired. Manure is spread near to the well, following a nutrient management plan; well contamination is unlikely but possible.

After Situation:

Water quality results are known.

Scenario Feature Measure: No.

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $50.84 **Scenario Cost/Unit:** $50.84

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	0.5	$12.48
Materials						
Test, Standard Water Test, Irrigation Suitability	310	Irrigation water suitability lab analysis. Includes pH, alkalinity, carbonates/bicarbonates, EC, dissolved solids, B, Cl, Ca, Mg, Na, SAR, and hardness.	Each	$38.36	1	$38.36

Practice: 355 - Well Water Testing

Scenario: #2 - Specialty Water Test

Scenario Description:

Typical scenario includes the professional testing for pesticides, heavy metals, VOC's or other less common substances, in addition to the basic water test items. Tests are intended to confirm well water meets water quality standards for consumption by livestock or use in irrigation. Water samples are sent to an EPA or state certified laboratory for testing. This scenario is recommended when water quality is suspected to be degraded due to a specialized substance.

Before Situation:

There are no known contaminants of the well, however, neighboring wells have known issues with water quality, and confirmation of acceptable water quality is desired. Manure, pesticides, or other potential contaminants have been spread near to the well, in an unmanaged manner; well contamination is possible.

After Situation:

Water quality results are known.

Scenario Feature Measure: No.

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $200.86 **Scenario Cost/Unit:** $200.86

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	0.5	$12.48
Materials						
Test, singular specialized water test, well water	2003	Testing for specific pesticide, inorganic chemical or volatile organic not included in a basic well suitability test.. Includes materials and shipping only.	Each	$150.02	1	$150.02
Test, Standard Water Test, Irrigation Suitability	310	Irrigation water suitability lab analysis. Includes pH, alkalinity, carbonates/bicarbonates, EC, dissolved solids, B, Cl, Ca, Mg, Na, SAR, and hardness.	Each	$38.36	1	$38.36

Practice: 355 - Well Water Testing

Scenario: #3 - Full Spectrum Test

Scenario Description:

Typical scenario includes the professional comprehensive testing for all less common substances, to include: pesticides, heavy metals, VOC's or other less common substances, in addition to the basic water test items. Tests are intended to confirm well water meets water quality standards for consumption by livestock or use in irrigation. Water samples are sent to an EPA or state certified laboratory for testing. This scenario is recommended when water quality is known to be degraded due to a specialized substance but thorough analysis is warranted.

Before Situation:

There are no known contaminants of the well, however, neighboring wells have known issues with water quality, and confirmation of acceptable water quality is desired. Manure, pesticides, sewage sludge, or other potential contaminants have been spread near to the well, in an unmanaged manner; well contamination is likely.

After Situation:

Water quality results are known.

Scenario Feature Measure: No.

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $244.61 **Scenario Cost/Unit:** $244.61

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	0.5	$12.48
Materials						
Test, comprehensive specialized water test, well water	2002	Comprehensive testing for a broad spectrum of pesticides, inorganic chemicals or volatile organics not included in a basic well suitability test. Includes materials and shipping only.	Each	$193.77	1	$193.77
Test, Standard Water Test, Irrigation Suitability	310	Irrigation water suitability lab analysis. Includes pH, alkalinity, carbonates/bicarbonates, EC, dissolved solids, B, Cl, Ca, Mg, Na, SAR, and hardness.	Each	$38.36	1	$38.36

Practice: 356 - Dike

Scenario: #1 - Material haul, <= 1 mile

Scenario Description:

Construction of a barrier, constructed of an earthen embankment, to control water level. Embankment structure to provide adequate freeboard, allowance for settlement, and foundation and embankment stability. Material haul <= 1 mile. Associated practices include, but are not limited to: Conservation Cover (327), Constructed Wetland (656), Critical Area Planting (342), Ponds (378), Fence (382), Irrigation Land Leveling (464), Obstruction Removal (500), Prescribed Grazing (528), Structure for Water Control (587), Underground Outlet (620), Upland Wildlife Management (645), Wetland Creation (658), Wetland Enhancement (659), Wetland Restoration (657), Wetland Wildlife Habitat Management (644).

Before Situation:

Site is subject to flooding or inundation which poses a potential hazard to public safety, damage to land or property. Site may also require control of water level for purposes connected with crop production; fish and wildlife management; or wetland maintenance, improvement, restoration, or construction. An adequate quantity of soil suitable for constructing an earthen dike is available at an economical haul distance. Material haul <= 1 mile.

After Situation:

Water level controlled by a stable earthen structure. Potential hazard to public safety, land or property mitigated; environmental benefit provided. Typical scenario is for removal of sod layer, importing fill from 1 mile away, placement and compaction of fill and final site grading. Typical earthen dike assumed 1000 lineal feet, 6 ft. in height, 10 ft. top width, 2.5 H:1V side slopes. Post construction seeding and erosion control are not part of the scenario cost and should be contracted seperatly.

Scenario Feature Measure: Volume of Earthfill (including volume of soil berm, as needed)

Scenario Unit: Cubic Yard

Scenario Typical Size: 6,111

Scenario Cost: $49,676.24 **Scenario Cost/Unit:** $8.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	6111	$14,483.07
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	6111	$26,888.40
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	24	$2,994.72
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.32	6111	$1,955.52
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$308.64	1	$308.64
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	12	$1,319.28
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	3	$1,469.97
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 356 - Dike

Scenario: #2 - Material haul, > 1 mile

Scenario Description:

Construction of a barrier, constructed of an earthen embankment, to control water level. Embankment structure to provide adequate freeboard, allowance for settlement, and foundation and embankment stability. Material haul <= 1 mile. Associated practices include, but are not limited to: Conservation Cover (327), Constructed Wetland (656), Critical Area Planting (342), Ponds (378), Fence (382), Irrigation Land Leveling (464), Obstruction Removal (500), Prescribed Grazing (528), Structure for Water Control (587), Underground Outlet (620), Upland Wildlife Management (645), Wetland Creation (658), Wetland Enhancement (659), Wetland Restoration (657), Wetland Wildlife Habitat Management (644).

Before Situation:

Site is subject to flooding or inundation which poses a potential hazard to public safety, damage to land or property. Site may also require control of water level for purposes connected with crop production; fish and wildlife management; or wetland maintenance, improvement, restoration, or construction. An adequate quantity of soil suitable for constructing an earthen dike is available at an economical haul distance. Material haul > 1 mile.

After Situation:

Water level controlled by a stable earthen structure. Potential hazard to public safety, land or property mitigated; environmental benefit provided. Typical scenario is for removal of sod layer, importing fill from 3 miles away, placement and compaction of fill and final site grading. Typical earthen dike assumed 1000 lineal feet, 6 ft. in height, 10 ft. top width, 2.5 H:1V side slopes. Post construction seeding and erosion control are not part of the scenario cost and should be contracted seperatly.

Scenario Feature Measure: Volume of Earthfill (including volume of soil berm, as needed)

Scenario Unit: Cubic Yard

Scenario Typical Size: 6,111

Scenario Cost: $53,587.28 **Scenario Cost/Unit:** $8.77

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$308.64	1	$308.64
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.32	18333	$5,866.56
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	24	$2,994.72
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	6111	$26,888.40
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	6111	$14,483.07
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	12	$1,319.28
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	3	$1,469.97

Practice: 356 - Dike

Scenario: #3 - Class IV A and B, Wetland

Scenario Description:

Construction of an earthen embankment, to control water level. Embankment structure to provide adequate freeboard, allowance for settlement, and foundation and embankment stability. Typical earthen dike assumed 1000 lineal feet, Class IV A or B (2ft. in height, 8 ft. top width, 3H:1V side slopes). Associated practices include, but are not limited to: PS327 Conservation Cover, PS656 Constructed Wetland, PS342 Critical Area Planting, PS378 Ponds, PS382 Fence, PS500 Obstruction Removal, PS587 Structure for Water Control, PS620 Underground Outlet, PS645 Upland Wildlife Management, PS658 Wetland Creation, PS659 Wetland Enhancement, PS657 Wetland Restoration, PS644 Wetland Wildlife Habitat Management.

Before Situation:

Site is subject to flooding or indundation which poses a potential hazard to public safety, damage to land or property. Site may also require control of water level for purposes connected with crop production; fish and wildlife managment; or wetland maintenance, improvement, restoration, or construction. An adequate quantity of soil suitable for constructing an earthen dike is available at an economical haul distance. Material haul < 1 mile.

After Situation:

Water level controlled by a stable earthen structure. Potential hazard to public safety, land or property mitigated; environmental benefit provided.

Scenario Feature Measure: Volume of Earthfill (including volume of soil berm, as needed)

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,037

Scenario Cost: $5,780.77 **Scenario Cost/Unit:** $5.57

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Scraper, pull, 7 CY	1206	Pull type earthmoving scraper with 7 CY capacity. Does not include pulling equipment or labor. Add Tractor or Dozer, 160 HP typically required for single scraper.	Hour	$15.56	20	$311.20
Roller, static, smooth, self propelled	1392	Self propelled smooth drum static roller compactor, typically 1.5 ton with 34" roller. Equipment cost only. Does not include labor.	Hour	$23.41	16	$374.56
Tractor, agricultural, 160 HP	1203	Agricultural tractor with horsepower range of 140 to 190. Equipment and power unit costs. Labor not included.	Hour	$75.66	20	$1,513.20
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	24	$535.92
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	12	$1,319.28
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	3	$1,469.97

Practice: 356 - Dike

Scenario: #4 - Class IV A and B, Wetland, Protected

Scenario Description:

Construction of an rock-armored, earthen embankment, to control water level. Embankment structure to provide adequate freeboard, allowance for settlement, protection against wave action OR reinforced spillway, and foundation and embankment stability. Haul in materials for protecting dike surface/spillway. Typical earthen dike assumed 1000 lineal feet, Class IV A or B (2ft. in height, 8 ft. top width, 3H:1V side slopes). Associated practices include, but are not limited to: PS327 Conservation Cover, PS656 Constructed Wetland, PS342 Critical Area Planting, PS378 Ponds, PS382 Fence, PS500 Obstruction Removal, PS587 Structure for Water Control, PS620 Underground Outlet, PS645 Upland Wildlife Management, PS658 Wetland Creation, PS659 Wetland Enhancement, PS657 Wetland Restoration, PS644 Wetland Wildlife Habitat Management.

Before Situation:

Site is subject to flooding or indundation which poses a potential hazard to public safety, damage to land or property. In addition the size, location, and layout of the project is such that sufficient fetch distance is present to develop potentially damaging wave action OR dike is required to have an emergency spillway that is lined either with rock or geoxtile for reinforcement. Site may also require control of water level for purposes connected with crop production; fish and wildlife managment; or wetland maintenance, improvement, restoration, or construction. An adequate quantity of soil suitable for constructing an earthen dike is available at an economical haul distance. Material haul < 1 mile.

After Situation:

Water level controlled by a stable, rock-armored, earthen structure, OR rock or geotextile lined spillway on the earthen structure. Potential hazard to public safety, land or property mitigated; environmental benefit provided.

Scenario Feature Measure: Volume of Earthfill (including volume of soil berm, as needed)

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,037

Scenario Cost: $6,980.29 **Scenario Cost/Unit:** $6.73

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tractor, agricultural, 160 HP	1203	Agricultural tractor with horsepower range of 140 to 190. Equipment and power unit costs. Labor not included.	Hour	$75.66	20	$1,513.20
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.32	609	$194.88
Roller, static, smooth, self propelled	1392	Self propelled smooth drum static roller compactor, typically 1.5 ton with 34" roller. Equipment cost only. Does not include labor.	Hour	$23.41	16	$374.56
Scraper, pull, 7 CY	1206	Pull type earthmoving scraper with 7 CY capacity. Does not include pulling equipment or labor. Add Tractor or Dozer, 160 HP typically required for single scraper.	Hour	$15.56	20	$311.20
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	24	$535.92
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	12	$1,319.28
Materials						
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$25.76	39	$1,004.64
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	3	$1,469.97

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 359 - Waste Treatment Lagoon

Scenario: #1 - Waste Treatment Lagoon

Scenario Description:

A waste treatment lagoon is a component of a waste management system that provides storage and biological treatment of manure and other by-products of animal agricultural operations thereby reducing the pollution potential. Resource concern addressed is water quality by reducing the pollution potential to surface and groundwater by treating and storing liquid waste. Earthen lagoon liners are addressed with another standard.

Potential Associated Practices: Pond Sealing or Lining (521 series), Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), and Solid/Liquid Waste Separation Facility (632).

Before Situation:

Operator presently has a confined animal feeding operation without a waste management system adequate to handle the waste stream leaving the animal production facilities. Manure and other agricultural waste by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or are being transported but not properly utilized or disposed of. This situation poses an environmental threat of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources.

After Situation:

A waste treatment lagoon constructed from on-site material provides an environmentally safe facility for storing manure and other agricultural waste by-products. This facility provides the landowner a means of storing and treating waste until it can be utilized in a proper manner in accordance with a nutrient management plan.
Typical design size : Design Volume 439,440 ft3; 260' X 208' (top); 3:1 inside and outside side slopes; cut/fill ratio = 1.25; total depth = 13'; 1' freeboard (not included in design volume)

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 439,440

Scenario Cost: $105,419.40 **Scenario Cost/Unit:** $0.24

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	8101	$29,244.61
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.61	9125	$32,941.25
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	1389	$1,194.54
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	9102	$40,048.80
Materials						
Structural steel tubing, 2" diameter	1120	Structural steel tubing, 2" diameter, 1/8" wall thickness, materials only	Foot	$3.78	8	$30.24
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	4	$1,959.96

Practice: 360 - Waste Facility Closure

Scenario: #3 - Demolition of Concrete Waste Storage Structure

Scenario Description:

This practice scenario includes the demolition of a concrete waste storage structure. The purpose of the practice is to address resource concerns related to water quality degradation due to excess nutrient and pathogens in ground and/or surface waters and air quality impacts from greenhouse gases, particulate matter and associated precursors, and objectionable odors.
Associated practices: Nutrient Management (590), Critical Area Planting (342)

Before Situation:

An existing concrete waste storage structure is no longer functioning correctly or is not being used for its intended purpose. It poses a safety hazard for humans and livestock and is a threat to environmentally sustainability by the potential for impacts to water and air quality.

After Situation:

This scenario assumes a concrete waste storage structure, with top dimensions of 60 ft x 60 ft with 10 ft vertical walls. The walls are 8 inches thick, the concrete floor is 5 inches thick and the footing for the wall is 12 inches wide by 24 inches deep. The total structural storage volume equals 36,000 cubic feet. The total volume of concrete to be demolished is 3,580 cubic feet ([2 X (60 ft + 60 ft) X 10 ft X 8in /12 in/ft] + [60 ft X 60 ft X 5in /12 in/ft] + [2 X (60 ft + 60 ft) X 12in /12 in/ft X 24in /12in/ft]). The volume of waste to be removed approximately equals 50% of the structural volume (50% X 36,000 = 18,000 CF). The volume of earthwork (earthfill and/or excavation, final grading) required is approximately 50% of the structural volume. The concrete will be demolished and hauled off-site for recycling or disposal. Structural removal, as necessary, may include the sealing or removal and disposal of waste transfer components and other appurtenances associated with closure of the facility. Demolition of a concrete waste storage structure includes agitating, removing, and spreading the waste remaining in the structure. All waste material shall be land applied in accordance with Nutrient Management (590). Excavated areas will be filled in. The disturbed areas shall be vegetated in accordance with Critical Area Planting (342). Demolition of the concrete waste structure will address water quality degradation, air quality impacts and safety hazards by removing and properly utilizing the waste from the impoundment. The site will also become available for another use.

Scenario Feature Measure: Cubic Feet of concrete to be demolished

Scenario Unit: Cubic Foot

Scenario Typical Size: 3,580

Scenario Cost: $10,408.05 **Scenario Cost/Unit:** $2.91

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.30	133	$2,433.90
Manure, compost, injection	956	Loading, hauling and injecting manure/compost by ground equipment. Includes equipment, power unit and labor costs.	Gallon	$0.01	134640	$1,346.40
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	667	$2,934.80
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	10	$1,144.80
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.32	1330	$425.60
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	10	$375.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	4	$1,026.56

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 360 - Waste Facility Closure

Scenario: #4 - Waste Storage Pond Decomissioning

Scenario Description:

This practice scenario includes the decommissioning of an earthen liquid waste impoundment (embankment or excavated type). The purpose of the practice is to address resource concerns related to water quality degradation due to excess nutrient and pathogens in ground and/or surface waters and air quality impacts from greenhouse gases, particulate matter and associated precursors, and objectionable odors.
Associated practices: Nutrient Management (590), Critical Area Planting (342)

Before Situation:

An existing lagoon or waste storage pond is no longer functioning correctly, has passed the practice lifespan, no longer meets the practice standard or is not being used for its intended purpose. It poses a safety hazard for humans and livestock and is a threat to environmental sustainability by the potential for impacts to water and air quality.

After Situation:

This scenario assumes a waste storage pond, with top dimensions of 110 ft x 110 ft, 8 ft total depth with 2:1 side slopes. The total structural storage volume equals 63,851 cubic feet. The volume of liquid waste to be pumped approximately equals 50% if the structural volume (50% X 63,851 CF = 31,925 CF). The volume of solid waste to be removed approximately equals 50% of the structural volume (50% X 63,851 = 31,925 CF). The volume of earthwork (earthfill and excavation) required to breach the embankment and/or fill in the impoundment and perform final grading of the site is approximately 50% of the structural volume. The volume of earthwork will include 60% as excavation and 40% as compacted earthfill. Structural removal, as necessary, may include the removal and disposal of the synthetic liner, sealing or removal and disposal of waste transfer components and other appurtenances associated with closure of the facility. Decommissioning of a liquid waste storage impoundment includes agitating, removing, and spreading liquid/slurry waste material, removing solid/sludge waste remaining in the bottom. All waste material shall be land applied in accordance with Nutrient Management (590). If present, the synthetic liner will be removed and properly disposed of. All inflow devices and associated appurtenances will be removed and properly disposed of. The embankment will be breached and the excavation filled in with the embankment material or hauled in earthfill. The disturbed areas shall be vegetated in accordance with Critical Area Planting (342). Closure of the waste impoundment will address water quality degradation, air quality impacts and safety hazards by removing and properly utilizing the waste from the impoundment. The site will also become available for another use.

Scenario Feature Measure: Cubic feet of structural storage

Scenario Unit: Cubic Foot

Scenario Typical Size: 63,851

Scenario Cost: $17,809.32 **Scenario Cost/Unit:** $0.28

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	4	$457.92
Spreading, manure sludge	1633	Loading, hauling and spreading manure solids/sludge by ground equipment on nearby fields. Includes equipment, power unit and labor costs.	Cubic Foot	$0.29	31925	$9,258.25
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	709	$1,680.33
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	473	$2,081.20
Manure, compost, injection	956	Loading, hauling and injecting manure/compost by ground equipment. Includes equipment, power unit and labor costs.	Gallon	$0.01	238803	$2,388.03
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	4	$150.08
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	12	$276.96

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	4	$1,026.56
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 360 - Waste Facility Closure

Scenario: #5 - Waste Storage Pond Decomissioning, Imported fill

Scenario Description:

This practice scenario includes the decommissioning of an earthen liquid waste impoundment (embankment or excavated type) where Imported fill is required. The purpose of the practice is to address resource concerns related to water quality degradation due to excess nutrient and pathogens in ground and/or surface waters and air quality impacts from greenhouse gases, particulate matter and associated precursors, and objectionable odors.
Associated practices: Nutrient Management (590), Critical Area Planting (342)

Before Situation:

An existing lagoon or waste storage pond is no longer functioning correctly or is not being used for its intended purpose. It poses a safety hazard for humans and livestock and is a threat to environmental sustainability by the potential for impacts to water and air quality.

After Situation:

This scenario assumes a waste storage pond, with top dimensions of 110 ft x 110 ft, 8 ft total depth with 2:1 side slopes. The total structural storage volume equals 63,851 cubic feet. The volume of liquid waste to be pumped approximately equals 50% if the structural volume (50% X 63,851 CF = 31,925 CF). The volume of solid waste to be removed approximately equals 50% of the structural volume (50% X 63,851 = 31,925 CF). The volume of earthwork (earthfill and excavation) required to breach the embankment and/or fill in the impoundment and perform final grading of the site is approximately 80% of the structural volume (80% of the ponds storage is below ground), 60% of fill needed will need to be imported from off site. Typical haul distance is 1 mile. Structural removal, as necessary, may include the removal and disposal of the synthetic liner, sealing or removal and disposal of waste transfer components and other appurtenances associated with closure of the facility. Decommissioning of a liquid waste storage impoundment includes agitating, removing, and spreading liquid/slurry waste material, removing solid/sludge waste remaining in the bottom. All waste material shall be land applied in accordance with Nutrient Management (590). If present, the synthetic liner will be removed and properly disposed of. All inflow devices and associated appurtenances will be removed and properly disposed of. The embankment will be breached and the excavation filled in with the embankment material or hauled in earthfill. The disturbed areas shall be vegetated in accordance with Critical Area Planting (342). Closure of the waste impoundment will address water quality degradation, air quality impacts and safety hazards by removing and properly utilizing the waste from the impoundment. The site will also become available for another use.

Scenario Feature Measure: Cubic feet of structural storage

Scenario Unit: Cubic Foot

Scenario Typical Size: 63,851

Scenario Cost: $27,187.34 **Scenario Cost/Unit:** $0.43

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.32	1362	$435.84
Manure, compost, injection	956	Loading, hauling and injecting manure/compost by ground equipment. Includes equipment, power unit and labor costs.	Gallon	$0.01	238803	$2,388.03
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	1362	$4,916.82
Spreading, manure sludge	1633	Loading, hauling and spreading manure solids/sludge by ground equipment on nearby fields. Includes equipment, power unit and labor costs.	Cubic Foot	$0.29	31925	$9,258.25
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	757	$1,794.09
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	1362	$5,992.80
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	4	$457.92

Labor

Labor

Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	4	$150.08
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	12	$276.96

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	4	$1,026.56

Practice: 362 - Diversion

Scenario: #1 - Small, less than or equal to 0.5 CY per LF

Scenario Description:

An earthen channel constructed across long slopes with supporting ridge on lower side, to divert runoff away from farmsteads, agricultural waste systems, streams, gullies, critical erosion areas, construction areas or other sensitive areas. Outlet may be waterway, underground outlet. or other suitable outlet. Typical diversion is, 1000 feet long installed on a field slope of 5 percent and requires less than 1/2 CY excavation per LF. Channel my be level or gradient and ridge may be vegetated or farmed. The quantity of excavation and fill is balanced.

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm or range fields, along access roads, and other locations. Also, roof runoff or surface runoff that becomes contaminated with agricultral wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

A diversion channel 1000 feet long requiring 0.4 cy of excavation per linear foot of channel is installed using a backhoe or small dozer. Field system meets "T" or "clean" storm water runoff is diverted away from streams, sensitive areas, or an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultral waste. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Underground Outlet (620), Mulching (484), and Subsurface Drainage (606).

Scenario Feature Measure: Length of Diversion

Scenario Unit: Linear Feet

Scenario Typical Size: 1,000

Scenario Cost: $3,349.90 **Scenario Cost/Unit:** $3.35

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	400	$948.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	400	$1,760.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	2	$46.16
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 362 - Diversion

Scenario: #2 - Medium-Small, >0.5 -1 CY per LF

Scenario Description:

An earthen channel constructed across long slopes with supporting ridge on lower side, to divert runoff away from farmsteads, agricultural waste systems, gullies, critical erosion areas, construction areas or other sensitive areas. Outlet may be a waterway, underground outlet. or other suitable outlet. Typical diversion is, 1000 feet long installed on a field slope of 5 percent and requires 1/2 - 1 CY excavation per LF. Channel may be level or gradient and ridge may be vegetated or farmed. The quantity of excavation and fill is balanced.

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm or range fields, along access roads, or other locations. Also, roof runoff or surface runoff that becomes contaminated with agricultral wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

A diversion channel 1000 feet long requiring 0.8 cy of excavation per linear foot of channel is installed using a backhoe or small dozer. Field system meets "T" or "clean" storm water runoff is diverted away from streams, sensitive areas, or an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultral waste. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Underground Outlet (620), Mulching (484), and Subsurface Drainage (606).

Scenario Feature Measure: Length of Diversion

Scenario Unit: Linear Feet

Scenario Typical Size: 1,000

Scenario Cost: $6,080.98 **Scenario Cost/Unit:** $6.08

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	800	$1,896.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	800	$3,520.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	3	$69.24
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 362 - Diversion

Scenario: #3 - Medium-Large, >1 - 2 CY per LF

Scenario Description:

An earthen channel constructed across long slopes with supporting ridge on lower side, to be used with large scale projects perhaps for flooding issues to divert runoff away from farmsteads, agricultural waste systems, gullies, critical erosion areas, construction areas or other sensitive areas. Outlet may be waterway, underground outlet. or other suitable outlet. Typical diversion is, 1000 feet long installed on a field slope of 5 percent and requires >1 - 2 CY excavation per LF. Channel my be level or gradient and ridge may be vegetated or farmed. The quantity of excavation and fill is balanced.

Before Situation:

Excessive sedimentation and soil erosion as a result of flooding, gully, rill or sheet erosion which exceeds "T" from farm fields and other locations.

After Situation:

A diversion channel 1000 feet long requiring 1.5 cy of excavation per linear foot of channel is installed using a backhoe or small dozer. Field system meets "T" or "clean" storm water runoff is diverted away from streams, sensitive areas, or an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultral waste. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Underground Outlet (620), Mulching (484), and Subsurface Drainage (606).

Scenario Feature Measure: Diversion Fill Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,000

Scenario Cost: $13,371.41 **Scenario Cost/Unit:** $13.37

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	1500	$6,600.00
Excavation, common earth, large equipment, 1500 ft	1221	Bulk excavation of common earth including sand and gravel with scrapers with average haul distance of 1500 feet. Includes equipment and labor.	Cubic Yard	$3.90	1500	$5,850.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	4	$92.32
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 362 - Diversion

Scenario: #4 - Large, > 2 CY per LF

Scenario Description:

An earthen channel constructed across long slopes with supporting ridge on lower side on very large scale projects, perhaps involving flooding issues, to divert runoff away from farmsteads, agricultural waste systems, gullies, critical erosion areas, construction areas or other sensitive areas. Outlet may be waterway, underground outlet. or other suitable outlet. Typical diversion is, 1000 feet long installed on a field slope of 5 percent and requires greater than 2 CY excavation per LF. Channel may be level or gradient and ridge may be vegetated or farmed. The quantity of excavation and fill is balanced.

Before Situation:

Excessive sedimentation and soil erosion as a result of flooding, gully, rill or sheet erosion which exceeds "T" from farm fields and other locations.

After Situation:

A diversion channel 1000 feet long requiring 2.5 cy of excavation per linear foot of channel is installed using a backhoe or small dozer. Field system meets "T" or "clean" storm water runoff is diverted away from streams, sensitive areas, or an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultral waste. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Underground Outlet (620), Mulching (484), and Subsurface Drainage (606).

Scenario Feature Measure: Diversion Fill Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,000

Scenario Cost: $21,047.02 **Scenario Cost/Unit:** $21.05

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.61	2500	$9,025.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	2500	$11,000.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	3	$69.24
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	5	$206.15
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 366 - Anaerobic Digester

Scenario: #1 - Small Plug Flow <1000 AU

Scenario Description:

A plug flow anaerobic digester can be part of a waste management system. It provides biological treatment of the waste in the absence of oxygen. This process for manure and other byproducts of animal agricultural operations will manage odors, reduce the net effect of greenhouse gas emissions, and/or reduce pathogens. This scenario is for a plug flow digester with less than 1,000 animal units. Selection of digester type will be based on effluent consistency. Energy generation is not included with this scenario.

Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Solid/Liquid Waste Separation Facility (632), Waste Treatment Lagoon (359), and Waste Storage Facility (313).

Before Situation:

Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmentally threat of excessive nutrients, organics, and pathogens being transported into surface and ground waters, in addition to the use of excessive amounts of fertilizers. The treatment of manure and other agricultural by-products is desired in order to manage odors, and/or reduce pathogens.

After Situation:

Manure and other agricultural by-products are being treated such that odors are managed and/or pathogens are reduced. Effluent from the digester is disposed of or utilized in a proper manner in accordance with a nutrient management plan.
A plug flow digester is typically constructed of concrete with vertical side walls and solid or flexible top. The typical scenario also includes items necessary to maintain mesophylic or thermophylic temperatures for bacterial activity (i.e. piping and boiler or other heat source).
Typical Design Scenario: 950 animal units (650 - 1,400 lbs dairy cows).

Scenario Feature Measure: Animals Units Contributing to Digester

Scenario Unit: Animal Unit

Scenario Typical Size: 910

Scenario Cost: $642,998.32 **Scenario Cost/Unit:** $706.59

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Plug Flow, Small (less than 1,000 animal units)	2478	Concrete plug flow anaerobic digester which includes poured walls, floor and top, reception and mixing tanks, piping installed in and/or around the digester for circulating heated liquid to maintain the necessary temperatures for efficient digester operat	Each	##########	1	$642,998.32

Practice: 366 - Anaerobic Digester

Scenario: #2 - Medium Plug Flow 1000-2000 AU

Scenario Description:

A plug flow anaerobic digester can be part of a waste management system. It provides biological treatment of the waste in the absence of oxygen. This process for manure and other byproducts of animal agricultural operations will manage odors, reduce the net effect of greenhouse gas emissions, and/or reduce pathogens. This scenario is for plug flow digesters with livestock operations between 1,000 and 2,000 animal units. Selection of digester type will be based on effluent consistency. Energy generation is not included with this scenario.

Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Solid/Liquid Waste Separation Facility (632), Waste Treatment Lagoon (359), and Waste Storage Facility (313).

Before Situation:

Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmentally threat of excessive nutrients, organics, and pathogens being transported into surface and ground waters, in addition to the use of excessive amounts of fertilizers. The treatment of manure and other agricultural by-products is desired in order to manage odors, and/or reduce pathogens.

After Situation:

Manure and other agricultural by-products are being treated such that odors are managed and/or pathogens are reduced. Effluent from the digester is disposed of or utilized in a proper manner in accordance with a nutrient management plan.
A plug flow digester is typically constructed of concrete with vertical side walls and solid or flexible top. The typical scenario also includes items necessary to maintain mesophylic or thermophylic temperatures for bacterial activity (i.e. piping and boiler or other heat source).
Typical design scenario: 1,750 animal units (1,250 - 1,400 lbs dairy cows).

Scenario Feature Measure: Animals Units Contributing to Digester

Scenario Unit: Animal Unit

Scenario Typical Size: 1,750

Scenario Cost: $880,281.73 **Scenario Cost/Unit:** $503.02

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Plug Flow, Medium (between 1,000 and 2,000 animal units)	2479	Concrete plug flow anaerobic digester which includes poured walls, floor and top, reception and mixing tanks, piping installed in and/or around the digester for circulating heated liquid to maintain the necessary temperatures for efficient digester operat	Each	##########	1	$880,281.73

Practice: 366 - Anaerobic Digester

Scenario: #3 - Large Plug Flow >2000 AU

Scenario Description:

A plug flow anaerobic digester can be part of a waste management system. It provides biological treatment of the waste in the absence of oxygen. This process for manure and other byproducts of animal agricultural operations will manage odors, reduce the net effect of greenhouse gas emissions, and/or reduce pathogens. This scenario is for plug flow digesters with more than 2,000 animal units. Selection of digester type will be based on effluent consistency. Energy generation is not included with this scenario.

Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Solid/Liquid Waste Separation Facility (632), Waste Treatment Lagoon (359), and Waste Storage Facility (313).

Before Situation:

Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmentally threat of excessive nutrients, organics, and pathogens being transported into surface and ground waters, in addition to the use of excessive amounts of fertilizers. The treatment of manure and other agricultural by-products is desired in order to manage odors, and/or reduce pathogens.

After Situation:

Manure and other agricultural by-products are being treated such that odors are managed and/or pathogens are reduced. Effluent from the digester is disposed of or utilized in a proper manner in accordance with a nutrient management plan.
A plug flow digester is typically constructed of concrete with vertical side walls and solid or flexible top. The typical scenario also includes items necessary to maintain mesophylic or thermophylic temperatures for bacterial activity (i.e. piping and boiler or other heat source).
Typical Design Scenario: 3,920 animal units (2,800 - 1,400 lbs dairy cows).

Scenario Feature Measure: Animals Units Contributing to Digester

Scenario Unit: Animal Unit

Scenario Typical Size: 3,920

Scenario Cost: $1,317,470.22 **Scenario Cost/Unit:** $336.09

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Plug Flow, Large (more than 2,000 animal units)	2480	Concrete plug flow anaerobic digester which includes poured walls, floor and top, reception and mixing tanks, piping installed in and/or around the digester for circulating heated liquid to maintain the necessary temperatures for efficient digester operat	Each	##########	1	##########

Practice: 366 - Anaerobic Digester

Scenario: #4 - Small Complete Mix <1000 AU

Scenario Description:

A complete mix anaerobic digester can be part of a waste management system. It provides biological treatment of the waste in the absence of oxygen. This process for manure and other byproducts of animal agricultural operations will manage odors, reduce the net effect of greenhouse gas emissions, and/or reduce pathogens. This scenario is for complete mix systems with less than 1,000 animal units. Selection of digester type will be based on effluent consistency. Energy generation is not included with this scenario.

Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Solid/Liquid Waste Separation Facility (632), Waste Treatment Lagoon (359), and Waste Storage Facility (313).

Before Situation:

Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmentally threat of excessive nutrients, organics, and pathogens being transported into surface and ground waters, in addition to the use of excessive amounts of fertilizers. The treatment of manure and other agricultural by-products is desired in order to manage odors, and/or reduce pathogens.

After Situation:

Manure and other agricultural by-products are being treated such that odors are managed and/or pathogens are reduced. Effluent from the digester is disposed of or utilized in a proper manner in accordance with a nutrient management plan.
A complete mix digester is typically a round above ground structure constructed of concrete or steel. The typical scenario also includes items necessary to maintain mesophylic or thermophylic temperatures for bacterial activity (i.e. piping and boiler or other heat source).
Typical Design Scenario: 1,039 animal units (742 - 1,400 lbs dairy cows).

Scenario Feature Measure: Animals Units Contributing to Digester

Scenario Unit: Animal Unit

Scenario Typical Size: 1,039

Scenario Cost: $737,766.02 **Scenario Cost/Unit:** $710.07

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Complete Mix, Small (less than 1,000 animal units)	2481	A complete mix flow anaerobic digester includes the containment facility, agitation or stirring equipment, and any necessary reception and mixing tanks, Piping installed in and/or around the digester for circulating heated liquid to maintain the necessary	Each	##########	1	$737,766.02

Practice: 366 - Anaerobic Digester

Scenario: #5 - Medium Complete Mix 1000-2500 AU

Scenario Description:

A complete mix anaerobic digester can be part of a waste management system. It provides biological treatment of the waste in the absence of oxygen. This process for manure and other byproducts of animal agricultural operations will manage odors, reduce the net effect of greenhouse gas emissions, and/or reduce pathogens. This scenario is for complete mix systems between 1,000 and 2,500 animal units. Selection of digester type will be based on effluent consistency. Energy generation is not included with this scenario.

Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Solid/Liquid Waste Separation Facility (632), Waste Treatment Lagoon (359), and Waste Storage Facility (313).

Before Situation:

Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmentally threat of excessive nutrients, organics, and pathogens being transported into surface and ground waters, in addition to the use of excessive amounts of fertilizers. The treatment of manure and other agricultural by-products is desired in order to manage odors, and/or reduce pathogens.

After Situation:

Manure and other agricultural by-products are being treated such that odors are managed and/or pathogens are reduced. Effluent from the digester is disposed of or utilized in a proper manner in accordance with a nutrient management plan.
A complete mix digester is typically a round above ground structure constructed of concrete or steel. The typical scenario also includes items necessary to maintain mesophylic or thermophylic temperatures for bacterial activity (i.e. piping and boiler or other heat source).
Typical Design Scenario: 2,000 animal units (1,350 - 1,400 lbs dairy cows).

Scenario Feature Measure: Animals Units Contributing to Digester

Scenario Unit: Animal Unit

Scenario Typical Size: 1,890

Scenario Cost: $1,287,674.69 **Scenario Cost/Unit:** $681.31

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Complete Mix, Medium (between 1,000 and 2,500 animal units)	2482	A complete mix flow anaerobic digester includes the containment facility, agitation or stirring equipment, and any necessary reception and mixing tanks, Piping installed in and/or around the digester for circulating heated liquid to maintain the necessary	Each	##########	1	##########

Practice: 366 - Anaerobic Digester

Scenario: #6 - Large Complete Mix >2,500 AU

Scenario Description:

A complete mix anaerobic digester can be part of a waste management system. It provides biological treatment of the waste in the absence of oxygen. This process for manure and other byproducts of animal agricultural operations will manage odors, reduce the net effect of greenhouse gas emissions, and/or reduce pathogens. This scenario is for complete mix systems with more than 2,500 animal units. Selection of digester type will be based on effluent consistency. Energy generation is not included with this scenario.

Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Solid/Liquid Waste Separation Facility (632), Waste Treatment Lagoon (359), and Waste Storage Facility (313).

Before Situation:

Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmentally threat of excessive nutrients, organics, and pathogens being transported into surface and ground waters, in addition to the use of excessive amounts of fertilizers. The treatment of manure and other agricultural by-products is desired in order to manage odors, and/or reduce pathogens.

After Situation:

Manure and other agricultural by-products are being treated such that odors are managed and/or pathogens are reduced. Effluent from the digester is disposed of or utilized in a proper manner in accordance with a nutrient management plan. A complete mix digester is typically a round above ground structure constructed of concrete or steel. The typical scenario also includes items necessary to maintain mesophylic or thermophylic temperatures for bacterial activity (i.e. piping and boiler or other heat source).
Typical Design Scenario: 3,220 animal units (2,300 - 1,400 lbs dairy cows).

Scenario Feature Measure: Animals Units Contributing to Digester

Scenario Unit: Animal Unit

Scenario Typical Size: 3,220

Scenario Cost: $1,495,501.30 **Scenario Cost/Unit:** $464.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Complete Mix, Large (more than 2,500 animal units)	2483	A complete mix flow anaerobic digester includes the containment facility, agitation or stirring equipment, and any necessary reception and mixing tanks, Piping installed in and/or around the digester for circulating heated liquid to maintain the necessary	Each	##########	1	##########

Practice: 366 - Anaerobic Digester

Scenario: #7 - Covered Lagoon/Holding Pond

Scenario Description:

A covered lagoon can be part of a waste management system. It provides biological treatment of the waste in the absence of oxygen. This process for manure and other byproducts of animal agricultural operations will manage odors, reduce the net effect of greenhouse gas emissions, and/or reduce pathogens. This scenario is for all livestock operation sizes. The waste holding/treatment area is covered by waste treatment lagoon (359) or waste storage facility (313) and the cover is addressed under roofs and covers (367). Selection of digester type will be based on effluent consistency. Costs for this scenario are only for system controls, gas collection, and flaring system. Energy generation is not included with this scenario.

Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Solid/Liquid Waste Separation Facility (632), Waste Treatment Lagoon (359), and Waste Storage Facility (313).

Before Situation:

Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmentally threat of excessive nutrients, organics, and pathogens being transported into surface and ground waters, in addition to the use of excessive amounts of fertilizers. The treatment of manure and other agricultural by-products is desired in order to manage odors, and/or reduce pathogens.

After Situation:

Manure and other agricultural by-products are being treated such that odors are managed and/or pathogens are reduced. Effluent from the digester is disposed of or utilized in a proper manner in accordance with a nutrient management plan.
A covered lagoon/holding pond typically has a fexible top installed over an earthen storage/treatment facility for the purpose of capturing the biogas.
Typical Design Scenario: 1,000 animal units (715 - 1,400 lbs dairy cows).

Scenario Feature Measure: Animals Units Contributing to Digester

Scenario Unit: Animal Unit

Scenario Typical Size: 1,000

Scenario Cost: $107,000.00 **Scenario Cost/Unit:** $107.00

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Covered Lagoon (not including the lagoon or the associated cover)	2484	Piping and collection system for biogas, controls for operating the digester system, flare excess gas to convert from methane to carbon dioxide Includes material, labor, and equipment.	Each	##########	1	$107,000.00

Practice: 367 - Roofs and Covers

Scenario: #1 - Flexible Roof

Scenario Description:

A flexible membrane or fabric-like roof placed on a steel truss hoop-like supports and supporting foundation. Manure is stored as a liquid in basins, tanks, and as a solid on concrete and earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

Associated practices include Waste Storage Facility (313), Animal Mortality Facility (316), Composting Facility (317), Roof Runoff Structure (558), and Waste Treatment (629).

Before Situation:

Applicable where the exclusion of precipitation from an animal waste storage and/or treatment facility will improve of an existing or planned system. Manure is stored as a liquid in basins, tanks, and as a solid on concrete and earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

After Situation:

A flexible membrane or fabric-like roof placed on a steel truss hoop-like supports and supporting foundation. Roof or cover will be engineered and installed in accordance with appropriate building codes and permits. Typical size is 1,000 square feet and is over an approved animal waste management facility as a component of a CNMP. It is designed to prevent precipitation to allow proper management of animal waste streams (manure or compost streams), thus mitigating the negative factors from the "before practice implementation".

Scenario Feature Measure: Footprint of the building

Scenario Unit: Square Foot

Scenario Typical Size: 1,000

Scenario Cost: $9,000.00 **Scenario Cost/Unit:** $9.00

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Roof, Hoop Truss Arch Structure, less than 30' wide	1667	Hoop Truss Arch Structure with fabric cover - less than 30' width, includes materials, equipment, and installation. Does not include foundation preparation.	Square Foot	$9.00	1000	$9,000.00

Practice: 367 - Roofs and Covers

Scenario: #2 - Roof Structure, <30ft Width

Scenario Description:

A timber or metal framed building with a timber or steel "sheet" roof, less than 30' wide and supporting foundation with open sides. The roof structure covers manure that is stored as a liquid in basins, tanks, or as a solid on concrete and earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

Associated practices include Waste Storage Facility (313), Animal Mortality Facility (316), Composting Facility (317), Agrichemical Handling Facility (309), Roof Runoff Structure (558), and Waste Treatment (629).

Before Situation:

Applicable where the exclusion of precipitation from an animal waste storage and/or treatment facility will improve an existing or planned system. Manure is stored as a liquid in basins, tanks, and as a solid on concrete or earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

After Situation:

A timber or metal framed building with a timber or steel "sheet" roof and supporting foundation with open sides. The structure is engineered and installed in accordance with appropriate building codes and permits. Typical size is 20'WX100'L for a total 2,000 square feet and is over an approved animal waste management facility as a component of a CNMP. It is designed to prevent precipitation and to allow proper management of animal waste streams (manure or compost streams), thus mitigating the negative factors from the "before practice implementation".

Scenario Feature Measure: Footprint of building

Scenario Unit: Square Foot

Scenario Typical Size: 2,000

Scenario Cost: $28,100.00 **Scenario Cost/Unit:** $14.05

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Roof, Post Frame Building , less than 30' wide	1672	Post Frame Building, no sides, - less than 30' width. Building sites with expected snow loads up to 30 lbs per square foot and wind exposure in semi protected areas (wooded or terrain with numerous closely spaced obstructions). Includes materials, shipp	Square Foot	$14.05	2000	$28,100.00

Practice: 367 - Roofs and Covers

Scenario: #3 - Roof Structure, <30ft Width wih siding

Scenario Description:

A timber or metal framed building with a timber or steel "sheet" roof, less than 30' wide, and supporting foundation and with siding on 2 sides of the building to prevent wind blown rain from entering on the sides of the barn. The roof structure covers manure that is stored as a liquid in basins, tanks, or as a solid on concrete and earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

Associated practices include Waste Storage Facility (313), Animal Mortality Facility (316), Composting Facility (317), Agrichemical Handling Facility (309), Roof Runoff Structure (558), and Waste Treatment (629).

Before Situation:

Applicable where the exclusion of precipitation from an animal waste storage and/or treatment facility will improve an existing or planned system. Manure is stored as a liquid in basins, tanks, and as a solid on concrete or earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

After Situation:

A timber or metal framed building with a timber or steel "sheet" roof and supporting foundation with siding on 2 sides of the building. The structure is engineered and installed in accordance with appropriate building codes and permits. Typical size is 20'WX100'L for a total 2,000 square feet and is over an approved animal waste management facility as a component of a CNMP. It is designed to prevent precipitation and to allow proper management of animal waste streams (manure or compost streams), thus mitigating the negative factors from the "before practice implementation".

Scenario Feature Measure: Footprint of building

Scenario Unit: Square Foot

Scenario Typical Size: 2,000

Scenario Cost: $35,224.40 **Scenario Cost/Unit:** $17.61

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Aerial lift, telescoping bucket	1893	Aerial lift, bucket truck or cherry picker, typical 40' boom. Equipment only.	Hour	$46.63	40	$1,865.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	40	$923.20
Materials						
Corrugated Steel, 21 gauge	224	Corrugated or ribbed, galvanized, 21 gauge, includes fasteners, materials only.	sq ft	$2.71	1600	$4,336.00
Roof, Post Frame Building , less than 30' wide	1672	Post Frame Building, no sides, - less than 30' width. Building sites with expected snow loads up to 30 lbs per square foot and wind exposure in semi protected areas (wooded or terrain with numerous closely spaced obstructions). Includes materials, shipp	Square Foot	$14.05	2000	$28,100.00

Practice: 367 - Roofs and Covers

Scenario: #4 - Roof Structure, 30-60ft Width

Scenario Description:

A timber or metal framed building with a timber or steel "sheet" roof, 30'-60' wide, and supporting foundation and with open sides. The roof structure covers manure that is stored as a liquid in basins, tanks, or as a solid on concrete and earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

Associated practices include Waste Storage Facility (313), Animal Mortality Facility (316), Composting Facility (317), Agrichemical Handling Facility (309), Roof Runoff Structure (558), and Waste Treatment (629).

Before Situation:

Applicable where the exclusion of precipitation from an animal waste storage and/or treatment facility will improve an existing or planned system. Manure is stored as a liquid in basins, tanks, and as a solid on concrete or earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

After Situation:

A timber or metal framed building with a timber or steel "sheet" roof and supporting foundation with open sides. The structure is engineered and installed in accordance with appropriate building codes and permits. Typical size is 40'WX100'L for a total 4,000 square feet and is over an approved animal waste management facility as a component of a CNMP. It is designed to prevent precipitation and to allow proper management of animal waste streams (manure or compost streams), thus mitigating the negative factors from the "before practice implementation".

Scenario Feature Measure: Footprint of building

Scenario Unit: Square Foot

Scenario Typical Size: 4,000

Scenario Cost: $21,600.00 **Scenario Cost/Unit:** $5.40

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Roof, Post Frame Building, 30' to 60' wide	1676	Post Frame Building, no sides, - 30' to 60' width. Building sites with expected snow loads up to 30 lbs per square foot and wind exposure in semi protected areas (wooded or terrain with numerous closely spaced obstructions). Includes materials, shipping	Square Foot	$5.40	4000	$21,600.00

Practice: 367 - Roofs and Covers

Scenario: #5 - Roof Structure, 30-60ft Width with siding

Scenario Description:

A timber or metal framed building with a timber or steel "sheet" roof, 30'-60' wide, and supporting foundation and with siding on 2 sides of the building to prevent wind blown rain from entering on the sides of the barn. The roof structure covers manure that is stored as a liquid in basins, tanks, or as a solid on concrete and earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

Associated practices include Waste Storage Facility (313), Animal Mortality Facility (316), Composting Facility (317), Agrichemical Handling Facility (309), Roof Runoff Structure (558), and Waste Treatment (629).

Before Situation:

Applicable where the exclusion of precipitation from an animal waste storage and/or treatment facility will improve an existing or planned system. Manure is stored as a liquid in basins, tanks, and as a solid on concrete or earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

After Situation:

A timber or metal framed building with a timber or steel "sheet" roof and supporting foundation with siding on 2 sides of the building. The structure is engineered and installed in accordance with appropriate building codes and permits. Typical size is 40'WX100'L for a total 4,000 square feet and is over an approved animal waste management facility as a component of a CNMP. It is designed to prevent precipitation and to allow proper management of animal waste streams (manure or compost streams), thus mitigating the negative factors from the "before practice implementation".

Scenario Feature Measure: Footprint of building

Scenario Unit: Square Foot

Scenario Typical Size: 4,000

Scenario Cost: $28,724.40 **Scenario Cost/Unit:** $7.18

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Aerial lift, telescoping bucket	1893	Aerial lift, bucket truck or cherry picker, typical 40' boom. Equipment only.	Hour	$46.63	40	$1,865.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	40	$923.20
Materials						
Corrugated Steel, 21 gauge	224	Corrugated or ribbed, galvanized, 21 gauge, includes fasteners, materials only.	sq ft	$2.71	1600	$4,336.00
Roof, Post Frame Building, 30' to 60' wide	1676	Post Frame Building, no sides, - 30' to 60' width. Building sites with expected snow loads up to 30 lbs per square foot and wind exposure in semi protected areas (wooded or terrain with numerous closely spaced obstructions). Includes materials, shipping	Square Foot	$5.40	4000	$21,600.00

Practice: 367 - Roofs and Covers

Scenario: #6 - Roof Structure, >60ft Width

Scenario Description:

A timber or metal framed building with a timber or steel "sheet" roof, >60' wide, and supporting foundation and with open sides. The roof structure covers manure that is stored as a liquid in basins, tanks, or as a solid on concrete and earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

Associated practices include Waste Storage Facility (313), Animal Mortality Facility (316), Composting Facility (317), Agrichemical Handling Facility (309), Roof Runoff Structure (558), and Waste Treatment (629).

Before Situation:

Applicable where the exclusion of precipitation from an animal waste storage and/or treatment facility will improve an existing or planned system. Manure is stored as a liquid in basins, tanks, and as a solid on concrete or earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

After Situation:

A timber or metal framed building with a timber or steel "sheet" roof and supporting foundation with open sides. The structure is engineered and installed in accordance with appropriate building codes and permits. Typical size is 80'WX100'L for a total 8,000 square feet and is over an approved animal waste management facility as a component of a CNMP. It is designed to prevent precipitation and to allow proper management of animal waste streams (manure or compost streams), thus mitigating the negative factors from the "before practice implementation".

Scenario Feature Measure: Footprint of building

Scenario Unit: Square Foot

Scenario Typical Size: 8,000

Scenario Cost: $53,760.00 **Scenario Cost/Unit:** $6.72

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Roof, Post Frame Building, greater than 60' wide	1673	Post Frame Building, no sides, - greater than 60' width. Building sites with expected snow loads up to 30 lbs per square foot and wind exposure in semi protected areas (wooded or terrain with numerous closely spaced obstructions). Includes materials, sh	Square Foot	$6.72	8000	$53,760.00

Practice: 367 - Roofs and Covers

Scenario: #7 - Roof Structure, >60ft Width with siding

Scenario Description:

A timber or metal framed building with a timber or steel "sheet" roof, >60' wide, and supporting foundation and with siding on 2 sides of the building to prevent wind blown rain from entering on the sides of the barn. The roof structure covers manure that is stored as a liquid in basins, tanks, or as a solid on concrete and earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

Associated practices include Waste Storage Facility (313), Animal Mortality Facility (316), Composting Facility (317), Agrichemical Handling Facility (309), Roof Runoff Structure (558), and Waste Treatment (629).

Before Situation:

Applicable where the exclusion of precipitation from an animal waste storage and/or treatment facility will improve an existing or planned system. Manure is stored as a liquid in basins, tanks, and as a solid on concrete or earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

After Situation:

A timber or metal framed building with a timber or steel "sheet" roof and supporting foundation with siding on 2 sides of the building. The structure is engineered and installed in accordance with appropriate building codes and permits. Typical size is 80'WX100'L for a total 8,000 square feet and is over an approved animal waste management facility as a component of a CNMP. It is designed to prevent precipitation and to allow proper management of animal waste streams (manure or compost streams), thus mitigating the negative factors from the "before practice implementation".

Scenario Feature Measure: Footprint of building

Scenario Unit: Square Foot

Scenario Typical Size: 8,000

Scenario Cost: $60,884.40 **Scenario Cost/Unit:** $7.61

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Aerial lift, telescoping bucket	1893	Aerial lift, bucket truck or cherry picker, typical 40' boom. Equipment only.	Hour	$46.63	40	$1,865.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	40	$923.20
Materials						
Corrugated Steel, 21 gauge	224	Corrugated or ribbed, galvanized, 21 gauge, includes fasteners, materials only.	sq ft	$2.71	1600	$4,336.00
Roof, Post Frame Building, greater than 60' wide	1673	Post Frame Building, no sides, - greater than 60' width. Building sites with expected snow loads up to 30 lbs per square foot and wind exposure in semi protected areas (wooded or terrain with numerous closely spaced obstructions). Includes materials, sh	Square Foot	$6.72	8000	$53,760.00

Practice: 367 - Roofs and Covers

Scenario: #9 - Flexible Membrane Cover

Scenario Description:

A fabricated rigid, semi-rigid, or flexible membrane over a waste storage or treatment facility. The membrane will cover the entire surface of a waste storage or treatment facility (e.g. waste treatment lagoon or anaerobic digester). Cover will exclude precipitation and/or capture biogas for controlled release for flaring or anaerobic digestion.

Associated practices include Waste Storage Facility (313), Waste Treatment Lagoon (359), Anaerobic Digester (366), Animal Mortality Facility (316), Composting Facility (317), Roof Runoff Structure (558), Pumping Plant (533), and Waste Treatment (629).

Before Situation:

Applicable where the exclusion of precipitation from an animal waste storage or treatment lagoon will improve the management of an existing or planned system, capture and controlled release or flaring of emissions from an existing or planned agricultural waste storage to improve air quality, and/or biogas production and capture for energy use are part of the existing or planned animal waste management system.

After Situation:

A fabricated rigid, semi-rigid, or flexible membrane over a waste storage or treatment facility. The membrane will cover the entire surface of a waste storage or treatment facility (e.g. waste treatment lagoon or anaerobic digester). Typical scenario is for a 200'x400' pond cover (80,000 sq ft).

Scenario Feature Measure: Surface of Membrane

Scenario Unit: Square Foot

Scenario Typical Size: 80,000

Scenario Cost: $92,081.84 **Scenario Cost/Unit:** $1.15

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	50	$6,239.00
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.15	1200	$3,780.00
Concrete, CIP, Slab on Grade, non reinforced	1225	Non reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$225.32	45	$10,139.40
Crane, truck mounted, hydraulic, 12 ton	1734	12 ton capacity truck mounted hydraulic crane. Equipment cost only.	Hour	$90.70	20	$1,814.00
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	40	$1,525.60
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	310	$7,154.80
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	84	$3,151.68
Materials						
Aggregate, gravel, washed, pea gravel	1331	Washed and graded pea gravel river stone. Includes materials and local delivery within 20 miles of quarry.	Cubic Yard	$42.96	90	$3,866.40
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Yard	$5.90	8890	$52,451.00
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	4	$1,959.96

Practice: 367 - Roofs and Covers

Scenario: #10 - Flexible Membrane Cover with Methane Collection System

Scenario Description:

A fabricated rigid, semi-rigid, or flexible membrane over a waste storage or treatment facility with a methane capture system . The membrane will cover the entire surface of a waste storage or treatment facility (e.g. waste treatment lagoon or anaerobic digester). Cover will exclude precipitation and capture biogas for controlled release for flaring or anaerobic digestion.

Associated practices include Waste Storage Facility (313), Waste Treatment Lagoon (359), Anaerobic Digester (366), Animal Mortality Facility (316), Composting Facility (317), Roof Runoff Structure (558), Pumping Plant (533), and Waste Treatment (629).

Before Situation:

Applicable where the exclusion of precipitation from an animal waste storage or treatment lagoon will improve the management of an existing or planned system, capture and controlled release or flaring of emissions from an existing or planned agricultural waste storage to improve air quality, and/or biogas production and capture for energy use are part of the existing or planned animal waste management system.

After Situation:

A fabricated rigid, semi-rigid, or flexible membrane over a waste storage or treatment facility. The membrane will cover the entire 200'X400' surface of waste (80,000 sq ft).

Scenario Feature Measure: Surface of Membrane

Scenario Unit: Square Foot

Scenario Typical Size: 80,000

Scenario Cost: $130,389.27 **Scenario Cost/Unit:** $1.63

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Crane, truck mounted, hydraulic, 12 ton	1734	12 ton capacity truck mounted hydraulic crane. Equipment cost only.	Hour	$90.70	20	$1,814.00
Concrete, CIP, Slab on Grade, non reinforced	1225	Non reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$225.32	45	$10,139.40
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	40	$4,991.20
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.15	1200	$3,780.00
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	40	$1,525.60
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	80	$3,001.60
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	310	$7,154.80
Materials						
Aggregate, gravel, washed, pea gravel	1331	Washed and graded pea gravel river stone. Includes materials and local delivery within 20 miles of quarry.	Cubic Yard	$42.96	90	$3,866.40
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Yard	$5.90	8890	$52,451.00
Covered Lagoon Gas Collection System	1664	Piping and collection system for biogas. Includes labor and equipment.	Each	$39,705.31	1	$39,705.31
Mobilization						

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	4	$1,959.96

Practice: 372 - Combustion System Improvement

Scenario: #1 - IC Engine Repower, <= 25 bhp

Scenario Description:

Older diesel engine replaced with new diesel engine repower (<= 25 bhp). The existing diesel engine may be stationary or portable operating an irrigation pump, or an auxiliary engine providing mechanical function for agricultural/forestry equipment.
Resource Concerns: Air Quality Impacts - Emissions of Ozone Precursors; Air Quality Impacts - Emissions of Particulate Matter (PM) and PM Precursors; Inefficient Energy Use - Equipment and Facilities; Inefficient Energy Use - Farming/Ranching Practices and Field Operations.
Associated Practices include: 374 - Farmstead Energy Improvement; 533 - Pumping Plant; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 447 - Irrigation System, Tailwater Recovery; 449 - Irrigation Water Management; 516 - Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; 614 - Watering Facility; 642 - Water Well, CAP 126 Comprehensive Air Quality Management Plan, CAP 122 Agricultural Energy Management Plan - Headquarters, and CAP 124 Agricultural Energy Management Plan - Landscape.

Before Situation:

An old or inefficient diesel engine powers an irrigation pumping plant or grain dryer fan, or is a backup power generation for a farming operation. The emissions of oxides of nitrogen and/or particulate matter from the engine are identified to contribute to an air quality resource concern OR the existing diesel engine is energy inefficient due to a conversion of the irrigation system, reduction in required pump capacity, or age of the power unit.
Air Quality Impacts: The existing internal combustion engine emissions are identified to contribute to an air quality resource concern.
Inefficient Energy Use: The existing internal combustion engine uses excess fuel to operate an existing irrigation pump, off-road agricultural vehicle or other auxillary engine providing a mechanical function for agricultural/forestry equipment.

After Situation:

The repowered diesel engine (<= 25 bhp) replaces the existing older engine; the engine being replaced will be disabled and a certificate of inoperability submitted prior to certification of practice completion. The existing engine is supported by a concrete pad; no cost have been included for a new pad. Additional costs may be incurred, if a concrete pad is not present.
For Air Quality: The repower diesel engine will be cleaner-burning and will emit less particulate matter and/or oxides of nitrogen than the previous existing engine.
For Energy: Energy efficiency will be improved by at least 20%; the increase in energy efficiency for the modified unit must be supported by an energy analysis.

Scenario Feature Measure: Size of Replacement Engine

Scenario Unit: Brake Horse Power

Scenario Typical Size: 10

Scenario Cost: $3,270.62 **Scenario Cost/Unit:** $327.06

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	8	$305.12
Materials						
Motor, IC Engine, less than 25 HP	1427	Most current Tier-level Diesel or Cleaner Engine and required appurtenances. Less than 25 bhp. Materials only.	Horsepower	$296.55	10	$2,965.50

Practice: 372 - Combustion System Improvement

Scenario: #2 - IC Engine Repower, >25 bhp

Scenario Description:

Older diesel engine replaced with new diesel engine repower (25 bhp or more). The existing diesel engine may be stationary or portable operating an irrigation pump, or an auxiliary engine providing mechanical function for agricultural/forestry equipment.
Resource Concerns: Air Quality Impacts - Emissions of Ozone Precursors; Air Quality Impacts - Emissions of Particulate Matter (PM) and PM Precursors; Inefficient Energy Use - Equipment and Facilities; Inefficient Energy Use - Farming/Ranching Practices and Field Operations.
Associated Practices include: 374 - Farmstead Energy Improvement; 533 - Pumping Plant; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 447 - Irrigation System, Tailwater Recovery; 449 - Irrigation Water Management; 516 - Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; 614 - Watering Facility; 642 - Water Well, CAP 126 Comprehensive Air Quality Management Plan, CAP 122 Agricultural Energy Management Plan - Headquarters, and CAP 124 Agricultural Energy Management Plan - Landscape.

Before Situation:

An old or inefficient diesel engine powers an irrigation pumping plant or grain dryer fan, or is a backup power generation for a farming operation. The emissions of oxides of nitrogen and/or particulate matter from the engine are identified to contribute to an air quality resource concern OR the existing diesel engine is energy inefficient due to a conversion of the irrigation system, reduction in required pump capacity, or age of the power unit.
Air Quality Impacts: The existing internal combustion engine emissions are identified to contribute to an air quality resource concern.
Inefficient Energy Use: The existing internal combustion engine uses excess fuel to operate an existing irrigation pump, off-road agricultural vehicle or other auxillary engine providing a mechanical function for agricultural/forestry equipment.

After Situation:

The repowered diesel engine (average of 175 bhp) replaces the existing older engine; the engine being replaced will be disabled and a certificate of inoperability submitted prior to certification of practice completion. The existing engine is supported by a concrete pad; no cost have been included for a new pad. Additional costs may be incurred, if a concrete pad is not present.
For Air Quality: The repower diesel engine will be cleaner-burning and will emit less particulate matter and/or oxides of nitrogen than the previous existing engine.
For Energy: Energy efficiency will be improved by at least 20%; the increase in energy efficiency for the modified unit must be supported by an energy analysis.

Scenario Feature Measure: Size of Replacement Engine

Scenario Unit: Brake Horse Power

Scenario Typical Size: 175

Scenario Cost: $35,862.24 **Scenario Cost/Unit:** $204.93

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	16	$610.24
Materials						
Motor, IC Engine, 100-199 HP	1430	Most current Tier-level Diesel or Cleaner Engine and required appurtenances. 100 to 199 bhp. Materials only.	Horsepower	$201.44	175	$35,252.00

Practice: 372 - Combustion System Improvement

Scenario: #3 - Electric Motor in-lieu of IC Engine, < 12 HP

Scenario Description:

Replace an existing IC engine operating an irrigation well with a new electric motor (< 12 HP). An existing IC engine is stationary or portable (does not propel a vehicle and is not an auxiliary IC engine on a vehicle). This replacement provides the greatest emission reductions by eliminating NOx, VOC, and PM emissions from the source.
Resource Concerns: Air Quality Impacts - Emissions of Ozone Precursors; Air Quality Impacts - Emissions of Particulate Matter (PM) and PM Precursors; Inefficient Energy Use - Equipment and Facilities; Inefficient Energy Use - Farming/Ranching Practices and Field Operations.
Associated Practices include: 374 - Farmstead Energy Improvement; 533 - Pumping Plant; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 447 - Irrigation System, Tailwater Recovery; 449 - Irrigation Water Management; 516 - Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; 614 - Watering Facility; 642 - Water Well, CAP 126 Comprehensive Air Quality Management Plan, CAP 122 Agricultural Energy Management Plan - Headquarters, and CAP 124 Agricultural Energy Management Plan - Landscape.

Before Situation:

Irrigation pump with diesel engine withdraws water from a well and provides water through a center pivot irrigation system. The emissions of oxides of nitrogen and/or particulate matter from the engine are identified to contribute to an air quality resource concern OR based on an evaluation of the engine, the pump, the well, and the center pivot irrigation system, the engine is less than 50 percent efficient in delivering water to the system.
Air Quality Impacts: The existing internal combustion engine emissions are identified to contribute to an air quality resource concern.
Inefficient Energy Use: The existing internal combustion engine uses excess fuel to operate an existing irrigation pump.
Plant Condition Impact: Poor plant condition and vigor is evident due to a lack of water during critical times in the growing season.
Water Quality Impacts: Fuel tank and fuel line have potential to cause environmental damage with leaks. The existing internal combustion engine is inefficient in delivering water to the system; subsequently, the lack of plant growth and uptake of nutrients, nitrogen and phosphorus are not being fully utilized and are available to be lost to surface and ground waters.

After Situation:

The electric motor replaces the existing older engine; the engine being replaced will be disabled and a certificate of inoperability submitted prior to certification of practice completion. The existing engine is supported by a concrete pad; no cost have been included for a new pad. Additional costs may be incurred, if a concrete pad is not present.
For Air Quality: The electric motor does not produce any on-farm emissions of oxides of nitrogen or particulate matter, resulting in a substantial emissions reduction on the farm.
For Energy: Energy efficiency will be improved by at least 20%.
For Plant Condition: Plant condition and vigor will be improved.
For Water Quality: The potential for environmental damage due to leaks from the tanks and fuel lines has been eliminated. Plant uptake of available nutrients will be increased and less nutrients will be lost to surface and ground waters.

Scenario Feature Measure: Number of Combustion Units Replaced

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $1,472.90 **Scenario Cost/Unit:** $1,472.90

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	8	$305.12
Materials						
Motor, electric, NEMA Premium, 10 HP	1172	Premium NEMA approved electric motor, 10 Horsepower and all required appurtenances. Includes materials and shipping only.	Each	$1,167.78	1	$1,167.78

Practice: 372 - Combustion System Improvement

Scenario: #4 - Electric Motor in-lieu of IC Engine, 12-69 HP

Scenario Description:

Replace an existing IC engine operating an irrigation well with a new electric motor (12-69 HP). An existing IC engine is stationary or portable (does not propel a vehicle and is not an auxiliary IC engine on a vehicle). This replacement provides the greatest emission reductions by eliminating NOx, VOC, and PM emissions from the source.
Resource Concerns: Air Quality Impacts - Emissions of Ozone Precursors; Air Quality Impacts - Emissions of Particulate Matter (PM) and PM Precursors; Inefficient Energy Use - Equipment and Facilities; Inefficient Energy Use - Farming/Ranching Practices and Field Operations.
Associated Practices include: 374 - Farmstead Energy Improvement; 533 - Pumping Plant; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 447 - Irrigation System, Tailwater Recovery; 449 - Irrigation Water Management; 516 - Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; 614 - Watering Facility; 642 - Water Well, CAP 126 Comprehensive Air Quality Management Plan, CAP 122 Agricultural Energy Management Plan - Headquarters, and CAP 124 Agricultural Energy Management Plan - Landscape.

Before Situation:

Irrigation pump with diesel engine withdraws water from a well and provides water through a center pivot irrigation system. The emissions of oxides of nitrogen and/or particulate matter from the engine are identified to contribute to an air quality resource concern OR based on an evaluation of the engine, the pump, the well, and the center pivot irrigation system, the engine is less than 50 percent efficient in delivering water to the system.
Air Quality Impacts: The existing internal combustion engine emissions are identified to contribute to an air quality resource concern.
Inefficient Energy Use: The existing internal combustion engine uses excess fuel to operate an existing irrigation pump.
Plant Condition Impact: Poor plant condition and vigor is evident due to a lack of water during critical times in the growing season.
Water Quality Impacts: Fuel tank and fuel line have potential to cause environmental damage with leaks. The existing internal combustion engine is inefficient in delivering water to the system; subsequently, the lack of plant growth and uptake of nutrients, nitrogen and phosphorus are not being fully utilized and are available to be lost to surface and ground waters.

After Situation:

The electric motor replaces the existing older engine; the engine being replaced will be disabled and a certificate of inoperability submitted prior to certification of practice completion. The existing engine is supported by a concrete pad; no cost have been included for a new pad. Additional costs may be incurred, if a concrete pad is not present.
For Air Quality: The electric motor does not produce any on-farm emissions of oxides of nitrogen or particulate matter, resulting in a substantial emissions reduction on the farm.
For Energy: Energy efficiency will be improved by at least 20%.
For Plant Condition: Plant condition and vigor will be improved.
For Water Quality: The potential for environmental damage due to leaks from the tanks and fuel lines has been eliminated. Plant uptake of available nutrients will be increased and less nutrients will be lost to surface and ground waters.

Scenario Feature Measure: Number of Combustion Units Replaced

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $6,363.03 **Scenario Cost/Unit:** $6,363.03

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	12	$457.68
Materials						
Motor, electric, NEMA Premium, 50 HP	1173	Premium NEMA approved electric motor, 50 Horsepower and all required appurtenances. Includes materials and shipping only.	Each	$5,905.35	1	$5,905.35

Practice: 372 - Combustion System Improvement

Scenario: #5 - Electric Motor in-lieu of IC Engine, 70-124 HP

Scenario Description:

Replace an existing IC engine operating an irrigation well with a new electric motor (70-124 HP). An existing IC engine is stationary or portable (does not propel a vehicle and is not an auxiliary IC engine on a vehicle). This replacement provides the greatest emission reductions by eliminating NOx, VOC, and PM emissions from the source.
Resource Concerns: Air Quality Impacts - Emissions of Ozone Precursors; Air Quality Impacts - Emissions of Particulate Matter (PM) and PM Precursors; Inefficient Energy Use - Equipment and Facilities; Inefficient Energy Use - Farming/Ranching Practices and Field Operations.
Associated Practices include: 374 - Farmstead Energy Improvement; 533 - Pumping Plant; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 447 - Irrigation System, Tailwater Recovery; 449 - Irrigation Water Management; 516 - Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; 614 - Watering Facility; 642 - Water Well, CAP 126 Comprehensive Air Quality Management Plan, CAP 122 Agricultural Energy Management Plan - Headquarters, and CAP 124 Agricultural Energy Management Plan - Landscape.

Before Situation:

Irrigation pump with diesel engine withdraws water from a well and provides water through a center pivot irrigation system. The emissions of oxides of nitrogen and/or particulate matter from the engine are identified to contribute to an air quality resource concern OR based on an evaluation of the engine, the pump, the well, and the center pivot irrigation system, the engine is less than 50 percent efficient in delivering water to the system.
Air Quality Impacts: The existing internal combustion engine emissions are identified to contribute to an air quality resource concern.
Inefficient Energy Use: The existing internal combustion engine uses excess fuel to operate an existing irrigation pump.
Plant Condition Impact: Poor plant condition and vigor is evident due to a lack of water during critical times in the growing season.
Water Quality Impacts: Fuel tank and fuel line have potential to cause environmental damage with leaks. The existing internal combustion engine is inefficient in delivering water to the system; subsequently, the lack of plant growth and uptake of nutrients, nitrogen and phosphorus are not being fully utilized and are available to be lost to surface and ground waters.

After Situation:

The electric motor replaces the existing older engine; the engine being replaced will be disabled and a certificate of inoperability submitted prior to certification of practice completion. The existing engine is supported by a concrete pad; no cost have been included for a new pad. Additional costs may be incurred, if a concrete pad is not present.
For Air Quality: The electric motor does not produce any on-farm emissions of oxides of nitrogen or particulate matter, resulting in a substantial emissions reduction on the farm.
For Energy: Energy efficiency will be improved by at least 20%.
For Plant Condition: Plant condition and vigor will be improved.
For Water Quality: The potential for environmental damage due to leaks from the tanks and fuel lines has been eliminated. Plant uptake of available nutrients will be increased and less nutrients will be lost to surface and ground waters.

Scenario Feature Measure: Number of Combustion Units Replaced

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $7,987.12 **Scenario Cost/Unit:** $7,987.12

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	16	$610.24
Materials						
Motor, electric, NEMA Premium, 100 HP	1174	Premium NEMA approved electric motor, 100 Horsepower and all required appurtenances. Includes materials and shipping only.	Each	$7,376.88	1	$7,376.88

Practice: 372 - Combustion System Improvement

Scenario: #6 - Electric Motor in-lieu of IC Engine, 125-174 HP

Scenario Description:

Replace an existing IC engine operating an irrigation well with a new electric motor (125-174 HP). An existing IC engine is stationary or portable (does not propel a vehicle and is not an auxiliary IC engine on a vehicle). This replacement provides the greatest emission reductions by eliminating NOx, VOC, and PM emissions from the source.
Resource Concerns: Air Quality Impacts - Emissions of Ozone Precursors; Air Quality Impacts - Emissions of Particulate Matter (PM) and PM Precursors; Inefficient Energy Use - Equipment and Facilities; Inefficient Energy Use - Farming/Ranching Practices and Field Operations.
Associated Practices include: 374 - Farmstead Energy Improvement; 533 - Pumping Plant; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 447 - Irrigation System, Tailwater Recovery; 449 - Irrigation Water Management; 516 - Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; 614 - Watering Facility; 642 - Water Well, CAP 126 Comprehensive Air Quality Management Plan, CAP 122 Agricultural Energy Management Plan - Headquarters, and CAP 124 Agricultural Energy Management Plan - Landscape.

Before Situation:

Irrigation pump with diesel engine withdraws water from a well and provides water through a center pivot irrigation system. The emissions of oxides of nitrogen and/or particulate matter from the engine are identified to contribute to an air quality resource concern OR based on an evaluation of the engine, the pump, the well, and the center pivot irrigation system, the engine is less than 50 percent efficient in delivering water to the system.
Air Quality Impacts: The existing internal combustion engine emissions are identified to contribute to an air quality resource concern.
Inefficient Energy Use: The existing internal combustion engine uses excess fuel to operate an existing irrigation pump.
Plant Condition Impact: Poor plant condition and vigor is evident due to a lack of water during critical times in the growing season.
Water Quality Impacts: Fuel tank and fuel line have potential to cause environmental damage with leaks. The existing internal combustion engine is inefficient in delivering water to the system; subsequently, the lack of plant growth and uptake of nutrients, nitrogen and phosphorus are not being fully utilized and are available to be lost to surface and ground waters.

After Situation:

The electric motor replaces the existing older engine; the engine being replaced will be disabled and a certificate of inoperability submitted prior to certification of practice completion. The existing engine is supported by a concrete pad; no cost have been included for a new pad. Additional costs may be incurred, if a concrete pad is not present.
For Air Quality: The electric motor does not produce any on-farm emissions of oxides of nitrogen or particulate matter, resulting in a substantial emissions reduction on the farm.
For Energy: Energy efficiency will be improved by at least 20%.
For Plant Condition: Plant condition and vigor will be improved.
For Water Quality: The potential for environmental damage due to leaks from the tanks and fuel lines has been eliminated. Plant uptake of available nutrients will be increased and less nutrients will be lost to surface and ground waters.

Scenario Feature Measure: Number of Combustion Units Replaced

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $15,833.74 **Scenario Cost/Unit:** $15,833.74

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	24	$915.36
Materials						
Motor, electric, NEMA Premium, 200 HP	1175	Premium NEMA approved electric motor, 200 Horsepower and all required appurtenances. Includes materials and shipping only.	Each	$22,459.88	0.5	$11,229.94
Motor, electric, NEMA Premium, 100 HP	1174	Premium NEMA approved electric motor, 100 Horsepower and all required appurtenances. Includes materials and shipping only.	Each	$7,376.88	0.5	$3,688.44

Practice: 372 - Combustion System Improvement

Scenario: #7 - Electric Motor in-lieu of IC Engine, 175-224 HP

Scenario Description:

Replace an existing IC engine operating an irrigation well with a new electric motor (175-224 HP). An existing IC engine is stationary or portable (does not propel a vehicle and is not an auxiliary IC engine on a vehicle). This replacement provides the greatest emission reductions by eliminating NOx, VOC, and PM emissions from the source.
Resource Concerns: Air Quality Impacts - Emissions of Ozone Precursors; Air Quality Impacts - Emissions of Particulate Matter (PM) and PM Precursors; Inefficient Energy Use - Equipment and Facilities; Inefficient Energy Use - Farming/Ranching Practices and Field Operations.
Associated Practices include: 374 - Farmstead Energy Improvement; 533 - Pumping Plant; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 447 - Irrigation System, Tailwater Recovery; 449 - Irrigation Water Management; 516 - Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; 614 - Watering Facility; 642 - Water Well, CAP 126 Comprehensive Air Quality Management Plan, CAP 122 Agricultural Energy Management Plan - Headquarters, and CAP 124 Agricultural Energy Management Plan - Landscape.

Before Situation:

Irrigation pump with diesel engine withdraws water from a well and provides water through a center pivot irrigation system. The emissions of oxides of nitrogen and/or particulate matter from the engine are identified to contribute to an air quality resource concern OR based on an evaluation of the engine, the pump, the well, and the center pivot irrigation system, the engine is less than 50 percent efficient in delivering water to the system.
Air Quality Impacts: The existing internal combustion engine emissions are identified to contribute to an air quality resource concern.
Inefficient Energy Use: The existing internal combustion engine uses excess fuel to operate an existing irrigation pump.
Plant Condition Impact: Poor plant condition and vigor is evident due to a lack of water during critical times in the growing season.
Water Quality Impacts: Fuel tank and fuel line have potential to cause environmental damage with leaks. The existing internal combustion engine is inefficient in delivering water to the system; subsequently, the lack of plant growth and uptake of nutrients, nitrogen and phosphorus are not being fully utilized and are available to be lost to surface and ground waters.

After Situation:

The electric motor replaces the existing older engine; the engine being replaced will be disabled and a certificate of inoperability submitted prior to certification of practice completion. The existing engine is supported by a concrete pad; no cost have been included for a new pad. Additional costs may be incurred, if a concrete pad is not present.
For Air Quality: The electric motor does not produce any on-farm emissions of oxides of nitrogen or particulate matter, resulting in a substantial emissions reduction on the farm.
For Energy: Energy efficiency will be improved by at least 20%.
For Plant Condition: Plant condition and vigor will be improved.
For Water Quality: The potential for environmental damage due to leaks from the tanks and fuel lines has been eliminated. Plant uptake of available nutrients will be increased and less nutrients will be lost to surface and ground waters.

Scenario Feature Measure: Number of Combustion Units Replaced

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $23,985.48 **Scenario Cost/Unit:** $23,985.48

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	40	$1,525.60
Materials						
Motor, electric, NEMA Premium, 200 HP	1175	Premium NEMA approved electric motor, 200 Horsepower and all required appurtenances. Includes materials and shipping only.	Each	$22,459.88	1	$22,459.88

Practice: 372 - Combustion System Improvement

Scenario: #8 - Electric Motor in-lieu of IC Engine, 225-274 HP

Scenario Description:

Replace an existing IC engine operating an irrigation well with a new electric motor (225-274 HP). An existing IC engine is stationary or portable (does not propel a vehicle and is not an auxiliary IC engine on a vehicle). This replacement provides the greatest emission reductions by eliminating NOx, VOC, and PM emissions from the source.
Resource Concerns: Air Quality Impacts - Emissions of Ozone Precursors; Air Quality Impacts - Emissions of Particulate Matter (PM) and PM Precursors; Inefficient Energy Use - Equipment and Facilities; Inefficient Energy Use - Farming/Ranching Practices and Field Operations.
Associated Practices include: 374 - Farmstead Energy Improvement; 533 - Pumping Plant; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 447 - Irrigation System, Tailwater Recovery; 449 - Irrigation Water Management; 516 - Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; 614 - Watering Facility; 642 - Water Well, CAP 126 Comprehensive Air Quality Management Plan, CAP 122 Agricultural Energy Management Plan - Headquarters, and CAP 124 Agricultural Energy Management Plan - Landscape.

Before Situation:

Irrigation pump with diesel engine withdraws water from a well and provides water through a center pivot irrigation system. The emissions of oxides of nitrogen and/or particulate matter from the engine are identified to contribute to an air quality resource concern OR based on an evaluation of the engine, the pump, the well, and the center pivot irrigation system, the engine is less than 50 percent efficient in delivering water to the system.
Air Quality Impacts: The existing internal combustion engine emissions are identified to contribute to an air quality resource concern.
Inefficient Energy Use: The existing internal combustion engine uses excess fuel to operate an existing irrigation pump.
Plant Condition Impact: Poor plant condition and vigor is evident due to a lack of water during critical times in the growing season.
Water Quality Impacts: Fuel tank and fuel line have potential to cause environmental damage with leaks. The existing internal combustion engine is inefficient in delivering water to the system; subsequently, the lack of plant growth and uptake of nutrients, nitrogen and phosphorus are not being fully utilized and are available to be lost to surface and ground waters.

After Situation:

The electric motor replaces the existing older engine; the engine being replaced will be disabled and a certificate of inoperability submitted prior to certification of practice completion. The existing engine is supported by a concrete pad; no cost have been included for a new pad. Additional costs may be incurred, if a concrete pad is not present.
For Air Quality: The electric motor does not produce any on-farm emissions of oxides of nitrogen or particulate matter, resulting in a substantial emissions reduction on the farm.
For Energy: Energy efficiency will be improved by at least 20%.
For Plant Condition: Plant condition and vigor will be improved.
For Water Quality: The potential for environmental damage due to leaks from the tanks and fuel lines has been eliminated. Plant uptake of available nutrients will be increased and less nutrients will be lost to surface and ground waters.

Scenario Feature Measure: Number of Combustion Units Replaced

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $28,346.54 **Scenario Cost/Unit:** $28,346.54

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	40	$1,525.60
Materials						
Motor, electric, NEMA Premium, 300 to 399 hp	1438	Premium NEMA approved Electric Motor and required appurtenances. 300 to 399 hp (222 - 295 kW). Includes materials and shipping only.	Horsepower	$103.94	150	$15,591.00
Motor, electric, NEMA Premium, 200 HP	1175	Premium NEMA approved electric motor, 200 Horsepower and all required appurtenances. Includes materials and shipping only.	Each	$22,459.88	0.5	$11,229.94

Practice: 372 - Combustion System Improvement

Scenario: #9 - Electric Motor in-lieu of IC Engine, 275-399 HP

Scenario Description:

Replace an existing IC engine operating an irrigation well with a new electric motor (275-399 HP). An existing IC engine is stationary or portable (does not propel a vehicle and is not an auxiliary IC engine on a vehicle). This replacement provides the greatest emission reductions by eliminating NOx, VOC, and PM emissions from the source.
Resource Concerns: Air Quality Impacts - Emissions of Ozone Precursors; Air Quality Impacts - Emissions of Particulate Matter (PM) and PM Precursors; Inefficient Energy Use - Equipment and Facilities; Inefficient Energy Use - Farming/Ranching Practices and Field Operations.
Associated Practices include: 374 - Farmstead Energy Improvement; 533 - Pumping Plant; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 447 - Irrigation System, Tailwater Recovery; 449 - Irrigation Water Management; 516 - Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; 614 - Watering Facility; 642 - Water Well, CAP 126 Comprehensive Air Quality Management Plan, CAP 122 Agricultural Energy Management Plan - Headquarters, and CAP 124 Agricultural Energy Management Plan - Landscape.

Before Situation:

Irrigation pump with diesel engine withdraws water from a well and provides water through a center pivot irrigation system. The emissions of oxides of nitrogen and/or particulate matter from the engine are identified to contribute to an air quality resource concern OR based on an evaluation of the engine, the pump, the well, and the center pivot irrigation system, the engine is less than 50 percent efficient in delivering water to the system.
Air Quality Impacts: The existing internal combustion engine emissions are identified to contribute to an air quality resource concern.
Inefficient Energy Use: The existing internal combustion engine uses excess fuel to operate an existing irrigation pump.
Plant Condition Impact: Poor plant condition and vigor is evident due to a lack of water during critical times in the growing season.
Water Quality Impacts: Fuel tank and fuel line have potential to cause environmental damage with leaks. The existing internal combustion engine is inefficient in delivering water to the system; subsequently, the lack of plant growth and uptake of nutrients, nitrogen and phosphorus are not being fully utilized and are available to be lost to surface and ground waters.

After Situation:

The electric motor replaces the existing older engine; the engine being replaced will be disabled and a certificate of inoperability submitted prior to certification of practice completion. The existing engine is supported by a concrete pad; no cost have been included for a new pad. Additional costs may be incurred, if a concrete pad is not present.
For Air Quality: The electric motor does not produce any on-farm emissions of oxides of nitrogen or particulate matter, resulting in a substantial emissions reduction on the farm.
For Energy: Energy efficiency will be improved by at least 20%.
For Plant Condition: Plant condition and vigor will be improved.
For Water Quality: The potential for environmental damage due to leaks from the tanks and fuel lines has been eliminated. Plant uptake of available nutrients will be increased and less nutrients will be lost to surface and ground waters.

Scenario Feature Measure: Number of Combustion Units Replaced

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $37,904.60 **Scenario Cost/Unit:** $37,904.60

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	40	$1,525.60
Materials						
Motor, electric, NEMA Premium, 300 to 399 hp	1438	Premium NEMA approved Electric Motor and required appurtenances. 300 to 399 hp (222 - 295 kW). Includes materials and shipping only.	Horsepower	$103.94	350	$36,379.00

Practice: 372 - Combustion System Improvement

Scenario: #10 - Electric Motor in-lieu of IC Engine, 400-499 HP

Scenario Description:

Replace an existing IC engine operating an irrigation well with a new electric motor (400-499 HP). An existing IC engine is stationary or portable (does not propel a vehicle and is not an auxiliary IC engine on a vehicle). This replacement provides the greatest emission reductions by eliminating NOx, VOC, and PM emissions from the source.
Resource Concerns: Air Quality Impacts - Emissions of Ozone Precursors; Air Quality Impacts - Emissions of Particulate Matter (PM) and PM Precursors; Inefficient Energy Use - Equipment and Facilities; Inefficient Energy Use - Farming/Ranching Practices and Field Operations.
Associated Practices include: 374 - Farmstead Energy Improvement; 533 - Pumping Plant; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 447 - Irrigation System, Tailwater Recovery; 449 - Irrigation Water Management; 516 - Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; 614 - Watering Facility; 642 - Water Well, CAP 126 Comprehensive Air Quality Management Plan, CAP 122 Agricultural Energy Management Plan - Headquarters, and CAP 124 Agricultural Energy Management Plan - Landscape.

Before Situation:

Irrigation pump with diesel engine withdraws water from a well and provides water through a center pivot irrigation system. The emissions of oxides of nitrogen and/or particulate matter from the engine are identified to contribute to an air quality resource concern OR based on an evaluation of the engine, the pump, the well, and the center pivot irrigation system, the engine is less than 50 percent efficient in delivering water to the system.
Air Quality Impacts: The existing internal combustion engine emissions are identified to contribute to an air quality resource concern.
Inefficient Energy Use: The existing internal combustion engine uses excess fuel to operate an existing irrigation pump.
Plant Condition Impact: Poor plant condition and vigor is evident due to a lack of water during critical times in the growing season.
Water Quality Impacts: Fuel tank and fuel line have potential to cause environmental damage with leaks. The existing internal combustion engine is inefficient in delivering water to the system; subsequently, the lack of plant growth and uptake of nutrients, nitrogen and phosphorus are not being fully utilized and are available to be lost to surface and ground waters.

After Situation:

The electric motor replaces the existing older engine; the engine being replaced will be disabled and a certificate of inoperability submitted prior to certification of practice completion. The existing engine is supported by a concrete pad; no cost have been included for a new pad. Additional costs may be incurred, if a concrete pad is not present.
For Air Quality: The electric motor does not produce any on-farm emissions of oxides of nitrogen or particulate matter, resulting in a substantial emissions reduction on the farm.
For Energy: Energy efficiency will be improved by at least 20%.
For Plant Condition: Plant condition and vigor will be improved.
For Water Quality: The potential for environmental damage due to leaks from the tanks and fuel lines has been eliminated. Plant uptake of available nutrients will be increased and less nutrients will be lost to surface and ground waters.

Scenario Feature Measure: Number of Combustion Units Replaced

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $53,311.60 **Scenario Cost/Unit:** $53,311.60

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	40	$1,525.60
Materials						
Motor, electric, NEMA Premium, 400 to 499 hp	1439	Premium NEMA approved Electric Motor and required appurtenances. 400 to 499 hp (296 - 372 kW). Includes materials and shipping only.	Horsepower	$115.08	450	$51,786.00

Practice: 372 - Combustion System Improvement

Scenario: #11 - Electric Motor in-lieu of IC Engine, >= 500 HP

Scenario Description:

Replace an existing IC engine operating an irrigation well with a new electric motor (greater than 500 HP). An existing IC engine is stationary or portable (does not propel a vehicle and is not an auxiliary IC engine on a vehicle). This replacement provides the greatest emission reductions by eliminating NOx, VOC, and PM emissions from the source.
Resource Concerns: Air Quality Impacts - Emissions of Ozone Precursors; Air Quality Impacts - Emissions of Particulate Matter (PM) and PM Precursors; Inefficient Energy Use - Equipment and Facilities; Inefficient Energy Use - Farming/Ranching Practices and Field Operations.
Associated Practices include: 374 - Farmstead Energy Improvement; 533 - Pumping Plant; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 447 - Irrigation System, Tailwater Recovery; 449 - Irrigation Water Management; 516 - Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; 614 - Watering Facility; 642 - Water Well, CAP 126 Comprehensive Air Quality Management Plan, CAP 122 Agricultural Energy Management Plan - Headquarters, and CAP 124 Agricultural Energy Management Plan - Landscape.

Before Situation:

Irrigation pump with diesel engine withdraws water from a well and provides water through a center pivot irrigation system. The emissions of oxides of nitrogen and/or particulate matter from the engine are identified to contribute to an air quality resource concern OR based on an evaluation of the engine, the pump, the well, and the center pivot irrigation system, the engine is less than 50 percent efficient in delivering water to the system.
Air Quality Impacts: The existing internal combustion engine emissions are identified to contribute to an air quality resource concern.
Inefficient Energy Use: The existing internal combustion engine uses excess fuel to operate an existing irrigation pump.
Plant Condition Impact: Poor plant condition and vigor is evident due to a lack of water during critical times in the growing season.
Water Quality Impacts: Fuel tank and fuel line have potential to cause environmental damage with leaks. The existing internal combustion engine is inefficient in delivering water to the system; subsequently, the lack of plant growth and uptake of nutrients, nitrogen and phosphorus are not being fully utilized and are available to be lost to surface and ground waters.

After Situation:

The electric motor replaces the existing older engine; the engine being replaced will be disabled and a certificate of inoperability submitted prior to certification of practice completion. The existing engine is supported by a concrete pad; no cost have been included for a new pad. Additional costs may be incurred, if a concrete pad is not present.
For Air Quality: The electric motor does not produce any on-farm emissions of oxides of nitrogen or particulate matter, resulting in a substantial emissions reduction on the farm.
For Energy: Energy efficiency will be improved by at least 20%.
For Plant Condition: Plant condition and vigor will be improved.
For Water Quality: The potential for environmental damage due to leaks from the tanks and fuel lines has been eliminated. Plant uptake of available nutrients will be increased and less nutrients will be lost to surface and ground waters.

Scenario Feature Measure: Number of Combustion Units Replaced

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $68,449.85 **Scenario Cost/Unit:** $68,449.85

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	40	$1,525.60
Materials						
Motor, electric, NEMA Premium, 500 hp and greater	1440	Premium NEMA approved Electric Motor and required appurtenances. 500 hp and greater (373+ kW). Includes materials and shipping only.	Horsepower	$116.39	575	$66,924.25

Practice: 373 - Dust Control on Unpaved Roads and Surfaces

Scenario: #4 - Petroleum-Based Road Oil Application, Once per Year

Scenario Description:

Application of a petroleum-based road oil as a dust suppressant once per year to an unpaved road or other unpaved surface where vehicle or wind action may result in emissions of particulate matter without treatment. The specific resource concern to be addressed is "Emissions of Particulate Matter (PM) and PM Precursors".

Before Situation:

The operation does not apply a dust suppressant to an unpaved surface. Vehicle or wind action on the untreated unpaved surface results in emissions of particulate matter that cause nuisance dusting or visibility-impairment effects.

After Situation:

The unpaved surface is graded and potholes are filled once per year. Petroleum-based road oil is applied via truck once per year as a dust suppressant to the unpaved surface with a minimization of overlap and avoidance of over-application. This scenario assumes a treated area of 1/4 mile in length and 12 feet in width. Associated practices include 560 - Access Road, 472 - Access Control, 561 - Heavy Use Area Protection, 342 - Critical Area Planting, 635 - Vegetated Treatment Area, 430 - Irrigation Pipeline, 436 - Irrigation Reservoir, 516 - Pipeline, 533 - Pumping Plant, 449 - Irrigation Water Management, 484 - Mulching, and 380 - Windbreak/Shelterbelt Establishment.

Scenario Feature Measure: Area Treated

Scenario Unit: Square Foot

Scenario Typical Size: 15,840

Scenario Cost: $4,662.85 **Scenario Cost/Unit:** $0.29

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Motor Grader, 200 HP	1782	Motor Grader or Maintainer, 200 hp. Typical of equipment with HP in range of 170-240. Equipment cost, does not include labor.	Hour	$158.43	5	$792.15
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	0.36	$2.10
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	5	$187.60
Materials						
Chemical, dust control, road oil, petroleum-based	1339	Petroleum-based road oil, such as SC-250 or SC-800. Includes materials and shipping only.	Gallon	$4.09	900	$3,681.00

Practice: 373 - Dust Control on Unpaved Roads and Surfaces

Scenario: #6 - Lignosulfonate Application, Once per Year

Scenario Description:

Application of an adhesive (i.e., lignosulfonate) as a dust suppressant once per year to an unpaved road or other unpaved surface where vehicle or wind action may result in emissions of particulate matter without treatment. The specific resource concern to be addressed is "Emissions of Particulate Matter (PM) and PM Precursors".

Before Situation:

The operation does not apply a dust suppressant to an unpaved surface. Vehicle or wind action on the untreated unpaved surface results in emissions of particulate matter that cause nuisance dusting or visibility-impairment effects.

After Situation:

The unpaved surface is graded and potholes are filled once per year. An adhesive, such as lignosulfonate, is applied via truck once per year as a dust suppressant to the unpaved surface with a minimization of overlap and avoidance of over-application. Once the dust suppressant is applied, the treated surface is compacted. This scenario assumes a treated area of 1/4 mile in length and 12 feet in width. Associated practices include 560 - Access Road, 472 - Access Control, 561 - Heavy Use Area Protection, 342 - Critical Area Planting, 635 - Vegetated Treatment Area, 430 - Irrigation Pipeline, 436 - Irrigation Reservoir, 516 - Pipeline, 533 - Pumping Plant, 449 - Irrigation Water Management, 484 - Mulching, and 380 - Windbreak/Shelterbelt Establishment.

Scenario Feature Measure: Area Treated

Scenario Unit: Square Foot

Scenario Typical Size: 15,840

Scenario Cost: $4,181.71 **Scenario Cost/Unit:** $0.26

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	0.36	$2.10
Motor Grader, 200 HP	1782	Motor Grader or Maintainer, 200 hp. Typical of equipment with HP in range of 170-240. Equipment cost, does not include labor.	Hour	$158.43	5	$792.15
Roller, static, smooth, self propelled	1392	Self propelled smooth drum static roller compactor, typically 1.5 ton with 34" roller. Equipment cost only. Does not include labor.	Hour	$23.41	2	$46.82
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	7	$262.64
Materials						
Chemical, dust control, adhesive, lignosulfonate	1341	Adhesive, such as lignosulfonate. Includes materials and shipping only.	Gallon	$3.42	900	$3,078.00

Practice: 373 - Dust Control on Unpaved Roads and Surfaces

Scenario: #7 - Petroleum Emulsion Application, Once per Year

Scenario Description:

Application of a petroleum emulsion as a dust suppressant once per year to an unpaved road or other unpaved surface where vehicle or wind action may result in emissions of particulate matter without treatment. The specific resource concern to be addressed is "Emissions of Particulate Matter (PM) and PM Precursors".

Before Situation:

The operation does not apply a dust suppressant to an unpaved surface. Vehicle or wind action on the untreated unpaved surface results in emissions of particulate matter that cause nuisance dusting or visibility-impairment effects.

After Situation:

The unpaved surface is graded and potholes are filled once per year. A petroleum emulsion is applied via truck once per year as a dust suppressant to the unpaved surface with a minimization of overlap and avoidance of over-application. Once the dust suppressant is applied, the treated surface is compacted. This scenario assumes a treated area of 1/4 mile in length and 12 feet in width. Associated practices include 560 - Access Road, 472 - Access Control, 561 - Heavy Use Area Protection, 342 - Critical Area Planting, 635 - Vegetated Treatment Area, 430 - Irrigation Pipeline, 436 - Irrigation Reservoir, 516 - Pipeline, 533 - Pumping Plant, 449 - Irrigation Water Management, 484 - Mulching, and 380 - Windbreak/Shelterbelt Establishment.

Scenario Feature Measure: Area Treated

Scenario Unit: Square Foot

Scenario Typical Size: 15,840

Scenario Cost: $4,730.71 **Scenario Cost/Unit:** $0.30

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	0.36	$2.10
Motor Grader, 200 HP	1782	Motor Grader or Maintainer, 200 hp. Typical of equipment with HP in range of 170-240. Equipment cost, does not include labor.	Hour	$158.43	5	$792.15
Roller, static, smooth, self propelled	1392	Self propelled smooth drum static roller compactor, typically 1.5 ton with 34" roller. Equipment cost only. Does not include labor.	Hour	$23.41	2	$46.82
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	7	$262.64
Materials						
Chemical, dust control, petroleum emulsion	1342	Petroleum emulsio. Includes materials and shipping only.	Gallon	$4.03	900	$3,627.00

Practice: 373 - Dust Control on Unpaved Roads and Surfaces

Scenario: #8 - Polymer Emulsion Application, Once per Year

Scenario Description:

Application of a polymer emulsion, such as polyacrylamide (PAM), as a dust suppressant once per year to an unpaved road or other unpaved surface where vehicle or wind action may result in emissions of particulate matter without treatment. The specific resource concern to be addressed is "Emissions of Particulate Matter (PM) and PM Precursors".

Before Situation:

The operation does not apply a dust suppressant to an unpaved surface. Vehicle or wind action on the untreated unpaved surface results in emissions of particulate matter that cause nuisance dusting or visibility-impairment effects.

After Situation:

The unpaved surface is graded and potholes are filled once per year. A polymer emulsion is applied via truck once per year as a dust suppressant to the unpaved surface with a minimization of overlap and avoidance of over-application. Once the dust suppressant is applied, the treated surface is compacted. This scenario assumes a treated area of 1/4 mile in length and 12 feet in width. Associated practices include 560 - Access Road, 472 - Access Control, 450 - Anionic Polyacrylamide (PAM) Application, 561 - Heavy Use Area Protection, 342 - Critical Area Planting, 635 - Vegetated Treatment Area, 430 - Irrigation Pipeline, 436 - Irrigation Reservoir, 516 - Pipeline, 533 - Pumping Plant, 449 - Irrigation Water Management, 484 - Mulching, and 380 - Windbreak/Shelterbelt Establishment.

Scenario Feature Measure: Area Treated

Scenario Unit: Square Foot

Scenario Typical Size: 15,840

Scenario Cost: $4,388.71 **Scenario Cost/Unit:** $0.28

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	0.36	$2.10
Motor Grader, 200 HP	1782	Motor Grader or Maintainer, 200 hp. Typical of equipment with HP in range of 170-240. Equipment cost, does not include labor.	Hour	$158.43	5	$792.15
Roller, static, smooth, self propelled	1392	Self propelled smooth drum static roller compactor, typically 1.5 ton with 34" roller. Equipment cost only. Does not include labor.	Hour	$23.41	2	$46.82
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	7	$262.64
Materials						
Chemical, dust control, polymer emulsion, tanker purchase	1343	Polymer emulsion, such as polyacrylamide purchased in bulk tanker of 4,000 gallons or more. Includes materials and shipping only.	Gallon	$3.65	900	$3,285.00

Practice: 374 - Farmstead Energy Improvement

Scenario: #1 - Ventilation - Exhaust

Scenario Description:

Replacement of a conventional exhaust fan with high volume, low speed, efficient exhaust fan. Fans being installed should be models previously tested by BESS Lab or the Air Movement and Control Association and be in top 20 percentile of fans tested. Practice certification will be through receipts and pictures from the applicant. Typical scenario includes the replacement of a 48" fan.

Before Situation:

Inefficient ventilation in an agricultural building.

After Situation:

High-efficiency ventilation system which reduces energy use. The new ventilation equipment will provide suitable air quality and reduce overall power requirements (kW) compared to the existing ventilation system as evidenced in an energy audit. Associated practices/activities: may include 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $1,371.18 **Scenario Cost/Unit:** $1,371.18

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	3	$114.42
Materials						
Fan, exhaust, 48" High Efficiency	1187	48 inch high efficiency exhaust fan, controls, wiring, and associated appurtenances. Materials only.	Each	$1,256.76	1	$1,256.76

Practice: 374 - Farmstead Energy Improvement

Scenario: #2 - Ventilation - HAF

Scenario Description:

A system of fans are installed to create a horizontal air circulation pattern; the new system promotes efficient heat and moisture distribution. In a typical 10,000 square foot greenhouse, 10 HAF fans are needed. Fan performance meets Energy Audit efficiency criteria as tested by AMCA or BESS Labs.

Before Situation:

Inefficent air circulation system in a greenhouse.

After Situation:

High-efficiency air circulation system which reduces energy use. The new equipment will provide suitable air quality and reduce overall power requirements (kW) compared to the existing system as evidenced in an energy audit. Associated practices/activities: may include 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $221.83 **Scenario Cost/Unit:** $221.83

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	2	$76.28
Materials						
Fan, HAF, 1/10 to 1/15 HP	1189	High efficiency Horizontal Air Flow (HAF) fan, controls, wiring, and associated appurtenances. Materials only.	Each	$145.55	1	$145.55

Practice: 374 - Farmstead Energy Improvement

Scenario: #3 - Plate Cooler

Scenario Description:

The installation of all stainless steel dual pass plate cooler, type 316 stainless steel. Practice certification will be through receipts and pictures from the applicant.

Before Situation:

Inefficient milk cooling (minimal pre-cooling of milk before entering the bulk tank).

After Situation:

High-efficiency milk cooling system which reduces energy use. The new milk cooling equipment will pre-cool the milk and reduce overall power requirements (kW) compared to the existing milk cooling system (where most of the cooling was accomplished in the bulk tank) as evidenced in an energy audit. Associated practices/activities: may include 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $6,624.09 **Scenario Cost/Unit:** $6,624.09

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	8	$305.12
Materials						
Plate Cooler, 750 - 999 gal/hr capacity	1178	Stainless Steel, dual pass plate cooler with 750 - 999 gallon/hour capacity. Includes materials and shipping only.	Each	$6,318.97	1	$6,318.97

Practice: 374 - Farmstead Energy Improvement

Scenario: #4 - Scroll Compressor

Scenario Description:

Install a new scroll compressor, associated controls, wiring, and materials to retrofit an existing refrigeration system. A new condenser is not included in this typical scenario. Typical scenario includes a new 5 horsepower scroll compressor.

Before Situation:

Inefficient reciprocating compressor as a key component of the refrigeration system used to cool milk. The compressor is a critical part of a milk cooling system, affecting milk quality, system reliability, and system efficiency.

After Situation:

A more efficient scroll compressor, which will reduce energy use, is evidenced by the energy audit. A comparably sized scroll compressor provides refrigeration capacity at a higher efficiency than a reciprocating compressor. Newer scroll compressor systems typically reduce electricity use by 15 to 25 percent compared to reciprocating compressors. Associated practices/activities: may include 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Horse Power

Scenario Unit: Horsepower

Scenario Typical Size: 5

Scenario Cost: $2,747.80 **Scenario Cost/Unit:** $549.56

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	4	$152.56
Materials						
Scroll Compressor - 5 HP	1183	Scroll compressor, 5 Horsepower, controls, wiring, and appurtenances. Materials only.	Each	$2,595.24	1	$2,595.24

Practice: 374 - Farmstead Energy Improvement

Scenario: #5 - Variable Speed Drive > 5 HP

Scenario Description:

The typical scenario consists of a variable speed drive (VSD) and appurtances, such as hook-ups, control panels, wiring, control blocks, filters, switches, pads, etc. attached to an electric motor used to drive a ventilation fan, irrigation pumps, vacuum pump, or similar equipment involved with agricultural production. The motor size, on which the VSD is added, is larger than 5 HP.

Before Situation:

The system is inefficient when a motor operates at constant speed to satisfy a load which varies as to flow rate and/or pressure requirements.

After Situation:

An on-farm energy audit has determined that energy use can be reduced through use of a VSD to control electric motors. After the VSD is applied, the motor speed can be adjusted to reduce power requirements and better match varied flow or pressure requirements. Associated practices/activities: may include 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Motor Horsepower

Scenario Unit: Horsepower

Scenario Typical Size: 50

Scenario Cost: $11,555.62 **Scenario Cost/Unit:** $231.11

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	8	$305.12
Materials						
Variable Speed Drive, 50 HP	1288	Variable speed drive for 50 Horsepower electric motor. Does not include motor. Materials only.	Horsepower	$225.01	50	$11,250.50

Practice: 374 - Farmstead Energy Improvement

Scenario: #6 - Automatic Controller System

Scenario Description:

The typical scenario consists of an automatic control system installed on an existing manually controlled agricultural system. Typical components may include any of the following: wiring, sensors, data logger, logic controller, communication link, software, switches, and relay.

Before Situation:

A manually controlled system is existing in an agricultural facility that causes the inefficient use of energy, as evidenced by an on-farm energy audit.

After Situation:

An on-farm energy audit has determined that energy use can be reduced through use of an automatic controller that helps regulates the energy consumption of the existing system. Associated practices/activities may include: 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each system

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $1,479.30 **Scenario Cost/Unit:** $1,479.30

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	8	$305.12
Materials						
Switches and Controls, programmable controller	1193	Programmable logic controller (with or without wireless telecommunications) commonly used to control pumps and irrigation systems	Each	$153.22	1	$153.22
Switches and Controls, temp sensors	1192	Temperature and soil moisture sensors installed as part of an electronic monitoring (with or without wireless telecommunications) commonly used to control pumps and irrigation systems	Each	$605.73	1	$605.73
Switches and Controls, Wi-Fi system and software	1194	Software with built-in cellular or Wi-Fi communication commonly used to control pumps and irrigation systems	Each	$415.23	1	$415.23

Practice: 374 - Farmstead Energy Improvement

Scenario: #7 - Motor Upgrade > 100 HP

Scenario Description:

The typical scenario consists of replacing an existing electric motor used to drive a ventilation fan, irrigation pumps, vacuum pump, or similar equipment involved with agricultural production with a new, high efficiency motor. The motor size is larger than 100 horsepower.

Before Situation:

The system is inefficient with a standard efficiency motor.

After Situation:

An on-farm energy audit has determined that energy use can be reduced through use of a NEMA premium efficiency motor. Associated practices/activities may include: 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $23,070.12 **Scenario Cost/Unit:** $23,070.12

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	16	$610.24
Materials						
Motor, electric, NEMA Premium, 200 HP	1175	Premium NEMA approved electric motor, 200 Horsepower and all required appurtenances. Includes materials and shipping only.	Each	$22,459.88	1	$22,459.88

Practice: 374 - Farmstead Energy Improvement

Scenario: #8 - Motor Upgrade 10 - 100 HP

Scenario Description:

The typical scenario consists of replacing an existing electric motor used to drive a ventilation fan, irrigation pumps, vacuum pump, or similar equipment involved with agricultural production with a new, high efficiency motor. The motor size is equal to or larger than 10 and less than or equal to 100 horsepower.

Before Situation:

The system is inefficient with a standard efficiency motor.

After Situation:

An on-farm energy audit has determined that energy use can be reduced through use of a NEMA premium efficiency motor. Associated practices/activities may include: 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $6,210.47 **Scenario Cost/Unit:** $6,210.47

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	8	$305.12
Materials						
Motor, electric, NEMA Premium, 50 HP	1173	Premium NEMA approved electric motor, 50 Horsepower and all required appurtenances. Includes materials and shipping only.	Each	$5,905.35	1	$5,905.35

Practice: 374 - Farmstead Energy Improvement

Scenario: #9 - Motor Upgrade > 1 and < 10 HP

Scenario Description:

The typical scenario consists of replacing an existing electric motor used to drive a ventilation fan, irrigation pumps, vacuum pump, or similar equipment involved with agricultural production with a new, high efficiency motor. The motor size is larger than 1 and less than 10 horsepower.

Before Situation:

The system is inefficient with a standard efficiency motor.

After Situation:

An on-farm energy audit has determined that energy use can be reduced through use of a NEMA premium efficiency motor. Associated practices/activities may include: 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $891.86 **Scenario Cost/Unit:** $891.86

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	4	$152.56
Materials						
Motor, electric, NEMA Premium, 5 HP	1171	Premium NEMA approved electric motor, 5 Horsepower and all required appurtenances. Includes materials and shipping only.	Each	$739.30	1	$739.30

Practice: 374 - Farmstead Energy Improvement

Scenario: #10 - Motor Upgrade ≤ 1 HP

Scenario Description:

The typical scenario consists of replacing an existing electric motor used to drive a ventilation fan, irrigation pumps, vacuum pump, or similar equipment involved with agricultural production with a new, high efficiency motor. The motor size is less than or equal to 1 horsepower.

Before Situation:

The system is inefficient with a standard efficiency motor.

After Situation:

An on-farm energy audit has determined that energy use can be reduced through use of a NEMA premium efficiency motor. Associated practices/activities may include: 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $605.47 **Scenario Cost/Unit:** $605.47

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	4	$152.56
Materials						
Motor, electric, NEMA Premium, 1 HP	1169	Premium NEMA approved electric motor, 1 Horsepower and all required appurtenances. Includes materials and shipping only.	Each	$452.91	1	$452.91

Practice: 374 - Farmstead Energy Improvement

Scenario: #11 - Heating - Radiant Systems

Scenario Description:

Replace "pancake" Brood Heaters in a poultry house with Radiant Tube Heaters, or similar. Replacement will require the materials and labor to remove existing heating system, re-plumb gas lines, cables and wench system to retrofit new radiant tube heaters, and miscellaneous items to complete the installation. Alternate acceptable radiant heating systems can include radiant brooders and quad radiant systems as evidenced by the energy audit. The typical scenario consists of the replacement of 28 brood heaters with 6 radiant tube heaters.

Before Situation:

Inefficient heat distribution equipment, such as conventional "pancake" brood heaters. The Pancake brooder, mounted at a low installation height, primarily warms the air. They provide a one-to-two foot perimeter at desired temperatures around each brooder. A large number of brooders are required to cover a significant percent of floor space. As the warmed air naturally rises it loses effectiveness for poultry on the ground.

After Situation:

Energy use is reduced through installation of a more efficient heater. Radiant tube heaters primarily warm objects within a direct line of sight (similar to the sun or an open fire). Air temperature is of relatively little importance for a radiant heating systems to be effective. As a result, radiant sytems are typically installed 5' or more above the floor level. This height extends the distribution of the radiant heat over a larger area than is possible with pancake style heaters. A roughly 16' diameter radiant heat zone heats over twice that of a convential pancake brooder. Associated practices/activities may include: 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 6

Scenario Cost: $8,987.32 **Scenario Cost/Unit:** $1,497.89

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	16	$610.24
Materials						
Heater, radiant tube	1163	Radiant tube heater rated at 125,000 BTU/hour. Materials only.	Each	$1,396.18	6	$8,377.08

Practice: 374 - Farmstead Energy Improvement

Scenario: #12 - Heating (Building)

Scenario Description:

Replace existing low efficiency heaters with new high efficiency heaters. High-efficiency heating systems include any heating unit with efficiency rating of 80%+ for fuel oil and 90%+ for natural gas and propane. Applications may be air heating/building environment and hydronic (boiler) heating for agricultural operations, including under bench, or root zone heating. An alternative to heater replacement might be the addition of climate control system and electronic temperature controls with +/- 1 degree F differential, to reduce the annual run time.

Before Situation:

Buildings heated with low efficiency heaters or heaters without proper electronic climate controls

After Situation:

Higher efficiency heaters reduce energy consumption, energy costs, and GHG emissions. These replacement systems can be fueled by natural gas, propane, or fuel oil. Associated practices/activities: 122-AgEMP - HQ and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Rated Heat Output

Scenario Unit: 1000 BTU/Hour

Scenario Typical Size: 750

Scenario Cost: $7,030.24 **Scenario Cost/Unit:** $9.37

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	16	$610.24
Materials						
Heater, high efficiency	1165	Natural gas, propane, or fuel oil unit heater or boiler and venting materials. Based on input kBTU/hour. Includes materials and shipping only.	1,000 BTU/Hour	$8.56	750	$6,420.00

Practice: 374 - Farmstead Energy Improvement

Scenario: #13 - Heating - Attic Heat Recovery vents

Scenario Description:

Install actuated inlets or automatic latching gravity inlets that draw warmer, drier air from the attic to assist with moisture and heat control when ventiliation fans are being operated in poultry houses and swine barns. Other systems to transfer heat, as detailed in ASABE S612-compliant energy audit may also be used. Based on a 40' x 500' poultry house.

Before Situation:

Heated buildings with attic spaces but no means to transfer heat between the heated space, attic, and ambient (outside) air when relative conditions allow for reduced energy use.

After Situation:

Attic vents or inlets allow dry warm air from the attic to cirulated through out the building. By using pre-warmed air from the attic less energy is needed for heating 122-AgEMP - HQ and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each inlet

Scenario Unit: Each

Scenario Typical Size: 14

Scenario Cost: $2,407.06 **Scenario Cost/Unit:** $171.93

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	24	$915.36
Materials						
Inlet, Attic Ceiling	2414	Poultry house attic air inlets. Includes materials only.	Each	$106.55	14	$1,491.70

Practice: 374 - Farmstead Energy Improvement

Scenario: #14 - Grain Dryer

Scenario Description:

A replacement continuous dryer rated for an appropriatle rated bushel/per hour capacity for the operation that includes a microcomputer-based control system that adjusts the amount of time the crop remains in the dryer in order to achieve a consistent and accurate moisture content in the dried product. Alternate types of replacement dryers which reduce energy use are acceptable as evidenced by the energy audit. The typical operation requires a rated capacity of 860 bushels per hour.

Before Situation:

Wet crop is loaded in the top of a horizontal, continuous dryer. Dried crop is augured from the bottom of the dryer. The heated air from the unit's burners passes from the burner plenum through the grain. An on-farm energy audit has identified inefficient manual control of the dryer where the operator controls the plenum temperature and the discharge auger speed to achieve the desired final moisture content. Moisture content is based on measurement of grain leaving the dryer. The plenum temperature setting depends on the moisture content of crop with a typical value of 220 F. The burner cycles on and off, automatically, as necessary to maintain the plenum temperature selected by the operator.

After Situation:

Energy use is reduced through installation of a more efficient continuous dryer that uses a microcomputer-based controller to reduce overdrying and total time of operation. Associated practices/activities may include: 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Rated capacity of the dryer

Scenario Unit: Bushel per Hour

Scenario Typical Size: 860

Scenario Cost: $71,138.84 **Scenario Cost/Unit:** $82.72

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	16	$610.24
Materials						
Grain dryer, Axial, 16'	1159	Grain dryer, 16 foot Axial with rated capacity of 600 bushels/hour. Materials only.	Bushels per Hour	$82.01	860	$70,528.60

Practice: 374 - Farmstead Energy Improvement

Scenario: #15 - Washer-extractor

Scenario Description:

For hygiene, dairies utilize wash-clothes during milking that require frequent washing and drying. The proposed washer-extractors use less energy when compared to conventional systems.

Before Situation:

Other methods for maintaining hygiene of dairy milking cows, or no hygiene is practiced.

After Situation:

A single washer-extractor unit is capable of cleaning and removing most of the moisture from over 800 lbs (dry load capacity) daily.

Scenario Feature Measure: Rated capacity of the unit.

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $7,790.47 **Scenario Cost/Unit:** $7,790.47

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	8	$305.12
Materials						
Washer Extractor	2489	Non-residential; 30 to 40 pound capacity (dry load); 4.3 - 6.0 cu.ft. (cylinder volume); minimum Modified Energy Factor (MEF) no lower than 2.2 (CuFt/kWh)/Cycle. Includes materials and shipping only.	Each	$7,485.35	1	$7,485.35

Practice: 374 - Farmstead Energy Improvement

Scenario: #16 - Water heater

Scenario Description:

On dairies there is need to heat water and/or milk and cool milk and/or other dairy products. These systems are energy efficient since they use less energy input to accomplish heating and cooling when compared to conventional heating and cooling systems.

Before Situation:

Other methods for maintaining heating and/or cooling of water.

After Situation:

Use of a heat pump significantly reduces the energy required for heating and/or cooling.

Scenario Feature Measure: Rated capacity of the unit.

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $305.21 **Scenario Cost/Unit:** $305.21

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	8	$305.12
Materials						
Water Heater (Water-Source Heat Pump)	2488	Energy efficient industrial heat pump systems used for heating and/or cooling of water.	BTU	$0.09	1	$0.09

Practice: 374 - Farmstead Energy Improvement

Scenario: #17 - Compressor heat recovery

Scenario Description:

On dairies there is need to heat water and/or milk and cool milk and/or other dairy products. These systems are energy efficient since they use less energy input to accomplish heating and cooling when compared to conventional heating and cooling systems.A heat exchangers (compressor heat recovery system) are used to cool milk following heating processes and to cool warm milk yet to be processed. Use of the heat exchangers reduces the need for additional energy to carry out each of these processes.

Before Situation:

Other refrigeration methods.

After Situation:

Use of a compressor heat recovery unit significantly reduces the energy required for heating and/or cooling. Scenario is for the installation of 1 Compressor heat recovery unit, typically rated at 1,000 BTU/Hour

Scenario Feature Measure: Number of heating units

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $3,671.52 **Scenario Cost/Unit:** $3,671.52

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	8	$305.12
Materials						
Compressor heat recovery (CHR) unit, High Efficiency	1899	Compressor heat recovery (CHR) units (insulated storage tanks with heat exchangers) added to a refrigeration system, use the heat extracted from a warm fluid (e.g., milk) that passes through the hot gas refrigerant line from the refrigeration system's co	Each	$3,366.40	1	$3,366.40

Practice: 374 - Farmstead Energy Improvement

Scenario: #18 - Alley Scraper

Scenario Description:

Install an electric-powered alley scraper system to replace the use of tractors for scraping manure in barn alley-ways.

Before Situation:

A tractor is used to scrape manure from barn alley-ways. For the typical system, this consumes over 435 million BTUs per year.

After Situation:

For the same function, a typical electric-powered alley scraper system consumes 153 million BTUs per year.

Scenario Feature Measure: Scraper System

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $9,153.60 **Scenario Cost/Unit:** $9,153.60

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	240	$9,153.60
Materials						
Scraper, alley	2611	A "V" shaped mechanical blade that is dragged over an alley by chain or cable to pull manure to collection channel at the end of the alley (or possibly the center of the barn). The blade then collapses and is drawn back to the opposite end of the alley.	Each	$18,486.20		$0.00

Practice: 374 - Farmstead Energy Improvement

Scenario: #19 - Condenser

Scenario Description:

Install an air or water cooled condenser, associated controls, wiring, and materials to retrofit an existing refrigeration system. Typical scenario includes a new 30 horsepower condenser.

Before Situation:

Inefficient condenser as a key component of the refrigeration system used to cool milk. The condenser is a critical part of a milk cooling system, affecting milk quality, system reliability, and system efficiency.

After Situation:

A more efficient air or water cooled condenser and overall refrigeration system, which will reduce energy use. Evaporative cooled condensers can save energy through reduction in energy needed for pumping water in traditional ground-cooled condensers and through a lowered saturated discharge temperature. Associated practices/activities: may include 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Replacement of former system

Scenario Unit: Horsepower

Scenario Typical Size: 30

Scenario Cost: $21,852.63 **Scenario Cost/Unit:** $728.42

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	40	$1,525.60
Materials						
Refrigeration/Condensor Unit	2632	Air or water cooled condensor with floating head presure controls, 30HP unit. Includes materials and shipping only.	Each	$20,327.03	1	$20,327.03

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #4 - Solid-Set Sprinkler System, Less than 20 Acres

Scenario Description:

Installation of a solid-set dust control sprinkler system on a confined animal operation with a pen and working alley area of less than 20 acres. The specific resource concern to be addressed is "Emissions of Particulate Matter (PM) and PM Precursors".

Before Situation:

The confined beef feedlot does not supply additional moisture to the pens and working alleys. There is a dry, loose manure layer that is subject to animal activity resulting in emissions of particulate matter that cause nuisance dusting or visibility-impairment effects.

After Situation:

A solid-set dust control sprinkler system is installed to provide enough water addition to meet the maximum total daily wet soil evaporation rate, with allowances for moisture input to pens/alley from animal manure and urine. The system is designed to avoid excessive overlap and over-application of water. This scenario has a typical pen/alley area of 15 acres. Associated practices include 430 - Irrigation Pipeline, 436 - Irrigation Reservoir, 442 - Irrigation System, Sprinkler, 516 - Pipeline, and 533 - Pumping Plant.

Scenario Feature Measure: Pen Surface Area, Including Working Alleys

Scenario Unit: Acre

Scenario Typical Size: 15

Scenario Cost: $174,004.35 **Scenario Cost/Unit:** $11,600.29

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dust Control, Open Lot Solid Set Sprinkler System, w/Appurtenances, < 20 Acres	1344	Solid set sprinkler system for dust control on open lot livestock pens, less than 20 acres, w/appurtenances and including complete labor and installation.	Acre	$11,600.29	15	$174,004.35

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #5 - Solid-Set Sprinkler System, 20-60 Acres

Scenario Description:

Installation of a solid-set dust control sprinkler system on a confined animal operation with a pen and working alley area of 20-60 acres. The specific resource concern to be addressed is "Emissions of Particulate Matter (PM) and PM Precursors".

Before Situation:

The confined beef feedlot does not supply additional moisture to the pens and working alleys. There is a dry, loose manure layer that is subject to animal activity resulting in emissions of particulate matter that cause nuisance dusting or visibility-impairment effects.

After Situation:

A solid-set dust control sprinkler system is installed to provide enough water addition to meet the maximum total daily wet soil evaporation rate, with allowances for moisture input to pens/alley from animal manure and urine. The system is designed to avoid excessive overlap and over-application of water. This scenario has a typical pen/alley area of 35 acres. Associated practices include 430 - Irrigation Pipeline, 436 - Irrigation Reservoir, 442 - Irrigation System, Sprinkler, 516 - Pipeline, and 533 - Pumping Plant.

Scenario Feature Measure: Pen Surface Area, Including Working Alleys

Scenario Unit: Acre

Scenario Typical Size: 35

Scenario Cost: $323,338.05 **Scenario Cost/Unit:** $9,238.23

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dust Control, Open Lot Solid Set Sprinkler System, w/Appurtenances, 20 to 60 Acres	1345	Solid set sprinkler system for dust control on open lot livestock pens, 20-60 acres, w/appurtenances and including complete labor and installation	Acre	$9,238.23	35	$323,338.05

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #6 - Solid-Set Sprinkler System, Greater than 60 Acres

Scenario Description:

Installation of a solid-set dust control sprinkler system on a confined animal operation with a pen and working alley area of greater than 60 acres. The specific resource concern to be addressed is "Emissions of Particulate Matter (PM) and PM Precursors".

Before Situation:

The confined beef feedlot does not supply additional moisture to the pens and working alleys. There is a dry, loose manure layer that is subject to animal activity resulting in emissions of particulate matter that cause nuisance dusting or visibility-impairment effects.

After Situation:

A solid-set dust control sprinkler system is installed to provide enough water addition to meet the maximum total daily wet soil evaporation rate, with allowances for moisture input to pens/alley from animal manure and urine. The system is designed to avoid excessive overlap and over-application of water. This scenario has a typical pen/alley area of 100 acres. Associated practices include 430 - Irrigation Pipeline, 436 - Irrigation Reservoir, 442 - Irrigation System, Sprinkler, 516 - Pipeline, and 533 - Pumping Plant.

Scenario Feature Measure: Pen Surface Area, Including Working Alleys

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $588,888.00 **Scenario Cost/Unit:** $5,888.88

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dust Control, Open Lot Solid Set Sprinkler System, w/Appurtenances, > 60 Acres	1346	Solid set sprinkler system for dust control on open lot livestock pens, greater than 60 acres, w/appurtenances and including complete labor and installation	Acre	$5,888.88	100	$588,888.00

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #7 - Truck-Mounted Mobile Sprinkler System

Scenario Description:

Use of a mobile truck-mounted sprinkler on a confined animal operation. The specific resource concern to be addressed is "Emissions of Particulate Matter (PM) and PM Precursors".

Before Situation:

The confined beef feedlot does not supply additional moisture to the pens and working alleys. There is a dry, loose manure layer that is subject to animal activity resulting in emissions of particulate matter that cause nuisance dusting or visibility-impairment effects.

After Situation:

A mobile truck-mounted sprinkler is used once per day to provide enough water addition to meet the maximum total daily wet soil evaporation rate, with allowances for moisture input to pens/working alleys from animal manure and urine. The application is intended to avoid excessive overlap and over-application of water. Associated practices include 436 - Irrigation Reservoir and 533 - Pumping Plant.

Scenario Feature Measure: Pen Surface Area, Including Working Alley ;

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $2,127.95 **Scenario Cost/Unit:** $2,127.95

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	365	$2,127.95

Practice: 378 - Pond

Scenario: #1 - Excavated Pit

Scenario Description:

A low-hazard water impoundment structure on agricultural lands to maintain or improve water quality and to provide water for livestock, fish and wildlife, recreation, fire control, developing renewable energy systems, and other related uses. Pond is created solely by excavation and impounds less than 3 feet against the embankment or spoil. Excavated material is spoiled, not placed in a designed embankment. Earthen spillway is constructed as needed. The resource concerns addressed include inadequate livestock water, excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition. Vegetation shall be established on all exposed areas, using 342-Critical Area Planting as needed.

Before Situation:

Area exists where water could naturally pool or run off to create a pond for livestock, wildlife, fire control, developing renewable energy systems, other related uses, and to maintain or improve water quality. Failure of the pond will not result in loss of life; damage to homes, commercial or industrial buildings, main highways, or railroads; or in interruption of the use or service of public utilities.

After Situation:

The typical pond is constructed by excavating 3100 cubic yards and spreading the spoil outside the pool area using a dozer or similar excavation equipment. Vegetation will be completed under critical area planting (342). Other associated practices include 382-Fence, 516-Pipeline, 521-Pond Sealing and Lining, 533-Pumping Plant, 614-Stock Watering, 587-Structure for Water Control, 396-Aquatic Organism Passage, and 570-Stormwater Runoff Control.

Scenario Feature Measure: Excavated Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 3,100

Scenario Cost: $14,427.32 **Scenario Cost/Unit:** $4.65

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	40	$4,991.20
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	3100	$7,347.00
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	42	$1,575.84
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: **378 - Pond**

Scenario: **#2 - Embankment Pond without Pipe**

Scenario Description:

A low-hazard water impoundment structure on agricultural land to maintain or improve water quality or to provide water for livestock, fish and wildlife, recreation, fire control, developing renewable energy systems, and other related uses. An earthen embankment will be constructed using on site material with an earthen auxiliary spillway. The resource concerns addressed include inadequate livestock water, excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition. Vegetation shall be established on all exposed areas, using 342-Critical Area Planting as needed.

Before Situation:

Area exists where water could naturally pool or run off to create a pond for livestock, wildlife, fire control, developing renewable energy systems, other related uses, and to maintain or improve water quality Failure of the embankment will not result in loss of life or damages of any kind.

After Situation:

The typical pond is constructed by excavating the pool area, constructing the auxiliary spillway, preparing the foundation as designed, and using 3100 cubic yards to create an embankment. The product of the storage times the effective height of the dam is less than 3,000. The effective height of the dam is 35 feet or less. The earthen auxiliary spillway will be constructed as designed. No principle spillway pipe will be used. Vegetation will be completed under critical area planting (342). Other associated practices include 382-Fence, 516-Pipeline, 521-Pond Sealing and Lining, 533-Pumping Plant, 614-Stock Watering, 587-Structure for Water Control, 396-Aquatic Organism Passage, and 570-Stormwater Runoff Control.

Scenario Feature Measure: Embankment Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 3,100

Scenario Cost: $28,361.48 **Scenario Cost/Unit:** $9.15

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	3100	$7,347.00
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	40	$4,991.20
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	3100	$13,640.00
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	43	$1,613.36
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 378 - Pond

Scenario: #3 - Embankment pond with pipe > 500 yd3

Scenario Description:

A low-hazard water impoundment structure on agricultural land to maintain or improve water quality and to provide water for livestock, fish and wildlife, recreation, fire control, developing renewable energy systems, and other related uses. An earthen embankment will be constructed from on site material with a principle spillway conduit and earthen auxiliary spillway, as designed. The resource concerns addressed include inadequate livestock water, excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition. Vegetation shall be established on all exposed areas, using 342-Critical Area Planting as needed.

Before Situation:

Area exists where water could naturally pool or run off to create a pond for livestock, wildlife, fire control, developing renewable energy systems, other related uses, and to maintain or improve water quality. Failure of the embankment will not result in loss of life or damages of any kind.

After Situation:

The typical low hazard pond is constructed by excavating the pool area, constructing the auxiliary spillway, preparing the foundation as designed, and using 3100 cubic yards to create an embankment. The product of the storage times the effective height of the dam is less than 3,000. The effective height of the dam is 35 feet or less. The principle spillway is installed using an approved conduit material. The earthen auxiliary spillway will be constructed as designed. Vegetation will be completed under critical area planting (342). Other associated practices include 382-Fence, 516-Pipeline, 521-Pond Sealing and Lining, 533-Pumping Plant, 614-Stock Watering, 587-Structure for Water Control, 396-Aquatic Organism Passage, and 570-Stormwater Runoff Control.

Scenario Feature Measure: Embankment Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 3,100

Scenario Cost: $35,014.16 **Scenario Cost/Unit:** $11.29

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	3100	$7,347.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	3100	$13,640.00
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	48	$5,989.44
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	3	$1,525.11
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	10	$381.40
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	48	$1,800.96
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	19.6	$753.62
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	1.6	$62.35
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$25.76	15	$386.40

Materials

Trash Guard, metal	1608	Trash Guard, fabricated-steel, includes materials, equipment, and labor to transport and place Conical shaped trash guard for drop inlet spillway. Typically fabricated of CMP and steel. Includes materials, equipment, and labor to fabricate and transport	Pound	$2.49	118	$293.82
Pipe, CMP, 18", 16 Gauge	1743	18" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$18.63	98	$1,825.74
Pipe, CMP, 30", 16 Gauge	1742	30" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$29.80	8	$238.40

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 378 - Pond

Scenario: #4 - Embankment Pond without Pipe, Imported Fill

Scenario Description:

A low-hazard water impoundment structure on agricultural land to maintain or improve water quality or to provide water for livestock, fish and wildlife, recreation, fire control, developing renewable energy systems, and other related uses. This scenario applies to sites where imported fill is required for all or part of the embankment. An earthen embankment will be constructed with an earthen auxiliary spillway. The resource concerns addressed include inadequate livestock water, excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition. Vegetation shall be established on all exposed areas, using 342-Critical Area Planting as needed.

Before Situation:

Area exists where water could naturally pool or run off to create a pond for livestock, wildlife, fire control developing renewable energy systems, other related uses, and to maintain or improve water quality Failure of the embankment will not result in loss of life or damages of any kind.

After Situation:

The typical pond is constructed by clearing and grubbing the footprint area, preparing foundation material where needed, importing embankment fill free of rock and debris and properly layering and compacting the fill to create the embankments, and constructing the auxiliary spillway. The embankment must meet Low Hazard Class dam criteria. The product of the storage times the effective height of the dam is less than 3,000 acre·ft2. The effective height of the dam is 35 feet or less. The earthen auxiliary spillway will be constructed as designed. No principle spillway pipe is used. Vegetation will be completed under critical area planting (342). Other associated practices include 382-Fence, 516-Pipeline, 521-Pond Sealing and Lining, 533-Pumping Plant, 614-Stock Watering, 587-Structure for Water Control, 396-Aquatic Organism Passage.

Scenario Feature Measure: Embankment Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 3,100

Scenario Cost: $36,754.73 **Scenario Cost/Unit:** $11.86

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	3100	$13,640.00
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	3100	$7,347.00
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	2325	$8,393.25
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	40	$4,991.20
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	43	$1,613.36
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: **378 - Pond**

Scenario: **#5 - Difficult Excavation**

Scenario Description:

A low-hazard water impoundment structure on agricultural lands to maintain or improve water quality and to provide water for livestock, fish and wildlife, recreation, fire control, developing renewable energy systems, and other related uses. Pond is created solely by excavation. Excavated material is wet and must be spoiled adjacent to the site, then allowed to dry prior to hauling and disposal, it is not placed in a designed embankment. Earthen spillway is constructed as needed. The resource concerns addressed include inadequate livestock water, excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition. Vegetation shall be established on all exposed areas, using 342-Critical Area Planting as needed.

Before Situation:

An area exists where water naturally pools or run off is caught. This creates a sediment laden wet area with debris for livestock, wildlife, fire control, developing renewable energy systems, other related uses, and to maintain or improve water quality. Wet sediment and debris removal from the area will not result in loss of life; damage to homes, commercial or industrial buildings, main highways, or railroads; or in interruption of the use or service of public utilities.

After Situation:

Adequate water storage capacity to meet the resource concern is achieved by excavating the wet sediment and debris. The excavated material is wet and must be dried prior to hauling to a permanent fill site. Hauling distance is typically within a mile. After the material is removed, the product of the storage times the effective height of the dam is less than 3,000 acre· ft2. The effective height of the dam is 35 feet or less. Vegetation will be completed under critical area planting (342). Other associated practices include 382-Fence, 521-Pond Sealing and Lining.

Scenario Feature Measure: Excavated Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,200

Scenario Cost: $14,719.76 **Scenario Cost/Unit:** $12.27

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	40	$4,579.20
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.32	1200	$384.00
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	1200	$4,332.00
Front End Loader, 95 HP	1327	Wheeled front end loader with horsepower range of 80 to 110. Equipment and power unit costs. Labor not included.	Hour	$52.66	24	$1,263.84
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	64	$2,401.28
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	24	$989.52
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 378 - Pond

Scenario: #6 - Embankment pond with pipe ≤ 500 yd3

Scenario Description:

A low-hazard water impoundment structure to maintain or improve water quality and to provide water for livestock, fish and wildlife, recreation, fire control, developing renewable energy systems, and other related uses. An earthen embankment will be constructed from on site material with a principle spillway conduit and earthen auxiliary spillway, as designed. The resource concerns addressed include inadequate livestock water, excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition. Vegetation shall be established on all exposed areas, using 342-Critical Area Planting as needed.

Before Situation:

Area exists where water could naturally pool or run off to create a pond for livestock, wildlife, fire control, developing renewable energy systems, other related uses, and to maintain or improve water quality. Failure of the embankment will not result in loss of life or damages of any kind.

After Situation:

The typical low hazard pond is constructed by excavating the pool area, constructing the auxiliary spillway, preparing the foundation as designed, and creating an embankment. In all, 500 yd3 or less earthwork is carried out. The product of the storage times the effective height of the dam is less than 3,000. The effective height of the dam is 35 feet or less. The principle spillway is installed using an approved conduit material. The earthen auxiliary spillway will be constructed as designed. Vegetation will be completed under critical area planting (342). Other associated practices include 382-Fence, 516-Pipeline, 521-Pond Sealing and Lining, 533-Pumping Plant, 614-Stock Watering, 587-Structure for Water Control, 396-Aquatic Organism Passage, and 570-Stormwater Runoff Control.

Scenario Feature Measure: Embankment Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 500

Scenario Cost: $14,472.30 **Scenario Cost/Unit:** $28.94

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formless, non reinforced	36	Non reinforced concrete cast-in-placed without forms by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	7.8	$1,255.02
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	1.4	$225.26
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	500	$2,200.00
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	16	$1,996.48
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$56.21	4	$224.84
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	4	$89.32
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	16	$600.32
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	24	$989.52
Materials						

Materials

Trash Guard, metal	1608	Trash Guard, fabricated-steel, includes materials, equipment, and labor to transport and place Conical shaped trash guard for drop inlet spillway. Typically fabricated of CMP and steel. Includes materials, equipment, and labor to fabricate and transport	Pound	$2.49	118	$293.82
Pipe, CMP, 36", 12 Gauge	1825	36" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$39.54	11	$434.94
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	62	$4,051.70
Pipe, CMP, 24", 12 Gauge	1417	24" Corrugated Metal Pipe, Galvanized, Uncoated, 12 gage. Material cost only.	Foot	$26.63	60	$1,597.80

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 378 - Pond

Scenario: #7 - Difficult Excavation and ≤ 500 CY embankment pond with pipe

Scenario Description:

A low-hazard water impoundment structure to maintain or improve water quality and to provide water for livestock, fish and wildlife, recreation, fire control, developing renewable energy systems, and other related uses. Wet sediment and debris are excavated and hauled from the pond storage area, and a principle spillway conduit and earthen auxiliary spillway is installed. After the wet material is excavated from the site, it is temporarily stored nearby to dry. Once dried, the material is then loaded and hauled to a permanent fill site within 1 mile of the project site. In addition, a maximum 500 cy earthen embankment is constructed from on site material with a principle spillway conduit and earthen auxiliary spillway, as designed. The wet material is frequently not used as embankment fill. The resource concerns addressed include inadequate livestock water, excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition. Vegetation shall be established on all exposed areas, using 342-Critical Area Planting as needed.

Before Situation:

An area exists where water naturally pools or run off is caught. This creates a sediment laden wet area with debris for livestock, wildlife, fire control, developing renewable energy systems, other related uses, and to maintain or improve water quality. Wet sediment and debris removal from the area will not result in loss of life; damage to homes, commercial or industrial buildings, main highways, or railroads; or in interruption of the use or service of public utilities. Furthermore, an embankment is constructed. Failure of the embankment will not result in loss of life or damages of any kind.

After Situation:

Adequate water storage capacity to meet the resource concern is achieved by excavating the wet sediment and debris. The excavated wet material (1200 cy) is excavated and disposed of at a permanent fill site. Hauling distance is typically within a mile. An embankment (500 cy) and necessary spillway (s) are constructed as designed. In all, 1,700 yd3 or less is carried out as excavation and earthwork. The product of the storage times the effective height of the dam is less than 3,000 acre· ft2. The effective height of the dam is 35 feet or less. Vegetation will be completed under critical area planting (342). Other associated practices include 382-Fence, 521-Pond Sealing and Lining. Total earthwork is excavation (1,200 cy) + Embankmenfill (500 cy) = 1,700 cy

Scenario Feature Measure: Earthwork

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,700

Scenario Cost: $26,991.10 **Scenario Cost/Unit:** $15.88

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formless, non reinforced	36	Non reinforced concrete cast-in-placed without forms by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	7.8	$1,255.02
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	1.4	$225.26
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	500	$2,200.00
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	1200	$4,332.00
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	16	$1,996.48
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	40	$4,579.20
Front End Loader, 95 HP	1327	Wheeled front end loader with horsepower range of 80 to 110. Equipment and power unit costs. Labor not included.	Hour	$52.66	24	$1,263.84
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	80	$3,001.60

Labor

Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	24	$989.52

Materials

Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	62	$4,051.70
Pipe, CMP, 24", 12 Gauge	1417	24" Corrugated Metal Pipe, Galvanized, Uncoated, 12 gage. Material cost only.	Foot	$26.63	60	$1,597.80
Trash Guard, metal	1608	Trash Guard, fabricated-steel, includes materials, equipment, and labor to transport and place Conical shaped trash guard for drop inlet spillway. Typically fabricated of CMP and steel. Includes materials, equipment, and labor to fabricate and transport	Pound	$2.49	118	$293.82
Pipe, CMP, 36", 12 Gauge	1825	36" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$39.54	11	$434.94

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 379 - Multi-Story Cropping

Scenario: #1 - Non-native Tree Planting

Scenario Description:

Non-native trees are planted to enhance existing agroforest conditions or develop an agroforest on cropland where shrubs, trees, and/or dwarf trees will grow. Resource concerns are degraded plant condition - Inadequate structure and composition, and excessive plant pest pressure (invasive species); Inadequate habitat for fish and wildlife - habitat degredation; and soil erosion - sheet and rill; .

Before Situation:

The agroforest lacks an overstory of trees, and that is negatively affecting existing plants growing on the site. Other non-native shrub species exist and landowner desires to establish a non-native forest overstory improve growing conditions and diversity. Wildlife species are also negatively impacted due to no connectivity to forests. Production and quality of agroforest products are less than desirable. Full sunlight exposure affects shrub health. Ground cover is lacking and sheet and rill erosion occurs during hard rainfall events. Exotic/invasive plants are an issue.

After Situation:

The typical Agroforest is <1ac to 5 ac, 2 ac is average. Non-native trees were planted that will grow and provide shade for the existing managed shrubs and/or trees and to create habitat that will benefit terrestrial species. Tree leaves will also provide ground cover, organic matter and wood products.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 200

Scenario Cost: $1,120.97 **Scenario Cost/Unit:** $5.60

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	12	$139.44
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	8	$329.84
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	12	$276.96
Materials						
Tree or shrub seedling, Tropical, non-native, containerized, 10 cu in	1548	tree or shrub tropical seedling, non-native, containerized, 10 cubic in size, 1.7" x 6.0". Includes materials and shipping only.	Each	$3.39	67	$227.13
Tree or Shrub, band pots, common species	1522	Band pots of common species trees or shrubs (e.g. Crabapple). Includes materials and shipping only.	Each	$1.74	67	$116.58
Shrub, seedling or transplant, bare root, 6-18"	1506	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.47	66	$31.02

Practice: 379 - Multi-Story Cropping

Scenario: #2 - Native Tree Planting

Scenario Description:

Native trees are planted to reestablish an open native forest and enhance existing agroforest conditions or develop an agroforest on cropland where shrubs, trees, and/or dwarf trees will grow. Resource concerns are soil erosion - sheet and rill; degraded plant condition - Inadequate structure and composition, and excessive plant pest pressure (invasive species); and Inadequate habitat for fish and wildlife - habitat degredation.

Before Situation:

The agroforest lacks an overstory of trees, and that is negatively affecting existing plants growing on the site. Other native or non-native shrub species exist and landowner desires to establish a native forest overstory. Wildlife species are also negatively impacted due to no connectivity to surrounding forests. Production and quality of agroforest products does not meet landowner needs. Full sunlight exposure affects shrub health. Ground cover is lacking and sheet and rill erosion occurs during hard rainfall events. Exotic/invasive plants are an issue.

After Situation:

The typical Agroforest is <1ac to 5 ac, 2 is average. Native trees are established that will provide shade for the existing managed shrubs and/or trees, to establish habitat that will benefit terrestrial species and provide connectivity to other native forests. Trees leaves will also provide ground cover, organic matter and wood products. The number of trees and their spacing will be determined by the shade/sun requirements of the existing agroforest species. Each planting spot is cleared of vegetation prior to tree establishment.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 200

Scenario Cost: $1,384.24 **Scenario Cost/Unit:** $6.92

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	12	$139.44
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	8	$329.84
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	12	$276.96
Materials						
Tree or shrub seedling, Tropical, native or non-native, 1 qt.	1541	Tree or shrub tropical seedling, native or non-native, 1 quart pot size. Includes materials and shipping only.	Each	$4.30	100	$430.00
Tree or shrub seedling, Tropical, native, bare root	1539	Tree or shrub, tropical, native, bare root. Includes materials and shipping only.	Each	$2.08	100	$208.00

Practice: 379 - Multi-Story Cropping

Scenario: #3 - Native Shrub Planting

Scenario Description:

Native shrubs are planted to enhance the current agroforest conditions. The land management goal is to diversify understory species that provide dual benefit - for the landowner and native wildlife species. Resource concerns that need to be addressed are degraded plant condition - Inadequate structure and composition, Undesirable plant productivity and health.

Before Situation:

Current setting is a single story forest, either monoculture or multi-culture, that is lacking desirable understory species. The understory may be comprised of introduced grasses, or unwanted, noxious, and/or invasive species. The current understory vegetation provides little habitat value for native wildlife species, and may encourage non-native specie use.

After Situation:

The agroforest is small in size - <1 to 5 acres, 2 is average. Established shrubs enhance economic opportunities along with diversifying the understory of a single or multi-story agroforest improving the overall plant diversity of the landscape. Additional canopy cover reduces rain drop impact on the soil, and leaf litter decomposes on site improving soil conditions. Some trees in the overstory may be removed to match sunlight requirements of newly established shrubs.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 200

Scenario Cost: $1,384.24 **Scenario Cost/Unit:** $6.92

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	12	$139.44
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	12	$276.96
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	8	$329.84
Materials						
Tree or shrub seedling, Tropical, native, bare root	1539	Tree or shrub, tropical, native, bare root. Includes materials and shipping only.	Each	$2.08	100	$208.00
Tree or shrub seedling, Tropical, native or non-native, 1 qt.	1541	Tree or shrub tropical seedling, native or non-native, 1 quart pot size. Includes materials and shipping only.	Each	$4.30	100	$430.00

Practice: 379 - Multi-Story Cropping

Scenario: #4 - Non-native Shrubs

Scenario Description:

The landscape setting is an existing agroforests where native or non-native trees are growing, providing shade, and wildlife habitat connectivity. Ground cover between shrubs trees is lacking. Due to removal of native vegetation exotic/invasive plant species are an issue. Resource concerns that need to be addressed are soil erosion - sheet and rill; degraded plant condition - Inadequate structure and composition, and excessive plant pest pressure (invasive species).

Before Situation:

Current setting is a single story forest, either monoculture or multi-culture, that is lacking desirable understory/ground species. The understory may be comprised of introduced grasses, or unwanted, noxious, and/or invasive species. The current understory vegetation provides little habitat value for native wildlife species, and may encourage non-native specie use. As with any shrub establishment preparing the site for the seedling survival is critical. Describe the setting where the practice will be installed.

After Situation:

Multistory Cropping is an intensive use of the defined landscape and generally is small in size - <1 to 5 acres, 2 is average. Established shrubs enhance economic opportunities along with diversifying the understory of a single or multi-story agroforest improving the overall diversity of the landscape. Additional canopy cover reduces rain drop impact on the soil, and leaf litter decomposes on site improving soil conditions. Some trees in the overstory may be removed to match sunlight requirements of newly established shrubs.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 200

Scenario Cost: $1,120.97 **Scenario Cost/Unit:** $5.60

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	12	$139.44
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	8	$329.84
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	12	$276.96
Materials						
Shrub, seedling or transplant, bare root, 6-18"	1506	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.47	66	$31.02
Tree or shrub seedling, Tropical, non-native, containerized, 10 cu in	1548	tree or shrub tropical seedling, non-native, containerized, 10 cubic in size, 1.7" x 6.0". Includes materials and shipping only.	Each	$3.39	67	$227.13
Tree or Shrub, band pots, common species	1522	Band pots of common species trees or shrubs (e.g. Crabapple). Includes materials and shipping only.	Each	$1.74	67	$116.58

Practice: 379 - Multi-Story Cropping

Scenario: #5 - Free Trees or shrubs

Scenario Description:

Native or non-native trees or shrubs have been donated and are established for enhancement of the multi-story agroforests or improve overstory conditions on existing cropland or agroforests. Resource concerns that need to be addressed are soil erosion - sheet and rill; degraded plant condition - Inadequate structure and composition, and excessive plant pest pressure (invasive species); and Inadequate habitat for fish and wildlife - habitat degredation.

Before Situation:

The agroforest lacks an overstory of trees or ground level shrub cover, and the lack of species negatively affect existing plants growing on the site. Wildlife species are also negatively impacted due to no connectivity to forests habitat. Production and quality of agroforest products are not desirable to the landowner. Full sunlight exposure affects shrub health. Ground cover is lacking and sheet and rill erosion occurs during hard rainfall events. Exotic/invasive plants are an issue.

After Situation:

The typical Agroforest is <1ac to 5 ac, 2 is average. Native or non-native trees and/or shrubs are planted and will provide cover for any existing shrubs or trees, establish habitat that will benefit terrestrial species and provide connectivity to other native forests. Trees and shrub leaves will also provide ground cover, organic matter and wood products.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 200

Scenario Cost: $746.24 **Scenario Cost/Unit:** $3.73

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	12	$139.44
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	12	$276.96
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	8	$329.84

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #1 - 1-row, tree or shrub, bareroot, hand planted

Scenario Description:

Single row of shrubs and/or trees, bareroot stock, planted by hand 4-10 feet apart. This practice is typically applied to crop, pasture or range or headquarters. Resource Concerns to be addressed may include: Soil Erosion (wind); Air Quality (odors, chemical drift, etc); Inadequate habitat for Fish and Wildlife (food, cover/shelter, continuity); Inefficient Energy Use (facilities, farming/ranching practices and field operations); Degraded Plant Condition (undesirable plant productivity and health); Water Quality Degradation (excess nutrients in surface waters, excessive sediment in surface waters,); or Excess/Insufficient Water (drifted snow, inefficient moisture management).

Before Situation:

Agricultural field, livestock paddock, feedlot, or farmstead, needing protection from chemical drift, odors, or wind; additional wildlife food and cover, or management of snow deposition

After Situation:

Wind velocity or air movement suitably reduced. Additional wildlife food and cover. Typical length is 500'.

Scenario Feature Measure: length of windbreak row(s)

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $404.53 **Scenario Cost/Unit:** $0.81

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	4	$149.24
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	3	$34.86
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	1	$41.23
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	4	$92.32
Materials						
Tree shelter, mesh tree tube, 24"	1555	24" tall vexar or other open weave tubular tree shelter to protect from animal damage. Materials only.	Each	$0.52	87	$45.24
Shrub, seedling or transplant, bare root, 6-18"	1506	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.47	62	$29.14
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.50	25	$12.50

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #2 - 1-row, trees, containers, hand planted

Scenario Description:

Single row of trees, container stock, planted by hand at 10 foot spacing. This practice is typically applied to crop, pasture or range or headquarters. Resource Concerns to be addressed may include: Soil Erosion (wind); Air Quality (odors, chemical drift, etc); Inadequate habitat for Fish and Wildlife (food, cover/shelter, continuity); Inefficient Energy Use (facilities, farming/ranching practices and field operations); Degraded Plant Condition (undesirable plant productivity and health); Water Quality Degradation (excess nutrients in surface waters, excessive sediment in surface waters,); or Excess/Insufficient Water (drifted snow, inefficient moisture management).

Before Situation:

Agricultural field, livestock paddock, feedlot or farmstead needing protection from chemical drift, odors, wind, additional wildlife food and cover, or management of snow deposition

After Situation:

Wind velocity or air movement suitably reduced. Additional wildlife food and cover. Typical length is 500'.

Scenario Feature Measure: length of windbreak row(s)

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $345.37 **Scenario Cost/Unit:** $0.69

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	3	$111.93
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	2	$23.24
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	3	$69.24
Materials						
Tree, conifer, seedling, containerized, 20 cu. in.	1521	Containerized conifer stock, 20 cubic inches (e.g. "Styro 45" plug), 2.4" x 6". Includes materials and shipping only.	Each	$1.17	50	$58.50

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #3 - 1-row, trees, containers, hand planted, protected

Scenario Description:

Single row of trees, container stock with tree protection, planted by hand at 10 foot spacing. This practice is typically applied to crop, pasture or range or headquarters. Resource Concerns to be addressed may include: Soil Erosion (wind); Air Quality (odors, chemical drift, etc); Inadequate habitat for Fish and Wildlife (food, cover/shelter, continuity); Inefficient Energy Use (facilities, farming/ranching practices and field operations); Degraded Plant Condition (undesirable plant productivity and health); Water Quality Degradation (excess nutrients in surface waters, excessive sediment in surface waters,); or Excess/Insufficient Water (drifted snow, inefficient moisture management).

Before Situation:

Agricultural field, livestock paddock, feedlot or farmstead needing protection from chemical drift, odors, wind, additional wildlife food and cover, or management of snow deposition

After Situation:

Wind velocity or air movement suitably reduced. Additional wildlife food and cover. Typical length is 500'.

Scenario Feature Measure: length of windbreak row(s)

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $511.88 **Scenario Cost/Unit:** $1.02

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	4	$149.24
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	3	$34.86
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	4	$92.32
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Materials						
Stakes, wood, 3/4" x 3/4" x 36"	1581	3/4" x 3/4" x 36" wood stakes to fasten items in place. Includes materials only.	Each	$0.71	50	$35.50
Tree shelter, solid tube type, 4" x 18"	1562	4" x 18" tree tube for protection from animal damage. Materials only.	Each	$1.13	50	$56.50
Tree, conifer, seedling, containerized, 20 cu. in.	1521	Containerized conifer stock, 20 cubic inches (e.g. "Styro 45" plug), 2.4" x 6". Includes materials and shipping only.	Each	$1.17	50	$58.50
Cable ties, plastic	1575	Plastic cable ties (typ. 8-12") to assist in securing items. Materials only.	Each	$0.05	50	$2.50

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #4 - 2-row, shrubs, machine planted

Scenario Description:

Two rows of shrubs for wind protection, energy conservation, wildlife habitat, air quality, snow management or to provide a visual screen. Shrubs planted with a tree planting machine 4 feet apart in the row with rows 16 feet apart. Typical length is 500 feet. This practice is typically applied to crop, pasture or range lands. Resource Concerns to be addressed include: Soil Erosion (wind); Excess/Insufficient Water (drifted snow, inefficient moisture management); Water Quality Degradation (excess nutrients in surface waters, pesticides transported to surface waters, excessive sediment in surface waters,); Degraded Plant Condition (undesirable plant productivity and health); Inadequate habitat for Fish and Wildlife (food, cover/shelter, continuity); Livestock Production Limitation (inadequate shelter); Air Quality Impacts (emission of particulate matter, objectionable odors); Inefficient Energy Use (facilities, farming/ranching practices and field operations).

Before Situation:

Agricultural field, livestock paddock, feedlot or farmstead needing protection from wind, additional wildlife food and cover, odor mitigation, visual screen or management of snow deposition

After Situation:

Wind velocity suitably reduced to reduce soil erosion, energy loss or to manage snow deposition. Additional wildlife food and cover, mixing of odor plumes and visual screening. Typical length is 500'.

Scenario Feature Measure: length of windbreak row(s)

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $327.64 **Scenario Cost/Unit:** $0.66

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	2	$47.06
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	1	$37.31
Mechanical tree planter	1600	Mechanical tree planter. Requires a pulling unit of either tractor or small dozer depending upon site conditions. Does not include labor.	Hour	$6.60	2	$13.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	1	$23.08
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	2	$44.66
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	1	$41.23
Materials						
Shrub, seedling or transplant, bare root, 6-18"	1506	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.47	250	$117.50
Wire flags	1586	Small vinyl flags attached to wire stakes, typically, 36" in length, for marking tree rows	Each	$0.09	40	$3.60

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #5 - 2-row, trees, machine planted

Scenario Description:

Two rows of trees for wind protection, energy conservation, wildlife habitat, air quality (odors and/or chemical screens), snow management or to provide a visual screen. Trees planted with a tree planting machine 10 feet apart in the row with rows 16 feet apart. Herbivores (deer, rabbits, etc.) are NOT expected to browse tree seedlings, tree protection is not needed. This practice is typically applied to crop, pasture or range lands. Resource Concerns to be addressed include: Soil Erosion (wind); Excess/Insufficient Water (drifted snow, inefficient moisture management); Water Quality Degradation (excess nutrients in surface waters, pesticides transported to surface waters, excessive sediment in surface waters,); Degraded Plant Condition (undesirable plant productivity and health); Inadequate habitat for Fish and Wildlife (food, cover/shelter, continuity); Livestock Production Limitation (inadequate shelter); Air Quality Impacts (emission of particulate matter, objectionable odors); Inefficient Energy Use (facilities, farming/ranching practices and field operations).

Before Situation:

Agricultural field, livestock paddock, feedlot or farmstead needing protection from wind, additional wildlife food and cover, odor mitigation, visual screen or management of snow deposition

After Situation:

Wind velocity suitably reduced to reduce soil erosion, energy loss or to manage snow deposition. Additional wildlife food and cover, mixing of odor plumes and visual and chemical screening. Typical length is 500'.

Scenario Feature Measure: length of windbreak row(s)

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $207.68 **Scenario Cost/Unit:** $0.42

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Mechanical tree planter	1600	Mechanical tree planter. Requires a pulling unit of either tractor or small dozer depending upon site conditions. Does not include labor.	Hour	$6.60	1	$6.60
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	1	$37.31
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	1	$23.53
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	1	$41.23
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	1	$22.33
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	1	$23.08
Materials						
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.50	100	$50.00
Wire flags	1586	Small vinyl flags attached to wire stakes, typically, 36" in length, for marking tree rows	Each	$0.09	40	$3.60

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #6 - 2-row, trees, machine planted, protected

Scenario Description:

Two 500 foot rows of hardwood tree seedlings for wind protection, energy conservation, wildlife habitat, air quality, snow management or to provide a visual screen. Trees planted with a tree planting machine 10 feet apart in the row with rows 16 feet apart. Herbivore (deer, rabbits, etc.) damage is likely, so each tree must be protected with a rigid tube tree shelter. This practice is typically applied to crop, pasture or range lands. Resource Concerns to be addressed include: Soil Erosion (wind); Excess/Insufficient Water (drifted snow, inefficient moisture management); Water Quality Degradation (excess nutrients in surface waters, pesticides transported to surface waters, excessive sediment in surface waters,); Degraded Plant Condition (undesirable plant productivity and health); Inadequate habitat for Fish and Wildlife (food, cover/shelter, continuity); Livestock Production Limitation (inadequate shelter); Air Quality Impacts (emission of particulate matter, objectionable odors); Inefficient Energy Use (facilities, farming/ranching practices and field operations).

Before Situation:

Agricultural field, livestock paddock, feedlot or farmstead needing protection from wind, additional wildlife food and cover, odor mitigation, visual screen or management of snow deposition

After Situation:

Wind velocity suitably reduced to reduce soil erosion, energy loss or to manage snow deposition. Additional wildlife food and cover, mixing of odor plumes and visual screening. Typical length is 500'.

Scenario Feature Measure: length of windbreak row(s)

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $684.30 **Scenario Cost/Unit:** $1.37

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	1	$23.53
Mechanical tree planter	1600	Mechanical tree planter. Requires a pulling unit of either tractor or small dozer depending upon site conditions. Does not include labor.	Hour	$6.60	1	$6.60
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	2	$46.16
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	1	$22.33
Materials						
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.50	100	$50.00
Wire flags	1586	Small vinyl flags attached to wire stakes, typically, 36" in length, for marking tree rows	Each	$0.09	40	$3.60
Cable ties, plastic	1575	Plastic cable ties (typ. 8-12") to assist in securing items. Materials only.	Each	$0.05	200	$10.00
Stakes, wood, 3/4" x 3/4" x 60"	1583	3/4" x 3/4" x 60" wood stakes to fasten items in place. Includes materials only.	Each	$1.56	100	$156.00
Tree shelter, solid tube type, 5" x 48"	1571	5" x 48" tree tube for protection from animal damage. Materials only.	Each	$2.09	100	$209.00

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #7 - 2-row, tree-shrub, hand planted

Scenario Description:

Two rows of trees and shrubs planted by hand. Trees are 10 feet apart in the row; shrubs are spaced at 4 feet; Rows are 16 feet apart. This practice is typically applied to crop, pasture or range lands. Resource Concerns to be addressed include: Soil Erosion (wind); Excess/Insufficient Water (drifted snow, inefficient moisture management); Water Quality Degradation (excess nutrients in surface waters, pesticides transported to surface waters, excessive sediment in surface waters,); Degraded Plant Condition (undesirable plant productivity and health); Inadequate habitat for Fish and Wildlife (food, cover/shelter, continuity); Livestock Production Limitation (inadequate shelter); Air Quality Impacts (emission of particulate matter, objectionable odors); Inefficient Energy Use (facilities, farming/ranching practices and field operations).

Before Situation:

Agricultural field, livestock paddock, feedlot or farmstead needing protection from wind, additional wildlife food and cover, odor mitigation, visual screen or management of snow deposition

After Situation:

Wind velocity suitably reduced to reduce soil erosion, energy loss or to manage snow deposition. Additional wildlife food and cover, mixing of odor plumes and visual screening. Typical length is 500'.

Scenario Feature Measure: length of windbreak row(s)

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $631.77 **Scenario Cost/Unit:** $1.26

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	6	$223.86
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	6	$69.72
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	6	$138.48
Materials						
Tree, conifer, seedling, containerized, 20 cu. in.	1521	Containerized conifer stock, 20 cubic inches (e.g. "Styro 45" plug), 2.4" x 6". Includes materials and shipping only.	Each	$1.17	50	$58.50
Shrub, seedling or transplant, bare root, 6-18"	1506	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.47	125	$58.75

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #8 - 2-row, tree-shrub, hand planted, protected

Scenario Description:

Two rows of trees and shrubs planted by hand. Trees are 10 feet apart in the row; shrubs are spaced at 4 feet within rows; Rows are 16 feet apart. Herbivore (deer, rabbits, etc.) damage is likely, so each seedling must be protected; trees typically with a rigid tube tree shelter; shrubs with wire mesh, vexar or similar. This practice is typically applied to crop, pasture or range lands. Resource Concerns to be addressed include: Soil Erosion (wind); Excess/Insufficient Water (drifted snow, inefficient moisture management); Water Quality Degradation (excess nutrients in surface waters, pesticides transported to surface waters, excessive sediment in surface waters,); Degraded Plant Condition (undesirable plant productivity and health); Inadequate habitat for Fish and Wildlife (food, cover/shelter, continuity); Livestock Production Limitation (inadequate shelter); Air Quality Impacts (emission of particulate matter, objectionable odors); Inefficient Energy Use (facilities, farming/ranching practices and field operations).

Before Situation:

Agricultural field, livestock paddock, feedlot or farmstead needing protection from wind, additional wildlife food and cover, odor mitigation, visual screen or management of snow deposition

After Situation:

Wind velocity suitably reduced to reduce soil erosion, energy loss or to manage snow deposition. Additional wildlife food and cover, mixing of odor plumes and visual screening. Typical length is 500'.

Scenario Feature Measure: length of windbreak row(s)

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $935.01 **Scenario Cost/Unit:** $1.87

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	6	$69.72
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	6	$223.86
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	9	$207.72
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Materials						
Tree, conifer, seedling, containerized, 20 cu. in.	1521	Containerized conifer stock, 20 cubic inches (e.g. "Styro 45" plug), 2.4" x 6". Includes materials and shipping only.	Each	$1.17	50	$58.50
Cable ties, plastic	1575	Plastic cable ties (typ. 8-12") to assist in securing items. Materials only.	Each	$0.05	50	$2.50
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.17	50	$108.50
Stakes, wood, 3/4" x 3/4" x 48"	1582	3/4" x 3/4" x 48" wood stakes to fasten items in place. Includes materials only.	Each	$1.16	50	$58.00
Tree shelter, mesh tree tube, 24"	1555	24" tall vexar or other open weave tubular tree shelter to protect from animal damage. Materials only.	Each	$0.52	125	$65.00
Shrub, seedling or transplant, bare root, 6-18"	1506	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.47	125	$58.75

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #9 - 2-row, tree-shrub, chemical drift, hand planted

Scenario Description:

Two rows of trees and shrubs planted by hand for chemical drift reduction. Plants should start relatively large (2 to 3 gallon) to fill in space more quickly to block drift. Trees are planted 10 feet apart in the row; shrubs are planted 4 feet apart in the row. Rows are 10-16 feet apart. This practice is typically applied to prevent chemical drift to adjacent cropland. Resource concerns addressed is primarily Air Quality Impacts for chemical drift. May have additional benefits for Air Quality (odors or particulate matter), Soil Erosion (wind); Water Quality Degradation (excess nutrients in surface waters, pesticides transported to surface waters, excessive sediment in surface waters,); Degraded Plant Condition (undesirable plant productivity and health); Inadequate habitat for Fish and Wildlife (food, cover/shelter, continuity); Inefficient Energy Use (facilities, farming/ranching practices and field operations).

Before Situation:

Agricultural field needing protection from chemical drift.

After Situation:

Windbreak contructed to maximize interception of chemical drift (usually 40% porosity at maturity). May also have benefits for reducing wind velocity to reduce soil erosion, energy loss or to manage snow deposition. Additional wildlife food and cover, mixing of odor plumes and visual screening. Typical length is 500'.

Scenario Feature Measure: Length of windbreak rows

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $3,116.79 **Scenario Cost/Unit:** $6.23

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	8	$298.48
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	4	$94.12
Trailer, flatbed, small	1505	Small flatbed trailer (typically less than 30' in length) pulled by a pickup to transport materials and equipment. Truck not included.	Hour	$6.52	2	$13.04
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	15	$174.30
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	4	$89.32
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	6	$247.38
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	30	$692.40
Materials						
Tree, conifer, seedling or transplant, potted or B&B, 2-3 gal.	1537	Potted or balled and burlapped conifer tree, 2-3 gal. Includes materials and shipping only.	Each	$7.13	50	$356.50
Shrub, seedling or transplant, potted or B&B, 2-3 gal.	1527	Potted or balled and burlapped shrub, 2-3 gal. Includes materials and shipping only.	Each	$9.21	125	$1,151.25

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #10 - 3-row or more, tree-shrub, hand planted

Scenario Description:

Three rows or more of trees and shrubs planted by hand. Trees are 10 feet apart in the row; shrubs are spaced at 4 feet within rows; Rows are 16 feet apart. The outside rows are shrubs/conifers the inside row(s) are hardwoods; follow job sheet for specific site. This practice is typically applied to crop, pasture or range lands. Resource Concerns to be addressed include: Soil Erosion (wind); Excess/Insufficient Water (drifted snow, inefficient moisture management); Water Quality Degradation (excess nutrients in surface waters, pesticides transported to surface waters, excessive sediment in surface waters,); Degraded Plant Condition (undesirable plant productivity and health); Inadequate habitat for Fish and Wildlife (food, cover/shelter, continuity); Livestock Production Limitation (inadequate shelter); Air Quality Impacts (emission of particulate matter, objectionable odors); Inefficient Energy Use (facilities, farming/ranching practices and field operations).

Before Situation:

Agricultural field, livestock paddock, feedlot or farmstead needing protection from wind, additional wildlife food and cover, odor mitigation, visual screening or management of snow deposition

After Situation:

Wind velocity suitably reduced to reduce soil erosion, energy loss or to manage snow deposition. Additional wildlife food and cover, mixing of odor plumes and visual screening. Typical length is 500'.

Scenario Feature Measure: length of windbreak row(s)

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $776.32 **Scenario Cost/Unit:** $1.55

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	6	$223.86
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	7.5	$87.15
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	7.5	$173.10
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Materials						
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.50	25	$12.50
Tree, hardwood, seedling or transplant, potted, 1 qt.	1529	Potted hardwood tree, 1 quart. Includes materials and shipping only.	Each	$3.20	25	$80.00
Shrub, seedling or transplant, bare root, 6-18"	1506	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.47	125	$58.75
Tree, conifer, seedling, containerized, 20 cu. in.	1521	Containerized conifer stock, 20 cubic inches (e.g. "Styro 45" plug), 2.4" x 6". Includes materials and shipping only.	Each	$1.17	50	$58.50

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #11 - 3-row or more, tree-shrub, hand planted, protected

Scenario Description:

Three rows or more of trees and shrubs planted by hand. Trees are 10 feet apart in the row; shrubs are spaced at 4 feet within rows; Rows are 16 feet apart. The outside rows are shrubs/conifers the inside row(s) are hardwoods; follow job sheet for specific site. Herbivore (deer, rabbits, etc.) damage is likely, so each tree must be protected with a rigid tube tree shelter. This practice is typically applied to crop, pasture or range lands. Resource Concerns to be addressed include: Soil Erosion (wind); Excess/Insufficient Water (drifted snow, inefficient moisture management); Water Quality Degradation (excess nutrients in surface waters, pesticides transported to surface waters, excessive sediment in surface waters,); Degraded Plant Condition (undesirable plant productivity and health); Inadequate habitat for Fish and Wildlife (food, cover/shelter, continuity); Livestock Production Limitation (inadequate shelter); Air Quality Impacts (emission of particulate matter, objectionable odors); Inefficient Energy Use (facilities, farming/ranching practices and field operations).

Before Situation:

Agricultural field, livestock paddock, feedlot or farmstead needing protection from wind, additional wildlife food and cover, odor mitigation, visual screening or management of snow deposition

After Situation:

Wind velocity suitably reduced to reduce soil erosion, energy loss or to manage snow deposition. Additional wildlife food and cover, mixing of odor plumes and visual screening.

Scenario Feature Measure: length of windbreak row(s)

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $1,237.02 **Scenario Cost/Unit:** $2.47

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	7.5	$87.15
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	6	$223.86
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Materials						
Tree shelter, mesh tree tube, 24"	1555	24" tall vexar or other open weave tubular tree shelter to protect from animal damage. Materials only.	Each	$0.52	125	$65.00
Stakes, wood, 3/4" x 3/4" x 48"	1582	3/4" x 3/4" x 48" wood stakes to fasten items in place. Includes materials only.	Each	$1.16	100	$116.00
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.17	100	$217.00
Cable ties, plastic	1575	Plastic cable ties (typ. 8-12") to assist in securing items. Materials only.	Each	$0.05	100	$5.00
Shrub, seedling or transplant, bare root, 6-18"	1506	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.47	125	$58.75
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.50	25	$12.50
Tree, conifer, seedling, containerized, 20 cu. in.	1521	Containerized conifer stock, 20 cubic inches (e.g. "Styro 45" plug), 2.4" x 6". Includes materials and shipping only.	Each	$1.17	50	$58.50
Tree, hardwood, seedling or transplant, potted, 1 qt.	1529	Potted hardwood tree, 1 quart. Includes materials and shipping only.	Each	$3.20	25	$80.00

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #12 - 4-row, Snow Shelter

Scenario Description:

Two, double rows of junipers or other suitable conifer seedlings are planted to serve as a snow fence following specific design criteria for unique site requirements. Typically each 2-row set has 16' spacing between rows and 48' between each set; 10ft spacing within rows. Mesh tubing installed for seedling protection when needed. This practice is typically applied to crop, pasture or range lands. Resource Concerns to be addressed include: Excess/Insufficient Water (drifted snow, inefficient moisture management), Inadequate habitat for Fish and Wildlife (food, cover/shelter, continuity), and Soil Erosion (wind).

Before Situation:

Snow drifts across areas of major use.

After Situation:

Windbreak is installed consisting of a two 2-row set of trees to settle snow prior to prevent drifing across roadways. Length of windbreak extends a sufficient length beyond the affected area to avoid end-drift. Typical length is 500'.

Scenario Feature Measure: length of windbreak row(s)

Scenario Unit: Foot

Scenario Typical Size: 500

Scenario Cost: $729.91 **Scenario Cost/Unit:** $1.46

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	5	$58.10
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	5	$186.55
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Materials						
Tree, conifer, seedling, containerized, 15 cu. in.	1520	Containerized conifer stock, 15 cubic inches (e.g. 2.0" x 6"). Includes materials and shipping only.	Each	$0.60	200	$120.00
Tree shelter, mesh tree tube, 24"	1555	24" tall vexar or other open weave tubular tree shelter to protect from animal damage. Materials only.	Each	$0.52	100	$52.00

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #13 - 1-row, Tree and/or Shrub, with Wind-protection Fence

Scenario Description:

Single row of trees and/or shrubs, planted by hand 4-10 feet apart with a wind-protection fence (i.e., snow fence, slatted wood fence) sufficient to protect seedlings from wind damage abrasion and from deposition which buries seedlings with wind-blown sand/silt. This practice is typically applied on or adjacent to cropland where wind erosion is excessive. Resource Concerns to be addressed may include: Soil Erosion (wind); Air Quality (odors, chemical drift, etc); Inadequate habitat for Fish and Wildlife (food, cover/shelter, continuity); Inefficient Energy Use (facilities, farming/ranching practices and field operations); Degraded Plant Condition (undesirable plant productivity and health); Water Quality Degradation (excess nutrients in surface waters, excessive sediment in surface waters,); or Excess/Insufficient Water (drifted snow, inefficient moisture management).

Before Situation:

Windblown sand and silt is a problem making it difficult to establish young seedlings. Additionally, one or more of the following resource concerns are identified on the site: sediments are deposited into surface waters; there is lack of wildlife or pollinator habitat; air or soil quality issues are present.

After Situation:

Wind velocity or air movement is suitably reduced. New seedlings are protected from wind damage. Typical length is 500'.

Scenario Feature Measure: length of windbreak row(s)

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $1,320.68 **Scenario Cost/Unit:** $2.64

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	4	$46.48
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	4	$149.24
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80
Materials						
Tree shelter, mesh tree tube, 24"	1555	24" tall vexar or other open weave tubular tree shelter to protect from animal damage. Materials only.	Each	$0.52	50	$26.00
Tree, conifer, seedling, containerized, 20 cu. in.	1521	Containerized conifer stock, 20 cubic inches (e.g. "Styro 45" plug), 2.4" x 6". Includes materials and shipping only.	Each	$1.17	50	$58.50
Snow Fence	1307	Wooden slatted fence used for control of snow accumulation and dune protection. Materials only.	Foot	$1.12	510	$571.20
Shrub, seedling or transplant, potted, 1 qt.	1524	Potted shrub, 1 quart. Includes materials and shipping only.	Each	$3.12	50	$156.00

Practice: 381 - Silvopasture

Scenario: #3 - Non-Commercial Thinning & Establish Native Grasses

Scenario Description:

Non-commercial thinning of an existing stand of trees followed by establishment of native grasses.

Before Situation:

10-acre pine plantation that is overstocked, with a basal area of 100 sq. ft. per acre. There is very little available forage for livestock, due to the dense shade of the tree canopy. Resource Concerns include Degraded Plant Condition - Undesirable Plant Productivity and Health, Inadequate Structure and Composition, Wildfire Hazard, Excessive Biomass Accumulation; Livestock Production Limitation - Inadequate Feed and Forage, and Inadequate Livestock Shelter.

After Situation:

The stand is thinned non-commercially to a basal area of 50 sq.ft. per acre, which will allow adequate sunlight to the forest floor for grass production, yet still provide shade and some protection from the elements for livestock and wildlife. Debris is removed, all tree cutting will leave the shortest possible stump height. The soil is prepared for planting using chemical and mechanical means, then a mix of native warm-season grasses will be established, providing forage to livestock and wildlife. All Resource Concerns listed above are adressed.

Scenario Feature Measure: Acres of silvopasture established

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $7,350.30 **Scenario Cost/Unit:** $735.03

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Lime application	953	Lime application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$9.65	10	$96.50
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	2	$40.58
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	10	$64.70
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	10	$58.30
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	10	$105.80
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	60	$379.20
Cultipacking	1100	Includes equipment, power unit and labor costs.	Acre	$8.05	10	$80.50
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	60	$1,384.80
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	8	$879.52
Materials						
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.51	500	$255.00
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.82	500	$410.00
Three plus Species Mix, Warm Season, Native Perennial	2327	Native, warm season perennial grass. Includes material and shipping only.	Acre	$220.98	10	$2,209.80
Lime, ENM	75	Fertilizer: Limestone Spread on field.	Ton	$58.25	20	$1,165.00

Materials

Tree Marking Paint	313	Trees to be cut through tree marking are physically identified through the application of paint on the tree. Typically one quart of paint is used to mark one acre of trees. Includes materials and shipping only.	Acre	$6.43	10	$64.30
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	10	$156.30

Practice: 381 - Silvopasture

Scenario: #4 - Non-Commercial Thinning & Establish Introduced Grasses

Scenario Description:

Non-commercial thinning of an existing stand of trees followed by establishment of introduced grasses.

Before Situation:

10-acre pine plantation that is overstocked, with a basal area of 100 sq. ft. per acre. There is very little available forage for livestock, due to the dense shade of the tree canopy. Resource Concerns include Degraded Plant Condition - Undesirable Plant Productivity and Health, Inadequate Structure and Composition, Wildfire Hazard, Excessive Biomass Accumulation; Livestock Production Limitation - Inadequate Feed and Forage, and Inadequate Livestock Shelter.

After Situation:

The stand is thinned non-commercially to a basal area of 50 sq.ft. per acre, which will allow adequate sunlight to the forest floor for grass production, yet still provide shade and some protection from the elements for livestock and wildlife. Debris is removed, all tree cutting will leave the shortest possible stump height. The soil is prepared for planting using chemical and mechanical means, then a mix of cool-season grasses and legumes will be established, providing forage to livestock and wildlife. All Resource Concerns listed above are adressed.

Scenario Feature Measure: Acres of silvopasture established

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $5,793.30 **Scenario Cost/Unit:** $579.33

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Cultipacking	1100	Includes equipment, power unit and labor costs.	Acre	$8.05	10	$80.50
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	2	$40.58
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	10	$105.80
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	10	$58.30
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	10	$64.70
Lime application	953	Lime application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$9.65	10	$96.50
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	60	$379.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	60	$1,384.80
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	8	$879.52
Materials						
Lime, ENM	75	Fertilizer: Limestone Spread on field.	Ton	$58.25	20	$1,165.00
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	10	$156.30
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.51	500	$255.00
Tree Marking Paint	313	Trees to be cut through tree marking are physically identified through the application of paint on the tree. Typically one quart of paint is used to mark one acre of trees. Includes materials and shipping only.	Acre	$6.43	10	$64.30

Materials

Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	10	$156.30
Four Species Mix, Cool Season, Introduced Perennial (2 grasses, 2 legumes)	2317	Cool season grass and legume mix. Includes material and shipping only.	Acre	$49.65	10	$496.50
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.82	500	$410.00

Practice: 381 - Silvopasture

Scenario: #5 - Existing Trees, Establish Native Grasses

Scenario Description:

Establishment of native grasses into an existing stand of trees that is already at an adequate density .

Before Situation:

10-acre pine plantation woodlot that has a basal area of 50 sq. ft. per acre. There is very little available forage for livestock, due to undesirable species in the understory. Resource Concerns include Degraded Plant Condition - Undesirable Plant Productivity and Health, Inadequate Structure and Composition; Livestock Production Limitation - Inadequate Feed and Forage.

After Situation:

The soil is prepared for planting using chemical and mechanical means, then a mix of native warm-season grasses will be established, providing forage to livestock and wildlife. All Resource Concerns listed above are adressed.

Scenario Feature Measure: Acres of silvopasture established

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $4,642.48 **Scenario Cost/Unit:** $464.25

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	10	$58.30
Cultipacking	1100	Includes equipment, power unit and labor costs.	Acre	$8.05	10	$80.50
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	2	$40.58
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	10	$64.70
Lime application	953	Lime application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$9.65	10	$96.50
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	10	$105.80
Materials						
Lime, ENM	75	Fertilizer: Limestone Spread on field.	Ton	$58.25	20	$1,165.00
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.51	500	$255.00
Three plus Species Mix, Warm Season, Native Perennial	2327	Native, warm season perennial grass. Includes material and shipping only.	Acre	$220.98	10	$2,209.80
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	10	$156.30
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.82	500	$410.00

Practice: **381 - Silvopasture**

Scenario: **#6 - Existing Trees, Establish Introduced Grasses**

Scenario Description:

Establishment of introduced grasses into an existing stand of trees that is already at an adequate density .

Before Situation:

10-acre pine plantation woodlot that has a basal area of 50 sq. ft. per acre. There is very little available forage for livestock, due to undesirable species in the understory. Resource Concerns include Degraded Plant Condition - Undesirable Plant Productivity and Health, Inadequate Structure and Composition; Livestock Production Limitation - Inadequate Feed and Forage.

After Situation:

The soil is prepared for planting using chemical and mechanical means, then a mix of cool-season grasses and legumes will be established, providing forage to livestock and wildlife. All Resource Concerns listed above are adressed.

Scenario Feature Measure: Acres of silvopasture established

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $2,929.18 **Scenario Cost/Unit:** $292.92

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Lime application	953	Lime application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$9.65	10	$96.50
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	10	$64.70
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	10	$58.30
Cultipacking	1100	Includes equipment, power unit and labor costs.	Acre	$8.05	10	$80.50
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	2	$40.58
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	10	$105.80
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	10	$156.30
Four Species Mix, Cool Season, Introduced Perennial (2 grasses, 2 legumes)	2317	Cool season grass and legume mix. Includes material and shipping only.	Acre	$49.65	10	$496.50
Lime, ENM	75	Fertilizer: Limestone Spread on field.	Ton	$58.25	20	$1,165.00
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.82	500	$410.00
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.51	500	$255.00

Practice: 381 - Silvopasture

Scenario: #9 - Establish Trees, Existing Grasses

Scenario Description:

Establishment of trees into an existing pasture that contains adequate native or introduced forage.

Before Situation:

10-acre pasture with suitable forage for livestock. There is very little protection from the elements (sun, wind, etc.) available to the livestock. Additionally, there are no long-term wood products being produced. Resource Concerns include Degraded Plant Condition - Undesirable Plant Productivity and Health, Inadequate Structure and Composition, Livestock Production Limitation - Inadequate Livestock Shelter.

After Situation:

The site will be prepared using Tree/Shrub Site Preparation (490), if needed, and then 200 pine trees per acre will be planted, providing shade and wind protection to livestock and wildlife, and, in time, producing a viable wood products crop. Per the conservation practice standard, livestock grazing will be deferred until the trees reach adequate height to resist damage, or use exclusion measures are established. All Resource Concerns listed above are adressed.

Scenario Feature Measure: Acres of silvopasture established

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $1,305.22 **Scenario Cost/Unit:** $130.52

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Mechanical tree planter	1600	Mechanical tree planter. Requires a pulling unit of either tractor or small dozer depending upon site conditions. Does not include labor.	Hour	$6.60	4	$26.40
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	4	$94.12
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	10	$64.70
Materials						
Wire flags	1586	Small vinyl flags attached to wire stakes, typically, 36" in length, for marking tree rows	Each	$0.09	2000	$180.00
Tree, conifer, seedling, bare root, 1-1	1513	Bare root conifer trees, 1-1 (2 years old). Includes materials and shipping only.	Each	$0.47	2000	$940.00

Practice: 382 - Fence

Scenario: #1 - Barbed/Smooth Wire

Scenario Description:

Multi-strand, Barbed or Smooth Wire or woven - Installation of fence will allow for implementation of grazing management that allows for an adequate rest and recovery period, protection of sensitive area, improved water quality and/or reduction of noxious and invasive weeds.

Before Situation:

On grazing lands health and vigor are negatively impacted by poor grazing distribution, timing of grazing and inadequate rest and recovery periods. Water quality is impacted by increased erosion and runoff, cattle access to water bodies or woody buffers is uncontrolled. Reduced vegetative cover increases the opportunity for encroachment of noxious and invasive weeds.

After Situation:

Installation of fence will allow for implementation of grazing management that allows for an adequate rest and recovery period, protection of sensitive area, improved water quality, reduction of noxious and invasive weeds and/or exclusion from woody buffers. Fence includes posts, wire, fasteners, gates, etc... Four strand wire is commonly installed. Fence will be installed with wildlife friendly considerations.

Scenario Feature Measure: Length of Fence

Scenario Unit: Feet

Scenario Typical Size: 2,640

Scenario Cost: $13,946.61 **Scenario Cost/Unit:** $5.28

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	160	$5,969.60
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	24	$564.72
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.39	24	$201.36
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	24	$535.92
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	160	$3,692.80
Materials						
Post, Wood, CCA treated, 6" x 8'	12	Wood Post, End 6" X 8', CCA Treated. Includes materials and shipping only.	Each	$14.96	8	$119.68
Wire, Barbed, Galvanized, 12.5 Gauge, 1,320' roll	1	Galvanized 12.5 gauge, 1,320' roll. Includes materials and shipping only.	Each	$70.53	8	$564.24
Post, Wood, CCA treated, 3-4" x 7'	9	Wood Post, Line 3-4" X 7', CCA Treated. Includes materials and shipping only.	Each	$6.20	40	$248.00
Post, Steel T, 1.33 lbs, 6'	15	Steel Post, Studded 6' - 1.33 lb. Includes materials and shipping only.	Each	$6.62	165	$1,092.30
Gate, Pipe, 14'	1058	6 rail tube gate, 16 gauge. Includes materials and shipping only.	Each	$165.51	2	$331.02
Post, Wood, CCA treated, 4" x 8'	10	Wood Post, Line 4" X 8', CCA Treated. Includes materials and shipping only.	Each	$7.99	4	$31.96
Fence, Wire Assembly, Barbed Wire	30	Brace pins, battens, clips, staples. Includes materials and shipping only.	Foot	$0.16	2640	$422.40
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: 382 - Fence

Scenario: #2 - Difficult Installation

Scenario Description:

Installation of Multi-strand, Barbed or Smooth Wire fence in difficult situations will allow for implementation of grazing management that allows for an adequate rest and recovery period, protection of sensitive areas, improved water quality and/or reduction of noxious and invasive weeds.

Before Situation:

On grazing lands plant health and vigor are negatively impacted by poor grazing distribution, timing of grazing and inadequate rest and recovery periods. Water quality is impacted by increased erosion and runoff, cattle access to water bodies is uncontrolled. Reduced vegetative cover increases the opportunity for encroachment of noxious and invasive weeds. Fence installation conditions are for difficult sites such as poor access, steep slopes, rocky sites, dense brush, wet conditions etc.

After Situation:

Installation of fence will allow for implementation of grazing management that allows for an adequate rest and recovery period, protection of sensitive area, improved water quality, reduction of noxious and invasive weeds. Fence includes posts, wire, fasteners, gates, brace posts, etc... Fence will be installed with wildlife friendly considerations.

Scenario Feature Measure: Length of Fence

Scenario Unit: Feet

Scenario Typical Size: 2,640

Scenario Cost: $20,052.27 **Scenario Cost/Unit:** $7.60

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	40	$941.20
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	250	$9,327.50
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	8	$50.56
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.39	40	$335.60
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	40	$893.20
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	250	$5,770.00
Materials						
Wire, Barbed, Galvanized, 12.5 Gauge, 1,320' roll	1	Galvanized 12.5 gauge, 1,320' roll. Includes materials and shipping only.	Each	$70.53	8	$564.24
Post, Wood, CCA treated, 6" x 8'	12	Wood Post, End 6" X 8', CCA Treated. Includes materials and shipping only.	Each	$14.96	8	$119.68
Post, Wood, CCA treated, 4" x 8'	10	Wood Post, Line 4" X 8', CCA Treated. Includes materials and shipping only.	Each	$7.99	4	$31.96
Post, Steel T, 1.33 lbs, 6'	15	Steel Post, Studded 6' - 1.33 lb. Includes materials and shipping only.	Each	$6.62	165	$1,092.30
Fence, Wire Assembly, Barbed Wire	30	Brace pins, battens, clips, staples. Includes materials and shipping only.	Foot	$0.16	2640	$422.40
Gate, Pipe, 14'	1058	6 rail tube gate, 16 gauge. Includes materials and shipping only.	Each	$165.51	2	$331.02
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: 382 - Fence

Scenario: #3 - Woven Wire

Scenario Description:

Woven - Installation of fence will allow for implementation of a grazing management that allows for an adequate rest and recovery period, protection of sensitive areas, improved water quality and/or reduction of noxious and invasive weeds. Land is typically rolling to steep.

Before Situation:

On grazing lands plant health and vigor are negatively impacted by poor grazing distribution, timing of grazing and inadequate rest and recovery periods. Water quality is impacted by increased erosion and runoff, livestock access to water bodies is uncontrolled. Reduced vegetative cover increases opportunity for encroachment of noxious and invasive weeds.

After Situation:

Installation of fence will allow for implementation of a rotational grazing plan that allows for an adequate rest and recovery period, protection of sensitive area, improved water quality, reduction of noxious and invasive weeds. Woven wire fence includes posts, wire, fasteners, gates, etc...

Scenario Feature Measure: Length of Fence

Scenario Unit: Feet

Scenario Typical Size: 2,640

Scenario Cost: $17,761.01 **Scenario Cost/Unit:** $6.73

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.39	24	$201.36
Fence, Wire Assembly, Woven Wire, Game Fence	1088	Brace pins, twist sticks, staples. Includes materials and shipping only.	Foot	$0.24	2640	$633.60
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	200	$7,462.00
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	24	$564.72
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	200	$4,616.00
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	24	$535.92
Materials						
Wire, Woven, Galvanized, 12.5 Gauge, 48"	4	Galvanized 12.5 gauge, 48" - 330' roll. Includes materials and shipping only.	Each	$249.98	8	$1,999.84
Post, Wood, CCA treated, 6" x 8'	12	Wood Post, End 6" X 8', CCA Treated. Includes materials and shipping only.	Each	$14.96	8	$119.68
Post, Wood, CCA treated, 4" x 8'	10	Wood Post, Line 4" X 8', CCA Treated. Includes materials and shipping only.	Each	$7.99	4	$31.96
Post, Steel T, 1.33 lbs, 6'	15	Steel Post, Studded 6' - 1.33 lb. Includes materials and shipping only.	Each	$6.62	165	$1,092.30
Gate, Pipe, 14'	1058	6 rail tube gate, 16 gauge. Includes materials and shipping only.	Each	$165.51	2	$331.02
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: 382 - Fence

Scenario: #4 - Electric

Scenario Description:

Electric - Installation of fence will allow for implementation of a grazing management that allows for an adequate rest and recovery period, protection of sensitive areas, improved water quality and/or reduction of noxious and invasive weeds.

Before Situation:

On grazinglands plant health and vigor are negatively impacted by poor grazing distribution, timing of grazing and inadequate rest and recovery periods. Water quality is impacted by increased erosion and runoff, cattle access to water bodies is uncontrolled. Reduced vegetative cover increases the opportunity for encroachment of noxious and invasive weeds.

After Situation:

Installation of fence will allow for implementation of grazing management that allows for an adequate rest and recovery period, protection of sensitive area, improved water quality, reduction of noxious and invasive weeds. Fence includes posts, wire, fasteners, gates, fence charger, etc... Two to three strand wire is commonly installed. Fence will be installed with wildlife friendly considerations.

Scenario Feature Measure: Length of Fence

Scenario Unit: Feet

Scenario Typical Size: 2,640

Scenario Cost: $7,853.56 **Scenario Cost/Unit:** $2.97

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	16	$376.48
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	90	$3,357.90
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.39	16	$134.24
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	90	$2,077.20
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	16	$357.28
Materials						
Post, Steel T, 1.33 lbs, 6'	15	Steel Post, Studded 6' - 1.33 lb. Includes materials and shipping only.	Each	$6.62	40	$264.80
Fence, Wire Assembly, High Tensile, Electric, 3 Strand	34	Brace pins, springs, strainers, battens, clips, crimp sleeves, staples, insulators, wrap around sleeves. Includes materials and shipping only.	Foot	$0.12	2640	$316.80
Electric, Lightening Diverter	22	Electric, Lightening diverter for electric fence. Includes materials and shipping only.	Each	$10.17	1	$10.17
Gate, Pipe, 14'	1058	6 rail tube gate, 16 gauge. Includes materials and shipping only.	Each	$165.51	2	$331.02
Post, Wood, CCA treated, 4" x 8'	10	Wood Post, Line 4" X 8', CCA Treated. Includes materials and shipping only.	Each	$7.99	4	$31.96
Electric, Tester	26	Electric, Tester for electric fence. Includes materials and shipping only.	Each	$40.76	1	$40.76
Wire, High Tensile, 12.5 Gauge, 4,000' roll	2	High Tensile 12.5 gauge, 4,000' roll. Includes materials and shipping only.	Each	$113.03	2	$226.06
Electric, Ground Rod Clamps	21	Electric, Ground Rod Clamps for electric fence. Includes materials and shipping only.	Each	$1.79	3	$5.37
Electric, Ground Rods	20	Electric, Ground Rod for electric fence. Includes materials and shipping only.	Each	$10.41	3	$31.23

Materials

Post, Wood, CCA treated, 6" x 8'	12	Wood Post, End 6" X 8', CCA Treated. Includes materials and shipping only.	Each	$14.96	8	$119.68

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: 382 - Fence

Scenario: #5 - Safety or Heavy Use

Scenario Description:

A barrier fence installed to exclude access in situations where there is a hazard in the exclusion area or where heavy livestock pressure on the fence is expected. Permanently installed fence built to (1) keep humans away from waste storage structures, or (2) to protect sensitive areas (such as riparian areas, wetlands, springs, etc.) where heavy livestock pressure on the fence can be expected. Heavy grade fence materials and close post spacing required.

Before Situation:

Where a NRCS designed and constructed waste storage structure is planned whereby significant risk to human safety is determined to be evident. Livestock has access to sensitive areas that may cause detrimental effect to animal/human health and wilidlife habitat. Resouce concerns affected are plant health and vigor, wildlife habitat, compaction of soils, runoff of sediment or water quality due to turbidity..

After Situation:

1. Humans and livestock are excluded from the waste storage structure for safety purposes by installing a fence around a waste storage structure. The fence would typically be about 450' long with 4 gates and installed by a fencing contractor. Woven wire fence with one strand of barb wire on top with gates for manure equipment access. 2. A more strongly built fence is needed because of heavy livestock pressure on the fence due to exclusion from sensitive areas or confinement in a heavy use area in order to achieve exclusion during critical periods. Improved livestock control and access to water or other sensative areas will promote saftey for livestock/humans improve health, vigor of sensitive species, limiting soil erosion, and condition.

Scenario Feature Measure: Length of Fence

Scenario Unit: Feet

Scenario Typical Size: 450

Scenario Cost: $3,277.38 **Scenario Cost/Unit:** $7.28

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.39	8	$67.12
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	8	$188.24
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	16	$596.96
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	16	$369.28
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	8	$178.64
Materials						
Gate, Pipe, 14'	1058	6 rail tube gate, 16 gauge. Includes materials and shipping only.	Each	$165.51	4	$662.04
Post, Wood, CCA treated, 4" x 8'	10	Wood Post, Line 4" X 8', CCA Treated. Includes materials and shipping only.	Each	$7.99	8	$63.92
Fence, Wire Assembly, Barbed Wire	30	Brace pins, battens, clips, staples. Includes materials and shipping only.	Foot	$0.16	450	$72.00
Wire, Barbed, Galvanized, 12.5 Gauge, 1,320' roll	1	Galvanized 12.5 gauge, 1,320' roll. Includes materials and shipping only.	Each	$70.53	1	$70.53
Post, Wood, CCA treated, 3-4" x 7'	9	Wood Post, Line 3-4" X 7', CCA Treated. Includes materials and shipping only.	Each	$6.20	40	$248.00
Post, Wood, CCA treated, 6" x 8'	12	Wood Post, End 6" X 8', CCA Treated. Includes materials and shipping only.	Each	$14.96	16	$239.36
Wire, Woven, Galvanized, 12.5 Gauge, 32"	3	Galvanized 12.5 gauge, 32" - 330' roll. Includes materials and shipping only.	Each	$174.34	2	$348.68

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: 382 - Fence

Scenario: #7 - Water Quality

Scenario Description:

Winter feeding or confinement area is moved at least 1/4-mile away from stream / riparian area. This scenario used 14-gauge commercial pipe panels, but producer may use rought cut llumber, cables or other method that meet the fencing standard (382) for corral-type fencing. The purpose is to improve water quality and riparian function. Size used for pricing was 50 feet by 104 feet or about 5,000 square feet, or about 300 linear feet of fencing.

Before Situation:

Winter feeding or confinement area has been located on or adjacent to a stream / riparian area. As a result, water quality and riparian area have been degraded.

After Situation:

Moving confinement area away from stream/riparian area will allow for implementation of practices to restore riparian function and water quality.

Scenario Feature Measure: Length of Fence

Scenario Unit: Foot

Scenario Typical Size: 308

Scenario Cost: $7,102.11 **Scenario Cost/Unit:** $23.06

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.39	8	$67.12
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	8	$298.48
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	8	$188.24
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	64	$1,477.12
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	8	$178.64
Materials						
Gate, Pipe, 14'	1058	6 rail tube gate, 16 gauge. Includes materials and shipping only.	Each	$165.51	2	$331.02
Panel, Corral	2579	14 gauge, 6 metal rail 5' 3" x 10 ', includes materials and shipping only.	Each	$106.23	28	$2,974.44
Post, Metal steel 4" x 10'	2562	Post, Metal steel 4" x 10', painted. Includes materials and shipping only.	Each	$46.55	24	$1,117.20
Post, Wood, CCA treated, 8" x 10'	2563	Wood Post, End 8" X 10', CCA Treated. Includes materials and shipping only.	Each	$49.54	6	$297.24
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: **382 - Fence**

Scenario: **#8 - Organic Fence**

Scenario Description:

Multi-strand, Barbed or Smooth Wire with untreated posts - Installation of fence will allow for implementation of grazing management that allows for an adequate rest and recovery period, protection of sensitive area, improved water quality and/or reduction of noxious and invasive weeds. The scenario uses untreated posts and other fence materials accepted for organic certification.

Before Situation:

On grazing lands health and vigor are negatively impacted by poor grazing distribution, timing of grazing and inadequate rest and recovery periods. Water quality is impacted by increased erosion and runoff, cattle access to water bodies or woody buffers is uncontrolled. Reduced vegetative cover increases the opportunity for encroachment of noxious and invasive weeds.

After Situation:

Installation of fence will allow for implementation of grazing management that allows for an adequate rest and recovery period, protection of sensitive area, improved water quality, reduction of noxious and invasive weeds and/or exclusion from woody buffers. Fence includes posts, wire, fasteners, gates, etc... Four strand wire is commonly installed. Fence will be installed with wildlife friendly considerations.

Scenario Feature Measure: Length of fence

Scenario Unit: Foot

Scenario Typical Size: 2,640

Scenario Cost: $14,936.93 **Scenario Cost/Unit:** $5.66

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.39	24	$201.36
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	160	$5,969.60
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	24	$564.72
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	160	$3,692.80
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	24	$535.92
Materials						
Post, Wood, CCA treated, 6" x 12-14'	13	Wood Post, Line/End 6" X 12-14', CCA Treated. Includes materials and shipping only.	Each	$26.73	52	$1,389.96
Post, Steel T, 1.33 lbs, 6'	15	Steel Post, Studded 6' - 1.33 lb. Includes materials and shipping only.	Each	$6.62	165	$1,092.30
Gate, Pipe, 14'	1058	6 rail tube gate, 16 gauge. Includes materials and shipping only.	Each	$165.51	2	$331.02
Fence, Wire Assembly, Barbed Wire	30	Brace pins, battens, clips, staples. Includes materials and shipping only.	Foot	$0.16	2640	$422.40
Wire, Barbed, Galvanized, 12.5 Gauge, 1,320' roll	1	Galvanized 12.5 gauge, 1,320' roll. Includes materials and shipping only.	Each	$70.53	8	$564.24
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: 383 - Fuel Break

Scenario: #1 - Dozer, Level to Moderate Slopes

Scenario Description:

Fuel Break installation on level to moderate slopes (typically 30% or less) requires tree thinning, treating woody residue, pruning, and mowing. Thinning treatment and pruning is done by hand. Treating woody residue (piling/burning, crushing, mowing, or off-site removal) is mostly mechanized using equipment such as brush hogs, mowers, and dozers. Chemical spot treatment is applied as needed to control sprouting. Resource concerns are degraded plant condition - wildfire hazard, excess biomass accumulation & undesirable productivity and health.

Before Situation:

Forest stand is overstocked with desirable and undesirable trees. Overstocking creates conditions conducive to wildfire movement across the landscape, and severe loss/damage of the forest stand. Shrub levels are high and significanly increase wildfire risk. Tree crowns are touching, trees retain limbs down to understory vegetation creating a "ladder" for fire movement into the overstory, and understory vegetation (brush and grasses) create a significant fuel load to rate a high to severe fire hazard. The terrain is level to moderately sloped (0-30%), increasing difficulty as slope steepens.

After Situation:

Fuel Break is installed at the property line or a key locations to reduce crown fire spread. Size of fuel break is 4 acres; the width varies due to site conditions. The trees are thinned so open gaps are created in crown overstory, branches on remaining trees are pruned to 8 to 10 feet in height, all woody residue (thinned trees and pruned branches) are treated (piled/burned or lopped/scattered) so little remains in the fuel break and understory vegetation is mowed down to less than 1 foot in height. Cut stumps have been chemically treated to control sprouting.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 4

Scenario Cost: $7,168.01 **Scenario Cost/Unit:** $1,792.00

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Pruning tool, pole saw	1319	Gasoline powered pole chainsaw. Labor not included.	Hour	$8.03	8	$64.24
Pruning tools, hand tools	1318	Pruning tools, hand tools, shears, loppers, pole saw, handsaw. Material costs only. Labor not included.	Hour	$4.77	8	$38.16
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	10	$1,247.80
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	80	$505.60
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	8	$298.48
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$50.98	8	$407.84
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$57.01	8	$456.08
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	12	$494.76
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	12	$450.24
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	20	$446.60
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	88	$2,031.04
Materials						

Materials

Tree Marking Paint	313	Trees to be cut through tree marking are physically identified through the application of paint on the tree. Typically one quart of paint is used to mark one acre of trees. Includes materials and shipping only.	Acre	$6.43	4	$25.72
Herbicide, Triclopyor	338	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$42.30	4	$169.20

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61
Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been i	Dollar	$1.03	100	$103.00

Practice: 383 - Fuel Break

Scenario: #2 - Dozer, Steep slopes >30%

Scenario Description:

Fuel Break installation on steep slopes (>30%) requires tree thinning, treating woody residue, pruning, and brush cutting. Thinning treatment, tree pruning and brush cutting are done by hand. Treating woody residue (piling/burning, crushing, or off-site removal) is mostly mechanized, typically using dozer and masticator equipment. Chemical spot treatment applied as needed to control sprouting. Resource concerns are degraded plant condition - wildfire hazard, excess biomass accumulation & undesirable productivity and health.

Before Situation:

The forest stand is overstocked with trees (desirable and undesirable) and is at risk of loss if a wildfire should occur. Tree crowns are touching, trees retain limbs down to understory vegetation creating a "ladder" for fire movement into the overstory, and understory vegetation (brush and grasses) create a significant fuel load to rate a high to severe fire hazard. A fuel break is implemented to reduce the risk of a crown spreading wildfire. The terrain is steep, 40+%, which significantly reduces efficiency and increases cost of installation. More cutting of trees & brush and treatment of woody residue is accomplished using labor due to very steep slopes.

After Situation:

Fuel Break is installed at the property line or key locations to reduce crown fire spread. Size of fuel break is 4 acres; the width varies due to site conditions. The trees are thinned so open gaps are created in crown overstory; branches on remaining trees are pruned to a minimum of 8 to 10 feet in height; all woody residue, thinned trees, pruned branches and cut brush, are treated.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 4

Scenario Cost: $11,703.14 **Scenario Cost/Unit:** $2,925.79

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Pruning tools, hand tools	1318	Pruning tools, hand tools, shears, loppers, pole saw, handsaw. Material costs only. Labor not included.	Hour	$4.77	12	$57.24
Pruning tool, pole saw	1319	Gasoline powered pole chainsaw. Labor not included.	Hour	$8.03	8	$64.24
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$57.01	14	$798.14
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$128.90	10	$1,289.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	10	$373.10
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	160	$1,011.20
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	10	$1,247.80
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	22	$907.06
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	11	$412.72
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	11	$245.63
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	198	$4,569.84
Materials						
Herbicide, Triclopyor	338	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$42.30	4	$169.20

Materials

Tree Marking Paint	313	Trees to be cut through tree marking are physically identified through the application of paint on the tree. Typically one quart of paint is used to mark one acre of trees. Includes materials and shipping only.	Acre	$6.43	4	$25.72

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61
Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been i	Dollar	$1.03	100	$103.00

Practice: 383 - Fuel Break

Scenario: #3 - Masticator, Level to Moderate Slopes

Scenario Description:

Fuel Break installation on level to moderate slopes (typically 30% or less) requires tree thinning, treating woody residue, pruning, and mowing. Thinning treatment and pruning is done by hand. Woody residue (thinned trees, pruned branches and brush) is mostly masticated but some is piled/burned, hauled of site or lopped/scattered. Cut stumps are chemically treated to control sprouting. Resource concerns are degraded plant condition - wildfire hazard, excess biomass accumulation & undesirable productivity and health.

Before Situation:

The forest stand is overstocked with trees (desirable and undesirable) and is at risk of loss if a wildfire should occur. Tree crowns are touching, trees retain limbs down to understory vegetation creating a "ladder" for fire movement into the overstory, and understory vegetation (brush and grasses) create a significant fuel load to rate a high to severe fire hazard. Slope of terrain increases fire hazard. The terrain moderately sloped, 1-30+% increasing difficulty as slope steepens.

After Situation:

Fuel Break is installed at the property line or key locations to reduce crown fire spread. Size of fuel break is 4 acres; the width varies due to site conditions. The trees are thinned so open gaps are created in crown overstory, branches on remaining trees are pruned to 8 to 10 feet in height, all woody residue (thinned trees, pruned branches and brush) are mostly masticated but some is piled/burned, hauled of site or lopped/scattered) understory vegetation is cut down to less than 1 foot in height. Cut stumps have been chemically treated to control sprouting.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 4

Scenario Cost: $7,602.20 **Scenario Cost/Unit:** $1,900.55

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Pruning tools, hand tools	1318	Pruning tools, hand tools, shears, loppers, pole saw, handsaw. Material costs only. Labor not included.	Hour	$4.77	8	$38.16
Pruning tool, pole saw	1319	Gasoline powered pole chainsaw. Labor not included.	Hour	$8.03	8	$64.24
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$57.01	8	$456.08
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	60	$379.20
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	8	$298.48
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$50.98	5	$254.90
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$128.90	16	$2,062.40
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	84	$1,938.72
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	25	$558.25
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	20	$824.60
Materials						
Tree Marking Paint	313	Trees to be cut through tree marking are physically identified through the application of paint on the tree. Typically one quart of paint is used to mark one acre of trees. Includes materials and shipping only.	Acre	$6.43	4	$25.72
Herbicide, Triclopyor	338	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$42.30	4	$169.20
Mobilization						

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64
Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been i	Dollar	$1.03	100	$103.00
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: 383 - Fuel Break

Scenario: #4 - Masticator, Steep slopes >30%

Scenario Description:

Fuel Break installation on steep slopes (>30%) requires tree thinning, treating woody residue, pruning, and brush cutting. Thinning treatment and pruning is done by a combination of mechanized and hand treatments. Woody residue (thinned trees, pruned branches and brush) is mostly masticated but some is piled/burned, hauled of site or lopped/scattered. Cut stumps are chemically treated to control sprouting. Resource concerns are degraded plant condition - wildfire hazard, excess biomass accumulation & undesirable productivity and health.

Before Situation:

The forest stand is overstocked with trees (desirable and undesirable) and is at risk of loss if a wildfire should occur. Tree crowns are touching, trees retain limbs down to understory vegetation creating a "ladder" for fire movement into the overstory, and understory vegetation (brush and grasses) create a significant fuel load to rate a high to severe fire hazard. Slope of terrain significantly increases fire hazard rating due to preheating effect. The terrain is steeply sloped, 40+%, which significantly reduces implementation efficiency. More hand cutting and treatment of woody residue is accomplished using labor due to very steep slopes.

After Situation:

Fuel Break is installed a the property line or a key locations to reduce crown fire spread. Size of fuel break is 4 acres; the width varies due to site conditions. The trees are thinned so open gaps are created in crown overstory, branches on remaining trees are pruned to 8 to 10 feet in height, all woody residue (thinned trees, pruned branches and brush) are mostly masticated but some is piled/burned, hauled of site or lopped/scattered) so little remains in the fuel break and understory vegetation is cut down to less than 1 foot in height. Cut stumps have been chemically treated to control sprouting.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 4

Scenario Cost: $10,648.29 **Scenario Cost/Unit:** $2,662.07

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	12	$447.72
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$128.90	20	$2,578.00
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$57.01	12	$684.12
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	120	$758.40
Pruning tool, pole saw	1319	Gasoline powered pole chainsaw. Labor not included.	Hour	$8.03	7	$56.21
Pruning tools, hand tools	1318	Pruning tools, hand tools, shears, loppers, pole saw, handsaw. Material costs only. Labor not included.	Hour	$4.77	14	$66.78
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	25	$558.25
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	24	$900.48
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	20	$824.60
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	132	$3,046.56

Materials

Materials

Tree Marking Paint	313	Trees to be cut through tree marking are physically identified through the application of paint on the tree. Typically one quart of paint is used to mark one acre of trees. Includes materials and shipping only.	Acre	$6.43	4	$25.72
Herbicide, Triclopyor	338	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$42.30	4	$169.20

Mobilization

Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been i	Dollar	$1.03	100	$103.00
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 383 - Fuel Break

Scenario: #5 - Hand Treatments

Scenario Description:

Fuel Break installation requires tree thinning, treating woody residue, pruning, and mowing. Thinning treatment, pruning, brush cutting and treating woody residue (piling/burning, crushing, or off-site removal), is done by hand. Resource concerns are degraded plant condition - wildfire hazard, excess biomass accumulation & undesirable productivity and health.

Before Situation:

Forest stand is overstocked with desirable and undesirable trees. Overstocking creates conditions conducive to wildfire movement across the landscape, and loss of the forest stand. Excess stocking is impacting the health of the desired forest ecosystem and wildfire hazard poses risk to humans, structures, air quality, plants and animals. Tree crowns are touching, trees retain limbs down to understory vegetation creating a "ladder" for fire movement into the overstory, and understory vegetation (brush and grasses) create a significant fuel load.

After Situation:

A fuel break is installed by hand cutting trees, hand pruning remaining trees, piling and burning or removal of woody residue from tree cutting and pruning. Fuel break installation is at property lines, around structures, at roadways, or other key locations to reduce continuity of vegetation cover. Width of fuel break varies based on site conditions.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 4

Scenario Cost: $8,672.80 **Scenario Cost/Unit:** $2,168.20

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	12	$447.72
Pruning tools, hand tools	1318	Pruning tools, hand tools, shears, loppers, pole saw, handsaw. Material costs only. Labor not included.	Hour	$4.77	10	$47.70
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	240	$1,516.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	258	$5,954.64
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	14	$577.22
Materials						
Tree Marking Paint	313	Trees to be cut through tree marking are physically identified through the application of paint on the tree. Typically one quart of paint is used to mark one acre of trees. Includes materials and shipping only.	Acre	$6.43	4	$25.72
Mobilization						
Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been i	Dollar	$1.03	100	$103.00

Practice: **383 - Fuel Break**

Scenario: **#6 - Non Forest Lands**

Scenario Description:

A non forest fuel break occurs outside of forestlands where brush, grass and forbs dominate. Landuses where this scenario will be applied may be range, pasture or wetlands. The fuel break area is mowed/bushhog so standing vegetation is reduced to a low height. Resource concerns are degraded plant condition - wildfire hazard.

Before Situation:

Wildfire movement is a concern within the designated area. Vegetation is tall, dense and continuous creating conditions conducive for fire movement across the landscape.

After Situation:

A fuel break is installed by shredding/mowing/bushhogging a defined width at property lines, around structures, at roadways, or other key locations to reduce continuity of vegetation cover. Width of fuel break varies based on site conditions.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 4

Scenario Cost: $1,502.62 **Scenario Cost/Unit:** $375.66

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$50.98	8	$407.84
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$19.51	8	$156.08
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	4	$149.24
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	10	$223.30
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	6	$138.48
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 384 - Woody Residue Treatment

Scenario: #1 - Orchard/Vineyard/ChristmasTree Removal

Scenario Description:

Slash created from Orchard/Vineyard/ChristmasTree removal is chipped and removed from the site in order to accomplish one or more purposes: reducing insect/disease substrate; improving access; and/or reducing potential risk to livestock and humans. Air emission reductions are achieved by chipping or shredding the materials in lieu of burning them. Material may be incorporated in the soil, used as a dust suppressant on unpaved roads or traffic areas. Resource concerns include emissions of particulate matter.

Before Situation:

Wood waste is either burned, creating an air quality issue, or left in place creating a wildfire hazard, an impediment to access, or a potential site for harboring pests. Energy conservation was not implemented.

After Situation:

Treatment of pruning residue results in the reduction in air pollutants, energy conservation occurred, improvement in access, and the reduction of sites that can harbor pests.

Scenario Feature Measure: Acres of orchard/vineyard with slash created from pruning

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $7,296.11 **Scenario Cost/Unit:** $364.81

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$128.90	20	$2,578.00
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	20	$470.60
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$121.69	20	$2,433.80
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	62	$1,384.46
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 384 - Woody Residue Treatment

Scenario: #2 - Chipping and hauling off-site

Scenario Description:

Reducing woody waste created during range, forestry, and agroforestry activities by gathering, chipping, and hauling off site to achieve management objectives. Does not include transport from property to a commercial facility. Resource concerns include potential emissions of particulate matter, potential excessive plant pest pressure, wildfire hazard from excessive biomass accumulation, and habitat degradation

Before Situation:

Woody residues, including juniper, causes management issues for wildlife habitat, fire hazard and sites for harboring pests.

After Situation:

Wildlife habitat is restored for Sage Grouse or other species. Fire and pest issues are reduced. Planting sites for reforestation are created. Air and energy resources are conserved.

Scenario Feature Measure: Acres treated

Scenario Unit: Acres

Scenario Typical Size: 20

Scenario Cost: $6,221.07 **Scenario Cost/Unit:** $311.05

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	20	$126.40
Truck, dump, 8 CY	1401	Dump truck for moving bulk material. Typically capacity is 12 ton or 8 cubic yards. Includes equipment only.	Hour	$58.47	20	$1,169.40
Brush Chipper, 6" capacity	938	Brush Chipper, 6" capacity, typically 35 HP. Includes chipper and power unit. Labor not included.	Hour	$22.18	20	$443.60
Log skidder	942	Equipment and power unit costs. Labor not included.	Hour	$128.90	10	$1,289.00
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	42	$937.86
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	12	$450.24
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	42	$969.36
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 384 - Woody Residue Treatment

Scenario: #3 - Lop and Scatter

Scenario Description:

Treating a stand where small diameter trees were thinned by hand, typically 4 to 6 inches in diameter or less. Heights are generally 30 feet or less. Slash accumulation poses wildfire, pest, or disease risk to the stand. Treatment involves lopping limbs and stems to within 18 inches of the ground with a chainsaw. Slopes are gentle to moderate. Lopping and scattering often occurs simultaneously with thinning.

Before Situation:

Small diameter woody debris of light to medium densities pose wildfire, pest or disease risks to the stand. Movement through the unit is difficult. Woody debris from thinning or pruning is at unacceptable heights and will persist if left untreated.

After Situation:

Chainsaw crews reduce legths and heights of debris to accpetable levels according to quality criteria. Fuel continuities are reduced. Brood material for pests and pathogens are minimized through accelerated drying and decomposition.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $4,478.56 **Scenario Cost/Unit:** $111.96

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	100	$632.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	40	$1,492.40
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	102	$2,354.16

Practice: 384 - Woody Residue Treatment

Scenario: #4 - Slash Treatment, Light

Scenario Description:

Treating an area of forest slash to reduce hazardous fuels and the risk of insect and disease, improve organic matter and reduce erosion while improving water quality. Slash is treated both by hand (cutting, lopping, piling, etc.) and mechanically (masticating, chipping, etc.). Resource concerns include: Wildfire hazard from excessive biomass accumulation and potential Excessive plant pest pressure.

Before Situation:

Woody material resulting from a silvicultural practice such as pruning or a light thinning operation is causing both fire hazard and pest issues.

After Situation:

Fire and pest issues are reduced with slash spread out and in contact with the ground. Additional benefits include reduced soil movement. The soil is protected and/or enhanced.

Scenario Feature Measure: Acres treated

Scenario Unit: Acres

Scenario Typical Size: 40

Scenario Cost: $10,241.06 **Scenario Cost/Unit:** $256.03

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	80	$505.60
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$128.90	40	$5,156.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	40	$1,492.40
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	42	$937.86
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	82	$1,892.56
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 384 - Woody Residue Treatment

Scenario: #5 - Forest Slash Treatment, Heavy

Scenario Description:

Treating an area of trees and significant woody vegetation to reduce hazardous fuels and the risk of insect and disease, improve organic matter, decrease unwanted biomass, and reduce erosion while improving water quality. Slash is to be lopped/treated/crushed within a foot of the ground, piled, or moved off-site to meet state fire hazard reduction standards. Typical equipment used include masticators, mulchers, drum choppers, and chainsaw work as needed in order to treat this heavier than normal slash load on varying slopes, terrain, accessibility and vegetative density. Resource concerns include potential emission of particulate matter, wildfire hazard from excessive biomass accumulation, excessive plant pest pressure, and habitat degradation.

Before Situation:

Heavy woody material (difficult to walk through) resulting from silvicultural/management operations caused both fire hazard, access, potential harm to humans and animals, and pest issues.

After Situation:

Fire, access, and pest issues are reduced with slash spread out and in contact with the ground. An additional benefit is reduced soil movement.

Scenario Feature Measure: Acres treated

Scenario Unit: Acres

Scenario Typical Size: 40

Scenario Cost: $17,647.46 **Scenario Cost/Unit:** $441.19

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Heavy mechanical site prep, drum chopping	1316	Mechanical operations that pushing trees and vegetation and crushing them with a water filled roller chopper. Requires heavy equipment such as dozers. Includes equipment, power unit and labor costs.	Acre	$150.26	20	$3,005.20
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	80	$505.60
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	40	$1,492.40
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$128.90	60	$7,734.00
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	60	$1,339.80
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	90	$2,077.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 384 - Woody Residue Treatment

Scenario: #6 - Restoration/conservation treatment following catastrophic events

Scenario Description:

The use of a combination of hand (chainsaw) and heavy equipment similar to those used in logging to treat slash resulting from catastrophic events such as fire, wind, severe pest outbreak, ice storm, etc. This scenario will remove/treat the larger material the size of which is consistent with the large equipment used. Resource concerns include: Excessive plant pest pressure, Potential emissions of particulate matter, Wildfire hazard from excessive biomass accumulation, and Habitat degradation.

Before Situation:

A large amount of slash and woody residue is created as a result of a non-silvicultural event such as a wind storm, wildfire, ice storm, pest outbreak, etc. Because the slash and residue is created by a catastrophic event that can cause tree-lodging, snags, broken tops, etc.; treatment is both difficult and dangerous. The presence of this material causes adverse effects on the forest include limiting access for management purposes, increasing the wildfire hazard, increasing the risk of potential harm to humans and livestock, and providing harboring sites for pests.

After Situation:

The material resulting from the catastrophic event is reduced to a level that will minimize the resource concerns.

Scenario Feature Measure: Acres of affected forest

Scenario Unit: Acres

Scenario Typical Size: 20

Scenario Cost: $18,333.77 **Scenario Cost/Unit:** $916.69

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	80	$505.60
Log skidder	942	Equipment and power unit costs. Labor not included.	Hour	$128.90	40	$5,156.00
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	$88.87	40	$3,554.80
Truck, dump, 8 CY	1401	Dump truck for moving bulk material. Typically capacity is 12 ton or 8 cubic yards. Includes equipment only.	Hour	$58.47	40	$2,338.80
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	45	$1,688.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	90	$2,009.70
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	90	$2,077.20
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 386 - Field Border

Scenario: #1 - Non-Native Species

Scenario Description:

A strip of permanent vegetation established at the edge or around the perimeter of a field using a mixture of Non-Native species. Practice includes seed, seedbed prep and planting of introduced species. Resource concerns addressed include: protect soil and water quality, manage pest population, increase carbon storage, and improve air quality.

Before Situation:

Before practice conditions may vary widely. Fields may have erosion issues from wind or water, a field border may be needed to manage pest populations, protect soil and water quality, provide wildlife food and cover, provide pollinator habitat, or a field border may be used to increase carbon storage and improve air quality. Water quality, soil erosion and/or wildlife food and cover may all be primary resource concerns.

After Situation:

This practice when applied around a field may support and connect other buffer practices within and between fields. Introduced grasses, legumes, forbs or shrubs will be established around the field edges to the extent needed to meet the resource needs and producer objectives. Minimum field border widths shall be based on NRCS local design criteria specific to the purpose for installing the practice. Introduced species of grasses, legumes, forbs or shrubs shall be selected that are adapted to site, will not function as a host for diseases of a field crop and have physical charactaristics necessary to control wind and water erosion to tolerable levels on the field border area.

Scenario Feature Measure: Number of acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $144.24 **Scenario Cost/Unit:** $144.24

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	2	$20.40
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.20	1	$15.20
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.62	2	$11.24
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$19.56	1	$19.56
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.83	2	$31.66
Four Species Mix, Cool Season, Introduced Perennial (2 grasses, 2 legumes)	2317	Cool season grass and legume mix. Includes material and shipping only.	Acre	$46.18	1	$46.18

Practice: 386 - Field Border

Scenario: #2 - Non-Native Species, Foregone Income

Scenario Description:

A strip of permanent vegetation established at the edge or around the perimeter of a field using a mixture of Non-Native species. This practice may also apply to recreation land or other land uses where agronomic crops including forages are grown. Practice includes seed, seedbed prep and planting of introduced species. The area of the field border is taken out of production, it typically being a higher value crop. Resource concerns addressed include: protect soil and water quality, manage pest population, increase carbon storage, and improve air quality. Use this scenario only when all land the land planted to a field boarder is current crop land taken out of production.

Before Situation:

Before practice conditions may vary widely. Fields may have erosion issues from wind or water, a field border may be needed to manage pest populations, protect soil and water quality, provide wildlife food and cover, provide pollinator habitat, or a field border may be used to increase carbon storage and improve air quality. Water quality, soil erosion and/or wildlife food and cover may all be primary resource concerns.

After Situation:

This practice when applied around a field may support and connect other buffer practices within and between fields. Introduced grasses, legumes, forbs or shrubs will be established around the field edges to the extent needed to meet the resource needs and producer objectives. Minimum field border widths shall be based on NRCS local design criteria specific to the purpose for installing the practice. Introduced species of grasses, legumes, forbs or shrubs shall be selected that are adapted to site, will not function as a host for diseases of a field crop and have physical charactaristics necessary to control wind and water erosion to tolerable levels on the field border area. Use this scenario only when all land planted to a field boarder is cropland taken out of current production.

Scenario Feature Measure: Number of acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $309.30 **Scenario Cost/Unit:** $309.30

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	2	$20.40
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.20	1	$15.20
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.62	2	$11.24
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$19.56	1	$19.56
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$165.06	1	$165.06
Materials						
Four Species Mix, Cool Season, Introduced Perennial (2 grasses, 2 legumes)	2317	Cool season grass and legume mix. Includes material and shipping only.	Acre	$46.18	1	$46.18
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.83	2	$31.66

Practice: 386 - Field Border

Scenario: #3 - Native Species

Scenario Description:

A strip of permanent vegetation established at the edge or around the perimeter of a field using a mixture of Native species. This practice may also apply to recreation land or other land uses where agronomic crops including forages are grown. Practice includes seedbed prep and planting of native species. Resource concerns addressed include: protect soil and water quality, provide wildlife food and cover, provide pollinator habitat, manage pest population, increase carbon storage, and improve air quality.

Before Situation:

Before practice conditions may vary widely. Fields may have erosion issues from wind or water, a field border may be needed to manage pest populations, protect soil and water quality, provide wildlife food and cover, provide pollinator habitat, or a field border may be used to increase carbon storage and improve air quality. Water quality, soil erosion and/or wildlife food and cover may all be primary resource concerns.

After Situation:

This practice when applied around a field may support and connect other buffer practices within and between fields. Native grasses, legumes, forbs and/or shrubs will be established around the field edges to the extent needed to meet the resource needs and producer objectives. Minimum field border widths shall be based on NRCS local design criteria specific to the purpose for installing the practice. Native species shall be selected that do not function as a host for diseases of a field crop and have physical charactaristics necessary to control wind and water erosion to tolerable levels on the field border area.

Scenario Feature Measure: Number of acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $303.62 **Scenario Cost/Unit:** $303.62

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.20	1	$15.20
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$19.56	1	$19.56
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.62	2	$11.24
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	2	$20.40
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.83	2	$31.66
Three plus Species Mix, Warm Season, Native Perennial	2327	Native, warm season perennial grass. Includes material and shipping only.	Acre	$205.56	1	$205.56

Practice: 386 - Field Border

Scenario: #4 - Native Species, Foregone Income

Scenario Description:

A strip of permanent vegetation established at the edge or around the perimeter of a field using Native species. This practice may also apply to recreation land or other land uses where agronomic crops including forages are grown. Practice includes seedbed prep and planting of native species. The area of the field border is taken out of production, it typically being a higher value crop. Resource concerns addressed include: protect soil and water quality, provide wildlife food and cover, provide pollinator habitat, manage pest population, increase carbon storage, and improve air quality. Use this scenario only when all land planted to a field boarder is current crop land taken out of production.

Before Situation:

Before practice conditions may vary widely. Fields may have erosion issues from wind or water, a field border may be needed to manage pest populations, protect soil and water quality, provide wildlife food and cover, provide pollinator habitat, or a field border may be used to increase carbon storage and improve air quality. Water quality, soil erosion and/or wildlife food and cover may all be primary resource concerns.

After Situation:

This practice when applied around a field may support and connect other buffer practices within and between fields. Native grasses, legumes, forbs and/or shrubs will be established around the field edges to the extent needed to meet the resource needs and producer objectives. Minimum field border widths shall be based on NRCS local design criteria specific to the purpose for installing the practice. Native species shall be selected that do not function as a host for diseases of a field crop and have physical charactaristics necessary to control wind and water erosion to tolerable levels on the field border area. Use this scenario only when all land planted to a field boarder is cropland taken out of current production.

Scenario Feature Measure: Number of acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $468.68 **Scenario Cost/Unit:** $468.68

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$19.56	1	$19.56
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.62	2	$11.24
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	2	$20.40
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.20	1	$15.20
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$165.06	1	$165.06
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.83	2	$31.66
Three plus Species Mix, Warm Season, Native Perennial	2327	Native, warm season perennial grass. Includes material and shipping only.	Acre	$205.56	1	$205.56

Practice: 386 - Field Border

Scenario: #5 - Organic

Scenario Description:

A strip of permanent vegetation established at the edge or around the perimeter of a field using Certified Organic Seed. Practice includes seedbed prep and planting of organic seed for herbaceous species. Resource concerns addressed include: protect soil and water quality, provide wildlife food and cover, provide pollinator habitat, manage pest population, increase carbon storage, and improve air quality.

Before Situation:

Before practice conditions may vary widely. Fields may have erosion issues from wind or water, a field border may be needed to manage pest populations, protect soil and water quality, provide wildlife food and cover, provide pollinator habitat, or a field border may be used to increase carbon storage and improve air quality. Water quality, soil erosion and/or wildlife food and cover may all be primary resource concerns.

After Situation:

This practice when applied around a field may support and connect other buffer practices within and between fields. Introduced grasses, legumes, forbs or shrubs will be established around the field edges to the extent needed to meet the resource needs and producer objectives. Minimum field border widths shall be based on NRCS local design criteria specific to the purpose for installing the practice. Introduced species of grasses, legumes, forbs or shrubs shall be selected that are adapted to site, will not function as a host for diseases of a field crop and have physical charactaristics necessary to control wind and water erosion to tolerable levels on the field border area.

Scenario Feature Measure: Number of Acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $140.33 **Scenario Cost/Unit:** $140.33

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	4	$40.80
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.20	1	$15.20
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$19.56	1	$19.56
Materials						
Certified Organic, Three Species Mix, Cool Season, Perennial Grasses and Legumes	2340	Certified organic cool season perennial grass and legume mix. Includes material and shipping only.	Acre	$64.77	1	$64.77

Practice: 386 - Field Border

Scenario: #6 - Organic, Foregone Income

Scenario Description:

A strip of permanent vegetation established at the edge or around the perimeter of a field using Certified Organic Seed. Practice includes seedbed prep and planting of organic seed for herbaceous species. The area of the field border is taken out of production, it typically being a higher value crop. Resource concerns addressed include: protect soil and water quality, provide wildlife food and cover, provide pollinator habitat, manage pest population, increase carbon storage, and improve air quality.

Before Situation:

Before practice conditions may vary widely. Fields may have erosion issues from wind or water, a field border may be needed to manage pest populations, protect soil and water quality, provide wildlife food and cover, provide pollinator habitat, or a field border may be used to increase carbon storage and improve air quality. Water quality, soil erosion and/or wildlife food and cover may all be primary resource concerns.

After Situation:

This practice when applied around a field may support and connect other buffer practices within and between fields. Introduced grasses, legumes, forbs or shrubs will be established around the field edges to the extent needed to meet the resource needs and producer objectives. Minimum field border widths shall be based on NRCS local design criteria specific to the purpose for installing the practice. Introduced species of grasses, legumes, forbs or shrubs shall be selected that are adapted to site, will not function as a host for diseases of a field crop and have physical charactaristics necessary to control wind and water erosion to tolerable levels on the field border area. Use this scenario only when all land planted to a field boarder is current crop land taken out of production.

Scenario Feature Measure: Number of Acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $330.15 **Scenario Cost/Unit:** $330.15

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	4	$40.80
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.20	1	$15.20
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$19.56	1	$19.56
Foregone Income						
FI, Organic, Wheat Dryland	2236	Organic Dryland Wheat is Primary Crop	Acre	$189.82	1	$189.82
Materials						
Certified Organic, Three Species Mix, Cool Season, Perennial Grasses and Legumes	2340	Certified organic cool season perennial grass and legume mix. Includes material and shipping only.	Acre	$64.77	1	$64.77

Practice: 386 - Field Border

Scenario: #7 - Pollinator

Scenario Description:

A strip of permanent vegetation established at the edge or around the perimeter of a field using a mix of native seed specific to pollinator species. Practice includes seedbed prep and planting of pollinator friendly species. Resource concerns addressed include: provide pollinator habitat, protect soil and water quality, provide wildlife food and cover, manage pest population, increase carbon storage, and improve air quality.

Before Situation:

Before practice conditions may vary widely. Fields may have erosion issues from wind or water, a field border may be needed to manage pest populations, protect soil and water quality, provide wildlife food and cover, provide pollinator habitat, or a field border may be used to increase carbon storage and improve air quality. Water quality, soil erosion and/or wildlife food and cover may all be primary resource concerns.

After Situation:

This practice when applied around a field will support and connect other buffer practices within and between fields. Pollinator herbaceous plantings will provide plants which flower throughout the growing season. This provides a source of nectar for adult pollinators and a diversity of herbaceous material for immature pollinator life stages and for nesting. Minimum field border widths shall be based on NRCS local design criteria specific to the purpose for installing the practice. Species selected shall meet the pollinator habitat requirements of the state and be adapted to site, not function as a host for diseases of a field crop and have physical charactaristics necessary to control wind and water erosion to tolerable levels on the field border area.

Scenario Feature Measure: Number of acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $385.23 **Scenario Cost/Unit:** $385.23

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.21	1	$6.21
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.20	1	$15.20
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	2	$20.40
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$19.56	1	$19.56
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.62	2	$11.24
Materials						
Nitrogen (N), Urea	71	Price per pound of N supplied by Urea. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.79	30	$23.70
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.43	20	$8.60
Untreated Conventional Seed, Pollinator Mix, Native Perennial Grasses and Forbs	2346	Untreated conventional native perennial grass and legume pollinator mix. May contain seed that are not available as certified organic. Includes material and shipping only.	Acre	$243.06	1	$243.06
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.83	2	$31.66
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.28	20	$5.60

Practice: 386 - Field Border

Scenario: #8 - Pollinator, Foregone Income

Scenario Description:

A strip of permanent vegetation established at the edge or around the perimeter of a field using a mix of native seed specific to pollinator species. Practice includes seedbed prep and planting of pollinator friendly species. The area of the field border is taken out of production, it typically being a higher value crop. Resource concerns addressed include: provide pollinator habitat, protect soil and water quality, provide wildlife food and cover, manage pest population, increase carbon storage, and improve air quality.

Before Situation:

Before practice conditions may vary widely. Fields may have erosion issues from wind or water, a field border may be needed to manage pest populations, protect soil and water quality, provide wildlife food and cover, provide pollinator habitat, or a field border may be used to increase carbon storage and improve air quality. Water quality, soil erosion and/or wildlife food and cover may all be primary resource concerns.

After Situation:

This practice when applied around a field will support and connect other buffer practices within and between fields. Pollinator herbaceous plantings will provide plants which flower throughout the growing season. This provides a source of nectar for adult pollinators and a diversity of herbaceous material for immature pollinator life stages and for nesting. Minimum field border widths shall be based on NRCS local design criteria specific to the purpose for installing the practice. Species selected shall meet the pollinator habitat requirements of the state and be adapted to site, not function as a host for diseases of a field crop and have physical charactaristics necessary to control wind and water erosion to tolerable levels on the field border area. Use this scenario only when all land planted to a field boarder is current crop land taken out of production.

Scenario Feature Measure: Number of acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $550.29 **Scenario Cost/Unit:** $550.29

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.62	2	$11.24
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.21	1	$6.21
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.20	1	$15.20
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	2	$20.40
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$19.56	1	$19.56
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$165.06	1	$165.06
Materials						
Untreated Conventional Seed, Pollinator Mix, Native Perennial Grasses and Forbs	2346	Untreated conventional native perennial grass and legume pollinator mix. May contain seed that are not available as certified organic. Includes material and shipping only.	Acre	$243.06	1	$243.06
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.83	2	$31.66
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.28	20	$5.60
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.43	20	$8.60
Nitrogen (N), Urea	71	Price per pound of N supplied by Urea. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.79	30	$23.70

Practice: **388 - Irrigation Field Ditch**

Scenario: **#1 - Irrigation Field Ditch**

Scenario Description:

This scenario is the construction of an Irrigation Field Ditch. Typical construction dimensions are 2' wide bottom x 2' deep x 1320' length with a side slope of 2:1.
Resource concerns: Excess/Insufficient Water - Inefficient Use of Irrigation Water
Associated Conservation Practices: 320-Irrigation Canal or Lateral; 443-Irrigation System, Surface or Subsurface Water; 533-Pumping Plant; 430-Irrigation Pipeline.

Before Situation:

Water supply for an area is inadequate for crop production and irrigation water application is inefficient.

After Situation:

An earthen canal that has adequate capacity to convey sufficient irrigation water to meet the demands of the system and make irrigation practical for the crops being grown.

Scenario Feature Measure: Volume of earth excavated

Scenario Unit: Cubic Yard

Scenario Typical Size: 587

Scenario Cost: $1,685.64 **Scenario Cost/Unit:** $2.87

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.30	587	$1,350.10
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$167.77	2	$335.54

Practice: 390 - Riparian Herbaceous Cover

Scenario: #1 - Riparian Broadcast Seeding

Scenario Description:

Use in habitats subject to intermittant flooding and saturated soils where the exising plant community has been disturbed, destroyed, or the species diversity is unable to provide adequate habitat. Site adapted species of grasses, legumes, and/or forbs are planted by broadcast and/or no-till or range drill seeding methods as necessary to accomplish the intended purpose(s). Seedbed preparation may require LIGHT TILLAGE (disking). Practuce applies in rangeland, pasture, cropland, and forest where natural seeding methods and/or management is unlikely to improve the plant community within a reasonable time period.

Practices that may facilitate the establishment of riparian herbaceous cover may include: Herbaceous Weed Control (315), Range Planting (550), Forage and Biomass Planting (512), Critical Area Planting (342), Filter Strip (393), Restoration and Management of Rare and Declining Habitats (643), Early Successional Habitat Dev. and Mgmt (647), Streambank and Shoreline Protection (580), Stream Habitat Improvement and Management (395), Acccess Control (472), Perscribed Grazing (528).

Resource Concerns include:Inadequate Habitat for Fish and Wildlife, Degraded Plant Condition, Soil Erosion, Water Quality Degradataion.

Before Situation:

The riparian zone vegetation is currently an undesirable or inadequate stand of perennial or annual vegetation as determined by the NRCS Stream Visual Assessment Protocol score of less than 5 for those elements. Natural reseeding or vegetation management is unlikely to improve the plant community within a reasonable amount of time. Existing vegetation does not provide adequate food, cover, and/or connectivity for riparian wildlife, and contributes insufficient amounts of organic matter for stream species food and cover. Riparian vegetation quality and/or quantity have been compromised by human activities and/or access of vehicles, people, and/or livestock to the extent that the riparian area and floodplain are not functioning to provide the necessary stream and riparian habitat components.

After Situation:

The riparian zone is established to an adapted, diverse vegetative plant community and is under close management to ensure long term survival and ecological succession. The quality and quantity of the riparian zone components are managed to support the species that depend on it for habitat as well as the functions it performs for stabilizing the streambank and/or shoreline, dissipating stream energy and trapping sediment, and improving and/or maintaining water quality. These functions include: stream temperature moderation through shading, recruitment of non-woody organic matter, habitat for terrestrial insects and other riparian dependent species, streambank integrity, and filtration of contaminants from surface run-off into the stream.

Scenario Feature Measure: Acres of Riparian Herbaceous Cover

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $1,387.60 **Scenario Cost/Unit:** $1,387.60

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.99	1	$11.99
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	3	$31.74
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Six Species Mix, Native Forb	2334	Native forb mix. Includes material and shipping only.	Acre	$986.62	1	$986.62
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: 390 - Riparian Herbaceous Cover

Scenario: #2 - Plug Planting

Scenario Description:

The riparian area is usually a narrow strip between the aquatic and terrestrial habitats subject to intermittant flooding and saturated soils where the exising plant community has been disturbed, destroyed, or the species diversity is unable to provide adequate habitat. Site adapted species of grasses, legumes, and/or forbs are planted as plugs to improve success. Seedbed preparation may require LIGHT TILLAGE (disking). Practuce applies in rangeland, pasture, cropland, and forest where natural seeding methods and/or management is unlikely to improve the plant community within a reasonable time period. Typically applied to 0.5 acres of herbacious cover.
Practices that may facilitate the establishment of riparian herbaceous cover may include: Herbaceous Weed Control (315), Range Planting (550), Forage and Biomass Planting (512), Critical Area Planting (342), Filter Strip (393), Restoration and Management of Rare and Declining Habitats (643), Early Successional Habitat Dev. and Mgmt (647), Streambank and Shoreline Protection (580), Stream Habitat Improvement and Management (395), Acccess Control (472), Perscribed Grazing (528).
Resource Concerns include:Inadequate Habitat for Fish and Wildlife, Degraded Plant Condition, Soil Erosion, Water Quality Degradataion.

Before Situation:

The riparian zone vegetation is currently an undesirable or inadequate stand of perennial or annual vegetation as determined by the NRCS Stream Visual Assessment Protocol score of less than 5 for those elements. Natural reseeding or vegetation management is unlikely to improve the plant community within a reasonable amount of time. Existing vegetation does not provide adequate food, cover, and/or connectivity for riparian wildlife, and contributes insufficient amounts of organic matter for stream species food and cover. Riparian vegetation quality and/or quantity have been compromised by human activities and/or access of vehicles, people, and/or livestock to the extent that the riparian area and floodplain are not functioning to provide the necessary stream and riparian habitat components.

After Situation:

The riparian zone is established to an adapted, diverse vegetative plant community and is under close management to ensure long term survival and ecological succession. The quality and quantity of the riparian zone components are managed to support the species that depend on it for habitat as well as the functions it performs for stabilizing the streambank and/or shoreline, dissipating stream energy and trapping sediment, and improving and/or maintaining water quality. These functions include: stream temperature moderation through shading, recruitment of non-woody organic matter, habitat for terrestrial insects and other riparian dependent species, streambank integrity, and filtration of contaminants from surface run-off into the stream.

Scenario Feature Measure: Acres of Riparian Herbaceous Cover

Scenario Unit: Acre

Scenario Typical Size: 0

Scenario Cost: $13,742.95 **Scenario Cost/Unit:** #Div/0!

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	1	$10.58
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	0.5	$10.15
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	5	$115.40
Materials						
Native Aquatic Plants, Emergent or Submerged	2336	Native aquatic emergent or submerged. All required materials for establishing vegetation. Includes material and shipping.	Each	$1.37	9680	$13,261.60
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 390 - Riparian Herbaceous Cover

Scenario: #3 - Combination Broadcast Seeding and Plug Planting

Scenario Description:

The riparian area is usually a narrow strip between the aquatic and terrestrial habitats subject to intermittant flooding and saturated soils where the exising plant community has been disturbed, destroyed, or the species diversity is unable to provide adequate habitat. Site adapted species of grasses, legumes, and/or forbs are planted by both broadcast and/or no-till or range drill seeding methods AND as plugs to ensure better species success. Seedbed preparation may require LIGHT TILLAGE (disking). Practuce applies in rangeland, pasture, cropland, and forest where natural seeding methods and/or management is unlikely to improve the plant community within a reasonable time period.

Practices that may facilitate the establishment of riparian herbaceous cover may include: Herbaceous Weed Control (315), Range Planting (550), Forage and Biomass Planting (512), Critical Area Planting (342), Filter Strip (393), Restoration and Management of Rare and Declining Habitats (643), Early Successional Habitat Dev. and Mgmt (647), Streambank and Shoreline Protection (580), Stream Habitat Improvement and Management (395), Acccess Control (472), Perscribed Grazing (528).

Resource Concerns include:Inadequate Habitat for Fish and Wildlife, Degraded Plant Condition, Soil Erosion, Water Quality Degradataion.

Before Situation:

The riparian zone vegetation is currently an undesirable or inadequate stand of perennial or annual vegetation as determined by the NRCS Stream Visual Assessment Protocol score of less than 5 for those elements. Natural reseeding or vegetation management is unlikely to improve the plant community within a reasonable amount of time. Existing vegetation does not provide adequate food, cover, and/or connectivity for riparian wildlife, and contributes insufficient amounts of organic matter for stream species food and cover. Riparian vegetation quality and/or quantity have been compromised by human activities and/or access of vehicles, people, and/or livestock to the extent that the riparian area and floodplain are not functioning to provide the necessary stream and riparian habitat components.

After Situation:

The riparian zone is established to an adapted, diverse vegetative plant community and is under close management to ensure long term survival and ecological succession. The quality and quantity of the riparian zone components are managed to support the species that depend on it for habitat as well as the functions it performs for stabilizing the streambank and/or shoreline, dissipating stream energy and trapping sediment, and improving and/or maintaining water quality. These functions include: stream temperature moderation through shading, recruitment of non-woody organic matter, habitat for terrestrial insects and other riparian dependent species, streambank integrity, and filtration of contaminants from surface run-off into the stream.

Scenario Feature Measure: Acres of Riparian Herbaceous Cover

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $13,911.27 **Scenario Cost/Unit:** $13,911.27

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.99	0.5	$6.00
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	1	$10.58
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	0.5	$10.15
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
One Species, Native Forb, Low Cost	2329	Native forb. Includes material and shipping only.	Acre	$186.18	0.5	$93.09
Native Aquatic Plants, Emergent or Submerged	2336	Native aquatic emergent or submerged. All required materials for establishing vegetation. Includes material and shipping.	Each	$1.37	9680	$13,261.60
Mobilization						

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 390 - Riparian Herbaceous Cover

Scenario: #4 - Pollinator Cover

Scenario Description:

A riparian area where the exising plant community has been disturbed, destroyed, or the species diversity is unable to provide adequate habitat. To improve habitat for pollinators, include 2-12 species that bloom sequentially during the growing season and ensure at least 2 species in bloom at any given time during the growing season. Site adapted species of grasses, legumes, and/or forbs are planted by both broadcast and/or no-till or range drill seeding methods and/or as plugs to ensure better species success. Seedbed preparation may require LIGHT TILLAGE (disking). Practuce applies in rangeland, pasture, cropland, and forest where natural seeding methods and/or management is unlikely to improve the plant community within a reasonable time period.

Practices that may facilitate the establishment of riparian herbaceous cover may include: Herbaceous Weed Control (315), Range Planting (550), Forage and Biomass Planting (512), Critical Area Planting (342), Filter Strip (393), Restoration and Management of Rare and Declining Habitats (643), Early Successional Habitat Dev. and Mgmt (647), Streambank and Shoreline Protection (580), Stream Habitat Improvement and Management (395), Acccess Control (472), Perscribed Grazing (528).

Resource Concerns include:Inadequate Habitat for Fish and Wildlife, Degraded Plant Condition, Soil Erosion, Water Quality Degradataion.

Before Situation:

The riparian zone vegetation is currently an undesirable or inadequate stand of perennial or annual vegetation as determined by the NRCS Stream Visual Assessment Protocol score of less than 5 for those elements. Natural reseeding or vegetation management is unlikely to improve the plant community within a reasonable amount of time. Existing vegetation does not provide adequate food, cover, and/or connectivity for riparian wildlife, and contributes insufficient amounts of organic matter for stream species food and cover, and is undesireable to pollinators. Riparian vegetation quality and/or quantity have been compromised by human activities and/or access of vehicles, people, and/or livestock to the extent that the riparian area and floodplain are not functioning to provide the necessary stream and riparian habitat components.

After Situation:

The riparian zone is established to an adapted, diverse vegetative plant community and is under close management to ensure long term survival and ecological succession. The quality and quantity of the riparian zone components are managed to support the species that depend on it for habitat as well as the functions it performs for stabilizing the streambank and/or shoreline, dissipating stream energy and trapping sediment, and improving and/or maintaining water quality. These functions include: stream temperature moderation through shading, recruitment of non-woody organic matter, habitat for terrestrial insects and other riparian dependent species, streambank integrity, and filtration of contaminants from surface run-off into the stream.

Scenario Feature Measure: Acre

Scenario Unit: Acre

Scenario Typical Size: 0

Scenario Cost: $1,312.77 **Scenario Cost/Unit:** #Div/0!

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	1	$10.58
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	0.5	$10.15
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	5	$115.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	2	$44.66
Materials						
Six Species Mix, Native Forb	2334	Native forb mix. Includes material and shipping only.	Acre	$986.62	0.5	$493.31
Three Species Mix, Native Forb	2333	Native forb mix. Includes material and shipping only.	Acre	$586.90	0.5	$293.45
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 390 - Riparian Herbaceous Cover

Scenario: #5 - Broadcast Seeting with Foregone Income

Scenario Description:

Use in habitats subject to intermittant flooding and saturated soils where the exising plant community has been disturbed, destroyed, or the species diversity is unable to provide adequate habitat. Area is removed from agricultural production. Site adapted species of grasses, legumes, and/or forbs are planted by broadcast and/or no-till or range drill seeding methods as necessary to accomplish the intended purpose(s). Seedbed preparation may require LIGHT TILLAGE (disking). Practuce applies in rangeland, pasture, cropland, and forest where natural seeding methods and/or management is unlikely to improve the plant community within a reasonable time period.
Practices that may facilitate the establishment of riparian herbaceous cover may include: Herbaceous Weed Control (315), Range Planting (550), Forage and Biomass Planting (512), Critical Area Planting (342), Filter Strip (393), Restoration and Management of Rare and Declining Habitats (643), Early Successional Habitat Dev. and Mgmt (647), Streambank and Shoreline Protection (580), Stream Habitat Improvement and Management (395), Acccess Control (472), Perscribed Grazing (528).
Resource Concerns include:Inadequate Habitat for Fish and Wildlife, Degraded Plant Condition, Soil Erosion, Water Quality Degradataion.

Before Situation:

The riparian zone vegetation is currently an undesirable or inadequate stand of perennial or annual vegetation as determined by the NRCS Stream Visual Assessment Protocol score of less than 5 for those elements. Natural reseeding or vegetation management is unlikely to improve the plant community within a reasonable amount of time. Existing vegetation does not provide adequate food, cover, and/or connectivity for riparian wildlife, and contributes insufficient amounts of organic matter for stream species food and cover. Riparian vegetation quality and/or quantity have been compromised by human activities and/or access of vehicles, people, and/or livestock to the extent that the riparian area and floodplain are not functioning to provide the necessary stream and riparian habitat components.

After Situation:

The riparian zone is established to an adapted, diverse vegetative plant community and is under close management to ensure long term survival and ecological succession. The quality and quantity of the riparian zone components are managed to support the species that depend on it for habitat as well as the functions it performs for stabilizing the streambank and/or shoreline, dissipating stream energy and trapping sediment, and improving and/or maintaining water quality. These functions include: stream temperature moderation through shading, recruitment of non-woody organic matter, habitat for terrestrial insects and other riparian dependent species, streambank integrity, and filtration of contaminants from surface run-off into the stream.

Scenario Feature Measure: Acres of Riparian Herbaceous Cover

Scenario Unit: Acre

Scenario Typical Size: 0

Scenario Cost: $1,100.06 **Scenario Cost/Unit:** #Div/0!

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.99	0.5	$6.00
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	1.5	$15.87
Foregone Income						
FI, Corn Irrigated	1960	Irrigated Corn is Primary Crop	Acre	$504.42	0.5	$252.21
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	2	$44.66
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	5	$115.40
Materials						
Six Species Mix, Native Forb	2334	Native forb mix. Includes material and shipping only.	Acre	$986.62	0.5	$493.31
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: 390 - Riparian Herbaceous Cover

Scenario: #6 - Plug Planting with Foregone income

Scenario Description:

Use in habitats subject to intermittant flooding and saturated soils where the exising plant community has been disturbed, destroyed, or the species diversity is unable to provide adequate habitat. Area is removed from agricultural production. Site adapted species of grasses, legumes, and/or forbs are planted as plugs to improve success. Seedbed preparation may require LIGHT TILLAGE (disking). Practuce applies in rangeland, pasture, cropland, and forest where natural seeding methods and/or management is unlikely to improve the plant community within a reasonable time period.

Practices that may facilitate the establishment of riparian herbaceous cover may include: Herbaceous Weed Control (315), Range Planting (550), Forage and Biomass Planting (512), Critical Area Planting (342), Filter Strip (393), Restoration and Management of Rare and Declining Habitats (643), Early Successional Habitat Dev. and Mgmt (647), Streambank and Shoreline Protection (580), Stream Habitat Improvement and Management (395), Acccess Control (472), Perscribed Grazing (528).

Resource Concerns include:Inadequate Habitat for Fish and Wildlife, Degraded Plant Condition, Soil Erosion, Water Quality Degradataion.

Before Situation:

The riparian zone vegetation is currently an undesirable or inadequate stand of perennial or annual vegetation as determined by the NRCS Stream Visual Assessment Protocol score of less than 5 for those elements. Natural reseeding or vegetation management is unlikely to improve the plant community within a reasonable amount of time. Existing vegetation does not provide adequate food, cover, and/or connectivity for riparian wildlife, and contributes insufficient amounts of organic matter for stream species food and cover. Riparian vegetation quality and/or quantity have been compromised by human activities and/or access of vehicles, people, and/or livestock to the extent that the riparian area and floodplain are not functioning to provide the necessary stream and riparian habitat components.

After Situation:

The riparian zone is established to an adapted, diverse vegetative plant community and is under close management to ensure long term survival and ecological succession. The quality and quantity of the riparian zone components are managed to support the species that depend on it for habitat as well as the functions it performs for stabilizing the streambank and/or shoreline, dissipating stream energy and trapping sediment, and improving and/or maintaining water quality. These functions include: stream temperature moderation through shading, recruitment of non-woody organic matter, habitat for terrestrial insects and other riparian dependent species, streambank integrity, and filtration of contaminants from surface run-off into the stream.

Scenario Feature Measure: Acres of Riparian Herbaceous Cover

Scenario Unit: Acre

Scenario Typical Size: 0

Scenario Cost: $13,995.16 **Scenario Cost/Unit:** #Div/0!

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	1	$10.58
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	0.5	$10.15
Foregone Income						
FI, Corn Irrigated	1960	Irrigated Corn is Primary Crop	Acre	$504.42	0.5	$252.21
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	5	$115.40
Materials						
Native Aquatic Plants, Emergent or Submerged	2336	Native aquatic emergent or submerged. All required materials for establishing vegetation. Includes material and shipping.	Each	$1.37	9680	$13,261.60
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 390 - Riparian Herbaceous Cover

Scenario: #7 - Combination Broadcast Seeding and Plug Planting with Foregone Income

Scenario Description:

Use in habitats subject to intermittant flooding and saturated soils where the exising plant community has been disturbed, destroyed, or the species diversity is unable to provide adequate habitat. Area is removed from agricultural production. Site adapted species of grasses, legumes, and/or forbs are planted by both broadcast and/or no-till or range drill seeding methods AND as plugs to ensure better species success. Seedbed preparation may require LIGHT TILLAGE (disking). Practuce applies in rangeland, pasture, cropland, and forest where natural seeding methods and/or management is unlikely to improve the plant community within a reasonable time period.
Practices that may facilitate the establishment of riparian herbaceous cover may include: Herbaceous Weed Control (315), Range Planting (550), Forage and Biomass Planting (512), Critical Area Planting (342), Filter Strip (393), Restoration and Management of Rare and Declining Habitats (643), Early Successional Habitat Dev. and Mgmt (647), Streambank and Shoreline Protection (580), Stream Habitat Improvement and Management (395), Acccess Control (472), Perscribed Grazing (528).
Resource Concerns include:Inadequate Habitat for Fish and Wildlife, Degraded Plant Condition, Soil Erosion, Water Quality Degradataion.

Before Situation:

The riparian zone vegetation is currently an undesirable or inadequate stand of perennial or annual vegetation as determined by the NRCS Stream Visual Assessment Protocol score of less than 5 for those elements. Natural reseeding or vegetation management is unlikely to improve the plant community within a reasonable amount of time. Existing vegetation does not provide adequate food, cover, and/or connectivity for riparian wildlife, and contributes insufficient amounts of organic matter for stream species food and cover. Riparian vegetation quality and/or quantity have been compromised by human activities and/or access of vehicles, people, and/or livestock to the extent that the riparian area and floodplain are not functioning to provide the necessary stream and riparian habitat components.

After Situation:

The riparian zone is established to an adapted, diverse vegetative plant community and is under close management to ensure long term survival and ecological succession. The quality and quantity of the riparian zone components are managed to support the species that depend on it for habitat as well as the functions it performs for stabilizing the streambank and/or shoreline, dissipating stream energy and trapping sediment, and improving and/or maintaining water quality. These functions include: stream temperature moderation through shading, recruitment of non-woody organic matter, habitat for terrestrial insects and other riparian dependent species, streambank integrity, and filtration of contaminants from surface run-off into the stream.

Scenario Feature Measure: Acres of Riparian Herbaceous Cover

Scenario Unit: Acre

Scenario Typical Size: 0

Scenario Cost: $7,402.79 **Scenario Cost/Unit:** #Div/0!

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	0.5	$5.29
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.99	0.25	$3.00
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	0.25	$5.07
Foregone Income						
FI, Corn Irrigated	1960	Irrigated Corn is Primary Crop	Acre	$504.42	0.5	$252.21
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	4	$92.32
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	1	$22.33
Materials						
Native Aquatic Plants, Emergent or Submerged	2336	Native aquatic emergent or submerged. All required materials for establishing vegetation. Includes material and shipping.	Each	$1.37	4840	$6,630.80

Materials

One Species, Native Forb, Low Cost	2329	Native forb. Includes material and shipping only.	Acre	$186.18	0.25	$46.55

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 390 - Riparian Herbaceous Cover

Scenario: #8 - Pollinator Cover with Foregone Income

Scenario Description:

A riparian area where the exising plant community has been disturbed, destroyed, or the species diversity is unable to provide adequate habitat. Area is removed from agricultural production. To improve habitat for pollinators, include 2-12 species that bloom sequentially during the growing season and ensure at least 2 species in bloom at any given time during the growing season. Site adapted species of grasses, legumes, and/or forbs are planted by both broadcast and/or no-till or range drill seeding methods and/or as plugs to ensure better species success. Seedbed preparation may require LIGHT TILLAGE (disking). Practuce applies in rangeland, pasture, cropland, and forest where natural seeding methods and/or management is unlikely to improve the plant community within a reasonable time period.
Practices that may facilitate the establishment of riparian herbaceous cover may include: Herbaceous Weed Control (315), Range Planting (550), Forage and Biomass Planting (512), Critical Area Planting (342), Filter Strip (393), Restoration and Management of Rare and Declining Habitats (643), Early Successional Habitat Dev. and Mgmt (647), Streambank and Shoreline Protection (580), Stream Habitat Improvement and Management (395), Acccess Control (472), Perscribed Grazing (528).
Resource Concerns include:Inadequate Habitat for Fish and Wildlife, Degraded Plant Condition, Soil Erosion, Water Quality Degradataion.

Before Situation:

The riparian zone vegetation is currently an undesirable or inadequate stand of perennial or annual vegetation as determined by the NRCS Stream Visual Assessment Protocol score of less than 5 for those elements. Natural reseeding or vegetation management is unlikely to improve the plant community within a reasonable amount of time. Existing vegetation does not provide adequate food, cover, and/or connectivity for riparian wildlife, and contributes insufficient amounts of organic matter for stream species food and cover, and is undesireable to pollinators. Riparian vegetation quality and/or quantity have been compromised by human activities and/or access of vehicles, people, and/or livestock to the extent that the riparian area and floodplain are not functioning to provide the necessary stream and riparian habitat components.

After Situation:

The riparian zone is established to an adapted, diverse vegetative plant community and is under close management to ensure long term survival and ecological succession. The quality and quantity of the riparian zone components are managed to support the species that depend on it for habitat as well as the functions it performs for stabilizing the streambank and/or shoreline, dissipating stream energy and trapping sediment, and improving and/or maintaining water quality. These functions include: stream temperature moderation through shading, recruitment of non-woody organic matter, habitat for terrestrial insects and other riparian dependent species, streambank integrity, and filtration of contaminants from surface run-off into the stream.

Scenario Feature Measure: Acre

Scenario Unit: Acre

Scenario Typical Size: 0

Scenario Cost: $1,541.90 **Scenario Cost/Unit:** #Div/0!

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	1	$10.58
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	0.5	$10.15
Foregone Income						
FI, Corn Irrigated	1960	Irrigated Corn is Primary Crop	Acre	$504.42	0.5	$252.21
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	4	$92.32
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	2	$44.66
Materials						
Six Species Mix, Native Forb	2334	Native forb mix. Includes material and shipping only.	Acre	$986.62	0.5	$493.31
Three Species Mix, Native Forb	2333	Native forb mix. Includes material and shipping only.	Acre	$586.90	0.5	$293.45
Mobilization						

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 391 - Riparian Forest Buffer

Scenario: #1 - Seeding

Scenario Description:

Establish a buffer of trees and/or shrubs to restore riparian plant communities and associated benefits. The buffer will be located adjacent to and up-gradient from a watercourse or water body extending a minimum of 35 feet wide. The planting will consist of trees or shrubs planted through direct seeding. Planting rate will be approximately 3000 seed per acre. Resource concerns to be addressed are Soil Erosion - excessive bank erosion; Water Quality - excess sediment and organics in surface waters and elevated temperature; Degraded Plant Condition - inadequate structure and composition; and Inadequate Habitat for Fish and Wildlife - habitat degradation.

Before Situation:

Typical sites include former riparian forests and habitat used for forage, cropland, speculation property, or other nonforest condition which contains undesirable amounts or types of vegetation. Active bank erosion is depositing sediment, nutrients and organics in the riparian area. Water temperature is high due to lack of shade. Habitat is not desirable for wildlife.

After Situation:

A buffer of trees and shrubs will be established along the riparian corridor which will provide stability, filtration, shade, and desirable habitat to address the above mentioned resource concerns.

Scenario Feature Measure: Area of planting

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $2,129.76 **Scenario Cost/Unit:** $212.98

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	8	$188.24
Mechanical nut planter	1601	Mechanical nut planter for direct seeding of trees and shrubs. Requires a pulling unit of either tractor or small dozer depending upon site conditions. Does not include labor.	Hour	$1.99	8	$15.92
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	12	$267.96
Materials						
Trees and shrubs, seed	1871	Tree or shrub seed, e.g., acorns, to establish trees. Includes materials and shipping only.	Pound	$4.67	300	$1,401.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: **391 - Riparian Forest Buffer**

Scenario: **#2 - Cuttings, Small to Medium**

Scenario Description:

Establish a buffer of trees and/or shrubs into a suitably prepared site to restore riparian plant communities and associated benefits. The buffer will be located adjacent to and up-gradient from a watercourse or water body extending a minimum of 35 feet wide. The planting will consist of tree and/or shrub live stakes (whips) planted by hand. The cuttings will be planted in a mosaic pattern while still dormant. Resource concerns to be addressed are Soil Erosion - excessive bank erosion; Water Quality - excess sediment and organics in surface waters and elevated temperature; Degraded Plant Condition - inadequate structure and composition; and Inadequate Habitat for Fish and Wildlife - habitat degradation.

Before Situation:

Typical sites include former riparian forests and habitat used for forage, cropland, speculation property, or other nonforest condition which contains undesirable amounts or types of vegetation. Active bank erosion is depositing sediment, nutrients and organics in the riparian area. Water temperature is high due to lack of shade. Habitat is not desirable for wildlife.

After Situation:

A buffer of trees and shrubs will be established along the riparian corridor which will provide stability, filtration, shade, and desirable habitat to address the above mentioned resource concerns.

Scenario Feature Measure: Area of planting

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $1,852.34 **Scenario Cost/Unit:** $1,852.34

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	4	$46.48
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	6	$223.86
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	8	$879.52
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	16	$369.28
Materials						
Cuttings, woody, medium size	1308	Woody cuttings, live stakes or whips typically 1/4" to 1" diameter and 24" to 48" long. Includes materials and shipping only.	Each	$0.49	680	$333.20

Practice: 391 - Riparian Forest Buffer

Scenario: #3 - Cuttings, Medium to Large

Scenario Description:

Establish a buffer of trees and/or shrubs into a suitably prepared site to restore riparian plant communities and associated benefits. The buffer will be located adjacent to and up-gradient from a watercourse or water body extending a minimum of 35 feet wide. The planting will consist of tree and/or shrub poles and live stakes (whips) planted by hand. The ratio of whips to poles will be 5:1. The cuttings will be planted in a mosaic pattern while still dormant. Tree mesh will be placed on the large cuttings. Resource concerns to be addressed are Soil Erosion - excessive bank erosion; Water Quality - excess sediment and organics in surface waters and elevated temperature; Degraded Plant Condition - inadequate structure and composition; and Inadequate Habitat for Fish and Wildlife - habitat degradation.

Before Situation:

Typical sites include former riparian forests and habitat used for forage, cropland, speculation property, or other nonforest condition which contains undesirable amounts or types of vegetation. Active bank erosion is depositing sediment, nutrients and organics in the riparian area. Water temperature is high due to lack of shade. Habitat is not desirable for wildlife.

After Situation:

A buffer of trees and shrubs will be established along the riparian corridor which will provide stability, filtration, shade, and desirable habitat to address the above mentioned resource concerns.

Scenario Feature Measure: Area of planting

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $4,755.37 **Scenario Cost/Unit:** $4,755.37

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	12	$447.72
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	4	$46.48
Trailer, flatbed, small	1505	Small flatbed trailer (typically less than 30' in length) pulled by a pickup to transport materials and equipment. Truck not included.	Hour	$6.52	8	$52.16
Tractor, agricultural, 30 HP	1501	Agricultural tractor with horsepower range of less than 50. Equipment and power unit costs. Labor not included.	Hour	$8.87	4.5	$39.92
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	4	$123.00
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$56.21	3.5	$196.74
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.39	4.5	$37.76
Water tank, portable	1602	Portable water tank transported in a pick up truck. Typically with 200 gallon capacity includes tank with pump, hose and sprayer. Does not include the pickup truck. Equipment only.	Hour	$2.59	3.5	$9.07
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	10	$1,099.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	8	$178.64
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	32	$738.56

Materials

Tree shelter, mesh tree tube, 48"	1556	48" tall vexar or other open weave tubular tree shelter to protect from animal damage. Materials only.	Each	$1.08	50	$54.00
Cuttings, woody, medium size	1308	Woody cuttings, live stakes or whips typically 1/4" to 1" diameter and 24" to 48" long. Includes materials and shipping only.	Each	$0.49	250	$122.50
Cuttings, woody, large size	1309	Woody pole cuttings or posts 2" to 6" in diameter and 6' long. Includes materials and shipping only.	Each	$18.38	50	$919.00

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	4	$690.44

Practice: 391 - Riparian Forest Buffer

Scenario: #4 - Bare-root, hand planted

Scenario Description:

Establish a buffer of trees and/or shrubs into a suitably prepared site to restore riparian plant communities and associated benefits. The buffer will be located adjacent to and up-gradient from a watercourse or water body extending a minimum of 35 feet wide. The planting will consist of hand planted bare-root shrubs, evergreen, and deciduous trees. One third of the area will be planted to each woody plant type. Planting for shrubs will be done at 6' x 6' spacing, evergreen tree spacing will be 12' x 15' and deciduous tree spacing at 15' x 15'.
Tree shelters will be placed on the hardwoods and evergreens. Resource concerns to be addressed are Soil Erosion - excessive bank erosion; Water Quality - excess sediment and organics in surface waters and elevated temperature; Degraded Plant Condition - inadequate structure and composition; and Inadequate Habitat for Fish and Wildlife - habitat degradation. Associated Practices may include Site Preparation or Mulching.

Before Situation:

Typical sites include former riparian forests and habitat used for forage, cropland, speculation property, or other nonforest condition which contains undesirable amounts or types of vegetation. Active bank erosion is depositing sediment, nutrients and organics in the riparian area. Water temperature is high due to lack of shade. Habitat is not desirable for wildlife.

After Situation:

A buffer of trees and shrubs will be established along the riparian corridor which will provide stability, filtration, shade, and desirable habitat to address the above mentioned resource concerns.

Scenario Feature Measure: Area of planting

Scenario Unit: Acre

Scenario Typical Size: 3

Scenario Cost: $4,700.68 **Scenario Cost/Unit:** $1,566.89

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trailer, enclosed, small	1503	Small enclosed trailer (typically less than 30' in length) pulled by a pickup to transport materials and equipment. Truck not included.	Hour	$4.04	8	$32.32
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	8	$246.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	8	$298.48
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	32	$371.84
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	50	$1,154.00
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	10	$412.30
Materials						
Shrub, seedling or transplant, bare root, 18"-36"	1507	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.58	1210	$701.80
Tree, hardwood, seedling or transplant, bare root, 16-36"	1510	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.86	194	$166.84
Tree, conifer, seedling, bare root, 1-1	1513	Bare root conifer trees, 1-1 (2 years old). Includes materials and shipping only.	Each	$0.47	242	$113.74
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.17	436	$946.12
Stakes, wood, 1" x 1" x 36"	1577	1" x 1" x 36" wood stakes to fasten items in place. Includes materials only.	Each	$0.59	436	$257.24

Practice: 391 - Riparian Forest Buffer

Scenario: #5 - Bare-root, machine planted

Scenario Description:

Establish a buffer of trees and/or shrubs into a suitably prepared site to restore riparian plant communities and associated benefits. The buffer will be located adjacent to and up-gradient from a watercourse or water body extending a minimum of 35 feet wide. The planting will consist of machine planted bare-root shrubs, evergreen, and deciduous trees. One third of the area will be planted to each woody plant type. Planting for shrubs will be done at 6' x 6' spacing, evergreen tree spacing will be 12' x 15' and deciduous tree spacing at 15' x 15'. Tree shelters will be placed on the hardwoods and evergreens. Resource concerns to be addressed are Soil Erosion - excessive bank erosion; Water Quality - excess sediment and organics in surface waters and elevated temperature; Degraded Plant Condition - inadequate structure and composition; and Inadequate Habitat for Fish and Wildlife - habitat degradation.

Before Situation:

Typical sites include former riparian forests and habitat used for forage, cropland, speculation property, or other nonforest condition which contains undesirable amounts or types of vegetation. Active bank erosion is depositing sediment, nutrients and organics in the riparian area. Water temperature is high due to lack of shade. Habitat is not desirable for wildlife.

After Situation:

A buffer of trees and shrubs will be established along the riparian corridor which will provide stability, filtration, shade, and desirable habitat to address the above mentioned resource concerns.

Scenario Feature Measure: Area of planting

Scenario Unit: Acre

Scenario Typical Size: 3

Scenario Cost: $4,346.00 **Scenario Cost/Unit:** $1,448.67

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	8	$188.24
Mechanical tree planter	1600	Mechanical tree planter. Requires a pulling unit of either tractor or small dozer depending upon site conditions. Does not include labor.	Hour	$6.60	8	$52.80
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	8	$246.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	30	$692.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	10	$223.30
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	10	$412.30
Materials						
Tree, conifer, seedling, bare root, 1-1	1513	Bare root conifer trees, 1-1 (2 years old). Includes materials and shipping only.	Each	$0.47	242	$113.74
Shrub, seedling or transplant, bare root, 18"-36"	1507	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.58	1210	$701.80
Stakes, wood, 1" x 1" x 36"	1577	1" x 1" x 36" wood stakes to fasten items in place. Includes materials only.	Each	$0.59	436	$257.24
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.17	436	$946.12
Tree, hardwood, seedling or transplant, bare root, 16-36"	1510	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.86	194	$166.84
Mobilization						

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 391 - Riparian Forest Buffer

Scenario: #6 - Small container, hand planted

Scenario Description:

Establish a buffer of trees and/or shrubs into a suitably prepared site to restore riparian plant communities and associated benefits. The buffer will be located adjacent to and up-gradient from a watercourse or water body extending a minimum of 35 feet wide. The planting will consist of hand planted small containerized shrubs, evergreen, and deciduous trees. One third of the area will be planted to each woody plant type. Planting for shrubs will be done at 8' x 8' spacing, evergreen tree spacing will be 12' x 15' and deciduous tree spacing at 15' x 15'. Tree shelters wil be placed on the hardwoods and evergreens. Resource concerns to be addressed are Soil Erosion - excessive bank erosion; Water Quality - excess sediment and organics in surface waters and elevated temperature; Degraded Plant Condition - inadequate structure and composition; and Inadequate Habitat for Fish and Wildlife - habitat degradation.

Before Situation:

Typical sites include former riparian forests and habitat used for forage, cropland, speculation property, or other nonforest condition which contains undesirable amounts or types of vegetation. Active bank erosion is depositing sediment, nutrients and organics in the riparian area. Water temperature is high due to lack of shade. Habitat is not desirable for wildlife.

After Situation:

A buffer of trees and shrubs will be established along the riparian corridor which will provide stability, filtration, shade, and desirable habitat to address the above mentioned resource concerns.

Scenario Feature Measure: Area of planting

Scenario Unit: Acre

Scenario Typical Size: 3

Scenario Cost: $8,270.13 **Scenario Cost/Unit:** $2,756.71

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	30	$348.60
Trailer, enclosed, small	1503	Small enclosed trailer (typically less than 30' in length) pulled by a pickup to transport materials and equipment. Truck not included.	Hour	$4.04	8	$32.32
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	8	$246.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	16	$596.96
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	10	$412.30
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	50	$1,154.00
Materials						
Tree, hardwood, seedling or transplant, potted, 1 qt.	1529	Potted hardwood tree, 1 quart. Includes materials and shipping only.	Each	$3.20	194	$620.80
Stakes, wood, 1" x 1" x 48"	1578	1" x 1" x 48" wood stakes to fasten items in place. Includes materials only.	Each	$2.02	436	$880.72
Tree, conifer, seedling or transplant, potted, 1 qt.	1534	Potted conifer tree, 1 quart. Includes materials and shipping only.	Each	$3.05	242	$738.10
Shrub, seedling or transplant, potted, 1 qt.	1524	Potted shrub, 1 quart. Includes materials and shipping only.	Each	$3.12	680	$2,121.60
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.17	436	$946.12
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: 391 - Riparian Forest Buffer

Scenario: #7 - Small container, machine planted

Scenario Description:

Establish a buffer of trees and/or shrubs into a suitably prepared site to restore riparian plant communities and associated benefits. The buffer will be located adjacent to and up-gradient from a watercourse or water body extending a minimum of 35 feet wide. The planting will consist of machine planted small containerized shrubs, evergreen, and deciduous trees. One third of the area will be planted to each woody plant type. Planting for shrubs will be done at 8' x 8' spacing, evergreen tree spacing will be 12' x 15' and deciduous tree spacing at 15' x 15'. Tree shelters wil be placed on the hardwoods and evergreens. Resource concerns to be addressed are Soil Erosion - excessive bank erosion; Water Quality - excess sediment and organics in surface waters and elevated temperature; Degraded Plant Condition - inadequate structure and composition; and Inadequate Habitat for Fish and Wildlife - habitat degradation.

Before Situation:

Typical sites include former riparian forests and habitat used for forage, cropland, speculation property, or other nonforest condition which contains undesirable amounts or types of vegetation. Active bank erosion is depositing sediment, nutrients and organics in the riparian area. Water temperature is high due to lack of shade. Habitat is not desirable for wildlife.

After Situation:

A buffer of trees and shrubs will be established along the riparian corridor which will provide stability, filtration, shade, and desirable habitat to address the above mentioned resource concerns.

Scenario Feature Measure: Area of planting

Scenario Unit: Acre

Scenario Typical Size: 3

Scenario Cost: $7,085.72 **Scenario Cost/Unit:** $2,361.91

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	8	$246.00
Mechanical tree planter	1600	Mechanical tree planter. Requires a pulling unit of either tractor or small dozer depending upon site conditions. Does not include labor.	Hour	$6.60	6	$39.60
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	6	$141.18
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	10	$412.30
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	18	$415.44
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	8	$178.64
Materials						
Tree, conifer, seedling or transplant, potted, 1 qt.	1534	Potted conifer tree, 1 quart. Includes materials and shipping only.	Each	$3.05	242	$738.10
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.17	436	$946.12
Stakes, wood, 1" x 1" x 48"	1578	1" x 1" x 48" wood stakes to fasten items in place. Includes materials only.	Each	$2.02	436	$880.72
Shrub, seedling or transplant, potted, 1 qt.	1524	Potted shrub, 1 quart. Includes materials and shipping only.	Each	$3.12	680	$2,121.60
Tree, hardwood, seedling or transplant, potted, 1 qt.	1529	Potted hardwood tree, 1 quart. Includes materials and shipping only.	Each	$3.20	194	$620.80
Mobilization						

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 391 - Riparian Forest Buffer

Scenario: #8 - Large container, hand planted

Scenario Description:

Establish a buffer of trees and/or shrubs into a suitably prepared site to restore riparian plant communities and associated benefits. The buffer will be located adjacent to and up-gradient from a watercourse or water body extending a minimum of 35 feet wide. The planting will consist of hand planted large containerized shrubs, evergreen, and deciduous trees. One half of the area will be planted to each tree type, hardwoods and conifers, at a spacing of 24' x 24'. Planting for shrubs will be done at 12' x 12' spacing in between the trees. Tree shelters wil be placed on the hardwoods and conifers. Resource concerns to be addressed are Soil Erosion - excessive bank erosion; Water Quality - excess sediment and organics in surface waters and elevated temperature; Degraded Plant Condition - inadequate structure and composition; and Inadequate Habitat for Fish and Wildlife - habitat degradation. Associated practices may include Site Preparation, Mulching, Irrigation, and Conservation Cover as needed.

Before Situation:

Typical sites include former riparian forests and habitat used for forage, cropland, speculation property, or other nonforest condition which contains undesirable amounts or types of vegetation. Active bank erosion is depositing sediment, nutrients and organics in the riparian area. Water temperature is high due to lack of shade. Habitat is not desirable for wildlife.

After Situation:

A buffer of trees and shrubs will be established along the riparian corridor which will provide stability, filtration, shade, and desirable habitat to address the above mentioned resource concerns.

Scenario Feature Measure: Area of planting

Scenario Unit: Acre

Scenario Typical Size: 3

Scenario Cost: $18,859.65 **Scenario Cost/Unit:** $6,286.55

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	16	$492.00
Trailer, flatbed, small	1505	Small flatbed trailer (typically less than 30' in length) pulled by a pickup to transport materials and equipment. Truck not included.	Hour	$6.52	16	$104.32
Trailer, enclosed, small	1503	Small enclosed trailer (typically less than 30' in length) pulled by a pickup to transport materials and equipment. Truck not included.	Hour	$4.04	16	$64.64
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	16	$693.12
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	32	$1,193.92
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	90	$1,045.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	194	$4,477.52
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	20	$446.60
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	20	$824.60
Materials						
Tree, hardwood, seedling or transplant, potted or B&B, 2-3 gal.	1532	Potted or balled and burlapped hardwood tree, 2-3 gal. Includes materials and shipping only.	Each	$7.41	112	$829.92
Tree shelter, solid tube type, 4" x 48"	1566	4" x 48" tree tube for protection from animal damage. Materials only.	Each	$4.10	225	$922.50

Materials

Stakes, wood, 3/4" x 3/4" x 60"	1583	3/4" x 3/4" x 60" wood stakes to fasten items in place. Includes materials only.	Each	$1.56	225	$351.00
Shrub, seedling or transplant, potted or B&B, 2-3 gal.	1527	Potted or balled and burlapped shrub, 2-3 gal. Includes materials and shipping only.	Each	$9.21	680	$6,262.80
Tree, conifer, seedling or transplant, potted or B&B, 2-3 gal.	1537	Potted or balled and burlapped conifer tree, 2-3 gal. Includes materials and shipping only.	Each	$7.13	113	$805.69

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 393 - Filter Strip

Scenario: #1 - Non-Native Species

Scenario Description:

A strip or area of native herbaceous vegetation situated between cropland, grazing land or disturbed land and sensitive areas using a mixture of Non-Native species. Practice includes seed, seedbed prep, and planting. Resource concern addressed is water quality.

Before Situation:

Cropland, grazing land, or disturbed land (including forestland) allows for runoff of suspended solids, dissolved and/or associated contaminants into environmentally-sensitive areas such as wetlands, riparian zones, critical habitat and neighboring non-ag properties. Water Quality resource concerns are associated with this practice.

After Situation:

The planned filter strip will be established and mainatined per the practice plan that will meet the criteria for the planned purpose(s). The vegetation will consist of non-native species. The filter strip will have adequate width to filter the planned pollutants. The practice includes seedbed preparation, seeding, and operation and maintenance to maintain the vegetation and the function of the filter strip. Species selected shall be able to withstand partial burial by sediment and tolerant of herbicides used on contribution area while protecting environmentally-sensitive areas.

Scenario Feature Measure: Number of Acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $149.79 **Scenario Cost/Unit:** $149.79

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	2	$21.16
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	1	$15.77
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	2	$11.66
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	1	$20.29
Materials						
Four Species Mix, Cool Season, Introduced Perennial (2 grasses, 2 legumes)	2317	Cool season grass and legume mix. Includes material and shipping only.	Acre	$49.65	1	$49.65
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	2	$31.26

Practice: 393 - Filter Strip

Scenario: #2 - Non-Native Species, Foregone Income

Scenario Description:

A strip or area of native herbaceous vegetation situated between cropland, grazing land or disturbed land and sensitive areas using a mixture of Non-Native species. Practice includes seed, seedbed prep, and planting. Resource concern addressed is water quality. Use this scenario only when all land the land planted to a filter strip is current crop land taken out of production.

Before Situation:

Cropland, grazing land, or disturbed land (including forestland) allows for runoff of suspended solids, dissolved and/or associated contaminants into environmentally-sensitive areas such as wetlands, riparian zones, critical habitat and neighboring non-ag properties. Water Quality resource concerns are associated with this practice.

After Situation:

The planned filter strip will be established and mainatined per the practice plan that will meet the criteria for the planned purpose(s). The vegetation will consist of non-native species. The filter strip will have adequate width to filter the planned pollutants. The practice includes seedbed preparation, seeding, and operation and maintenance to maintain the vegetation and the function of the filter strip. Species selected shall be able to withstand partial burial by sediment and tolerant of herbicides used on contribution area while protecting environmentally-sensitive areas. Use this scenario only when all land planted to a filter strip is current crop land taken out of production.

Scenario Feature Measure: Number of Acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $320.42 **Scenario Cost/Unit:** $320.42

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	1	$15.77
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	2	$21.16
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	2	$11.66
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	1	$20.29
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$170.63	1	$170.63
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	2	$31.26
Four Species Mix, Cool Season, Introduced Perennial (2 grasses, 2 legumes)	2317	Cool season grass and legume mix. Includes material and shipping only.	Acre	$49.65	1	$49.65

Practice: 393 - Filter Strip

Scenario: #3 - Native Species

Scenario Description:

A strip or area of native herbaceous vegetation situated between cropland, grazing land or disturbed land and sensitive areas using a mixture of Native species. Practice includes seed, seedbed prep, and planting. Resource concern addressed is water quality.

Before Situation:

Cropland, grazing land, or disturbed land (including forestland) allows for runoff of suspended solids, dissolved and/or associated contaminants into environmentally-sensitive areas such as wetlands, riparian zones, critical habitat and neighboring non-ag properties. Water Quality resource concerns are associated with this practice.

After Situation:

The planned filter strip will be established and mainatined per the practice plan that will meet the criteria for the planned purpose(s). The vegetation will consist of native species. The filter strip will have adequate width to filter the planned pollutants. The practice includes seedbed preparation, seeding, and operation and maintenance to maintain the vegetation and the function of the filter strip. Species selected shall be able to withstand partial burial by sediment and tolerant of herbicides used on contribution area while protecting environmentally-sensitive areas.

Scenario Feature Measure: Number of Acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $194.71 **Scenario Cost/Unit:** $194.71

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	2	$21.16
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	2	$11.66
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	1	$20.29
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	1	$15.77
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	2	$31.26
Two Species Mix, Warm Season, Native Perennial Grass	2325	Native, warm season perennial grass. Includes material and shipping only.	Acre	$94.57	1	$94.57

Practice: 393 - Filter Strip

Scenario: #4 - Native Species, Foregone Income

Scenario Description:

A strip or area of native herbaceous vegetation situated between cropland, grazing land or disturbed land and sensitive areas using a mixture of Native species. Practice includes seed, seedbed prep, and planting. Resource concern addressed is water quality. The area of the filter strip, typically irrigated cropland, is taken out of production.

Before Situation:

Cropland, grazing land, or disturbed land (including forestland) allows for runoff of suspended solids, dissolved and/or associated contaminants into environmentally-sensitive areas such as wetlands, riparian zones, critical habitat and neighboring non-ag properties. Water Quality resource concerns are associated with this practice.

After Situation:

The planned filter strip will be established and mainatined per the practice plan that will meet the criteria for the planned purpose(s). The vegetation will consist of native species. The filter strip will have adequate width to filter the planned pollutants. The practice includes seedbed preparation, seeding, and operation and maintenance to maintain the vegetation and the function of the filter strip. Species selected shall be able to withstand partial burial by sediment and tolerant of herbicides used on contribution area while protecting environmentally-sensitive areas. Use this scenario only when all land planted to a filter strip is current crop land taken out of production.

Scenario Feature Measure: Number of Acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $365.34 **Scenario Cost/Unit:** $365.34

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	2	$21.16
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	1	$15.77
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	2	$11.66
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	1	$20.29
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$170.63	1	$170.63
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	2	$31.26
Two Species Mix, Warm Season, Native Perennial Grass	2325	Native, warm season perennial grass. Includes material and shipping only.	Acre	$94.57	1	$94.57

Practice: 393 - Filter Strip

Scenario: #5 - Organic Non-Native Seed

Scenario Description:

A strip or area of native herbaceous vegetation situated between cropland, grazing land or disturbed land and sensitive areas using a mixture of Non-Native species. Practice includes seed, seedbed prep, and planting. A high seeding rate is used in areas of higher precipitation or on irrigated fields where moisture or other site conditions are not limiting. The high rate is typically in the vicinity of 30 lb/acre PLS (Pure Live Seed). Higher seeding rates account for seed losses to causes such as increased density of predators or moisture conditions which may cause seed to rot before sprouting. Since moisture is not limiting, a higher density of desireable seedlings also offers greater competition to weed seedlings without significant adverse effects to the planted species. Certified organic seed must be used.

Before Situation:

Cropland, grazing land, or disturbed land (including forestland) allows for runoff of suspended solids, dissolved and/or associated contaminants into environmentally-sensitive areas such as wetlands, riparian zones, critical habitat and neighboring non-ag properties. Water Quality resource concerns are associated with this practice.

After Situation:

The planned filter strip will be established and mainatined per the practice plan that will meet the criteria for the planned purpose(s). The vegetation will consist of non-native species. The filter strip will have adequate width to filter the planned pollutants. The practice includes seedbed preparation, seeding, and operation and maintenance to maintain the vegetation and the function of the filter strip. Species selected shall be able to withstand partial burial by sediment and tolerant of herbicides used on contribution area while protecting environmentally-sensitive areas.

Scenario Feature Measure: Number of Acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $179.54 **Scenario Cost/Unit:** $179.54

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	1	$20.29
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	3	$47.31
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	4	$42.32
Materials						
Certified Organic, Three Species Mix, Cool Season, Perennial Grasses and Legumes	2340	Certified organic cool season perennial grass and legume mix. Includes material and shipping only.	Acre	$69.62	1	$69.62

Practice: 393 - Filter Strip

Scenario: #6 - Organic Non-Native Seed, Foregone Income

Scenario Description:

A strip or area of native herbaceous vegetation situated between cropland, grazing land or disturbed land and sensitive areas using a mixture of Non-Native species. Practice includes seed, seedbed prep, and planting. A high seeding rate is used in areas of higher precipitation or on irrigated fields where moisture or other site conditions are not limiting. The high rate is typically in the vicinity of 30 lb/acre PLS (Pure Live Seed). Higher seeding rates account for seed losses to causes such as increased density of predators or moisture conditions which may cause seed to rot before sprouting. Since moisture is not limiting, a higher density of desireable seedlings also offers greater competition to weed seedlings without significant adverse effects to the planted species. The area of the filter strip is taken out of production.

Before Situation:

Cropland, grazing land, or disturbed land (including forestland) allows for runoff of suspended solids, dissolved and/or associated contaminants into environmentally-sensitive areas such as wetlands, riparian zones, critical habitat and neighboring non-ag properties. Water Quality resource concerns are associated with this practice.

After Situation:

The planned filter strip will be established and mainatined per the practice plan that will meet the criteria for the planned purpose(s). The vegetation will consist of non-native species. The filter strip will have adequate width to filter the planned pollutants. The practice includes seedbed preparation, seeding, and operation and maintenance to maintain the vegetation and the function of the filter strip. Species selected shall be able to withstand partial burial by sediment and tolerant of herbicides used on contribution area while protecting environmentally-sensitive areas. Use this scenario only when all land planted to a filter strip is current crop land taken out of production.

Scenario Feature Measure: Number of Acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $380.40 **Scenario Cost/Unit:** $380.40

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	3	$47.31
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	1	$20.29
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	4	$42.32
Foregone Income						
FI, Organic, Wheat Dryland	2236	Organic Dryland Wheat is Primary Crop	Acre	$200.86	1	$200.86
Materials						
Certified Organic, Three Species Mix, Cool Season, Perennial Grasses and Legumes	2340	Certified organic cool season perennial grass and legume mix. Includes material and shipping only.	Acre	$69.62	1	$69.62

Practice: 393 - Filter Strip

Scenario: #7 - Non-Native Seed, Land Shaping & Foregone Income

Scenario Description:

A strip or area of native herbaceous vegetation situated between cropland, grazing land or disturbed land and sensitive areas using a mixture of Non-Native species. Practice includes seed, seedbed prep, and planting. A high seeding rate is used in areas of higher precipitation or on irrigated fields where moisture or other site conditions are not limiting. The high rate is typically in the vicinity of 30 lb/acre PLS (Pure Live Seed). Higher seeding rates account for seed losses to causes such as increased density of predators or moisture conditions which may cause seed to rot before sprouting. Since moisture is not limiting, a higher density of desireable seedlings also offers greater competition to weed seedlings without significant adverse effects to the planted species. The area of the filter strip is taken out of production. The area needs land shaping in order to meet design criteria for the practice.

Before Situation:

Cropland, grazing land, or disturbed land (including forestland) allows for runoff of suspended solids, dissolved and/or associated contaminants into environmentally-sensitive areas such as wetlands, riparian zones, critical habitat and neighboring non-ag properties. Water Quality resource concerns are associated with this practice.

After Situation:

The planned filter strip will be established and mainatined per the practice plan that will meet the criteria for the planned purpose(s). The vegetation will consist of non-native species. The filter strip will have adequate width to filter the planned pollutants. The practice includes seedbed preparation, seeding, and operation and maintenance to maintain the vegetation and the function of the filter strip. Species selected shall be able to withstand partial burial by sediment and tolerant of herbicides used on contribution area while protecting environmentally-sensitive areas. The area of the filter strip is taken out of production. The area had land shaping in order to meet design criteria for the practice.

Scenario Feature Measure: Number of acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $515.51 **Scenario Cost/Unit:** $515.51

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	1	$5.83
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	1	$20.29
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	2	$21.16
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	4	$269.80
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	4	$150.08
Materials						
One Species, Cool Season, Introduced Perennial Grass	2313	Introduced, cool season perennial grass. Includes material and shipping only.	Acre	$32.72	1	$32.72
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	1	$15.63

Practice: 393 - Filter Strip

Scenario: #8 - Native Seed w/ Land Shaping & Foregone Income

Scenario Description:

A strip or area of native herbaceous vegetation situated between cropland, grazing land or disturbed land and sensitive areas using a mixture of Native species. The area of the field border is taken out of production. Practice includes seed, seedbed prep, and planting. A high seeding rate is used in areas of higher precipitation or on irrigated fields where moisture or other site conditions are not limiting. The high rate is typically in the vicinity of 16 lb/acre PLS (Pure Live Seed). Higher seeding rates account for seed losses to causes such as increased density of predators or moisture conditions which may cause seed to rot before sprouting. Since moisture is not limiting, a higher density of desireable seedlings also offers greater competition to weed seedlings without significant adverse effects to the planted species. The area of the filter strip is taken out of production. The area needs land shaping in order to meet design criteria for the practice.

Before Situation:

Cropland, grazing land, or disturbed land (including forestland) allows for runoff of suspended solids, dissolved and/or associated contaminants into environmentally-sensitive areas such as wetlands, riparian zones, critical habitat and neighboring non-ag properties. Water Quality resource concerns are associated with this practice.

After Situation:

The planned filter strip will be established and mainatined per the practice plan that will meet the criteria for the planned purpose(s). The vegetation will consist of non-native species. The filter strip will have adequate width to filter the planned pollutants. The practice includes seedbed preparation, seeding, and operation and maintenance to maintain the vegetation and the function of the filter strip. Species selected shall be able to withstand partial burial by sediment and tolerant of herbicides used on contribution area while protecting environmentally-sensitive areas. The area of the filter strip is taken out of production. The area had land shaping in order to meet design criteria for the practice.

Scenario Feature Measure: Number of acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $577.36 **Scenario Cost/Unit:** $577.36

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	4	$269.80
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	2	$21.16
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	1	$5.83
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	1	$20.29
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	4	$150.08
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	1	$15.63
Two Species Mix, Warm Season, Native Perennial Grass	2325	Native, warm season perennial grass. Includes material and shipping only.	Acre	$94.57	1	$94.57

Practice: 394 - Firebreak

Scenario: #1 - Constructed, Light Equipment

Scenario Description:

Installation of a bare-ground firebreak of a minimum width of 15' around a 20 acre field/farm using farm equipment (2 passes). Generally water control devices such as water bars are not needed due either to the lack of steep terrain or the temporary nature of the firebreak. Resource concerns include: Wildfire hazard from excessive biomass accumulation, Undesirable plant productivity and health, Inadequate plant structure and composition, and Habitat degradation.

Before Situation:

Tract, field, or farm lacks adequate firebreaks to either reduce the spread of wildfires or contain a prescribed burn. Installation will be accomplished by making two passes with the use of typical farm equipment such as tractors, plows, disks, or similar implements.

After Situation:

The property is adequately protected from wildfire or can be safely prescribe burned.
20 ac field is 660' x 1320'. Perimeter of about 3960'. Round to 4000'

Scenario Feature Measure: Length of firebreak

Scenario Unit: Feet

Scenario Typical Size: 4,000

Scenario Cost: $173.48 **Scenario Cost/Unit:** $0.04

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	2	$21.16
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	2	$31.54
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	2	$46.16

Practice: 394 - Firebreak

Scenario: #2 - Constructed, Medium equipment, Flat-medium slopes

Scenario Description:

Use of medium equipment such as small dozers to blade, disk, plow, etc. bare-soil firebreaks on slopes less than 15%. Generally, water control devices such as water bars are limited to 10 or less per 1,000 feet when properly planned and installed using the same equipment. Resource concerns include: Wildfire hazards from excessive biomass accumulation, Undesirable plant productivity and health, Inadequate plant structure and composition, and Habitat degradation.

Before Situation:

Tract, field, or farm lacks adequate firebreaks to either reduce the spread of wildfires or contain a prescribed burn. Conditions such as topography, the presence of brush and trees, etc. make the use of typical farm equipment impractical.

After Situation:

The property is adequately protected from wildfire or can be safely prescribe burned and the potential for excessive erosion from the firebreak is negligible.

Scenario Feature Measure: Length of firebreak

Scenario Unit: Feet

Scenario Typical Size: 3,000

Scenario Cost: $1,179.04 **Scenario Cost/Unit:** $0.39

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	4	$269.80
Water Bars	1500	Installation of graded trail water controlling structures such as water bars, broad based dips for erosion control. Typical cross section is 1.5 feet high with 4:1 side slopes yielding about 0.33 CY/ft of length.	Foot	$3.10	150	$465.00
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	5	$187.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 394 - Firebreak

Scenario: #3 - Constructed, Medium equipment, Steep slopes

Scenario Description:

Use of equipment such as small dozers to blade bare-soil firebreaks on slopes greater than 15%. Water control devices such as water bars placed at approximately 15 to 25 per 1,000 ft section of firebreak, are necessary to control erosion. These will be installed with the same equipment. Resource concerns include: Wildfire hazard from excessive biomass accumulation, Undesirable plant productivity and health, Inadequate plant structure and composition, Habitat degradation, Soil erosion, and Excessive sediment in surface waters.

Before Situation:

Tract, field, or farm lacks adequate firebreaks to either reduce the spread of wildfires or contain a prescribed burn. Conditions such as topography, the presence of brush and trees, etc. make the use of typical farm equipment impractical. As slopes increase, the potential for excessive erosion increases from soil disturbances. Therefore the installation of water control devices such as water bars will be important in protecting the resource base.

After Situation:

The property is adequately protected from wildfire or can be safely prescribe burned and the potential for excessive erosion from the firebreak is minimized.

Scenario Feature Measure: Length of firebreak

Scenario Unit: Feet

Scenario Typical Size: 1,000

Scenario Cost: $2,031.54 **Scenario Cost/Unit:** $2.03

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	4	$269.80
Water Bars	1500	Installation of graded trail water controlling structures such as water bars, broad based dips for erosion control. Typical cross section is 1.5 feet high with 4:1 side slopes yielding about 0.33 CY/ft of length.	Foot	$3.10	425	$1,317.50
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	5	$187.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 394 - Firebreak

Scenario: #4 - Constructed, Wide, Bladed or disked

Scenario Description:

Installing a bare-ground firebreak with a width of 30' or more on gently to strongly sloping slopes with equipment such as a dozer with a heavy disk. Using smaller equipment, erosion control devices such as water bars will be installed at approximately 15 to 25 per 1,000 feet of firebreak length. Devices will have stable outlets. Resource concerns include: Wildfire hazard from excessive biomass accumulation, Undesirable plant productivity and health, Inadequate plant structure and composition, Habitat degradation, Soil erosion, and Excessive sediment in surface waters.

Before Situation:

Tract, field, or farm lacks adequate firebreaks to either reduce the spread of wildfires or contain a prescribed burn. Wide firebreaks are needed due to topography, high wildfire risk or to their use as down-wind breaks for prescribed burns. Conditions such as topography, the presence of brush and trees, etc. make the use of typical farm equipment impractical. As slopes increase, the potential for excessive erosion increases from soil disturbances. Therefore the installation of water control devices such as water bars will be important in protecting the resource base.

After Situation:

The property is adequately protected from wildfire or can be safely prescribe burned and the potential for excessive erosion from the firebreak is minimized.

Scenario Feature Measure: Length of firebreak

Scenario Unit: Feet

Scenario Typical Size: 1,000

Scenario Cost: $5,560.32 **Scenario Cost/Unit:** $5.56

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Water Bars	1500	Installation of graded trail water controlling structures such as water bars, broad based dips for erosion control. Typical cross section is 1.5 feet high with 4:1 side slopes yielding about 0.33 CY/ft of length.	Foot	$3.10	875	$2,712.50
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	10	$674.50
Fire Plow	1306	Heavy wildland plow or disk used for installing firebreaks. Equipment costs only for plow, use with a dozer component. Labor not included.	Hour	$47.14	10	$471.40
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	18	$675.36
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	4	$1,026.56

Practice: 394 - Firebreak

Scenario: #5 - Vegetated, permanent

Scenario Description:

Establishing a 20 foot wide strip of permanent vegetation that will serve as a green firebreak. Scenario includes clearing the site, preparing the seedbed, seeding (typically cool season grasses and/or legumes), and applying needed soil amendments. Clearing will be achieved with the use of a bush hog or similar equipment. Seedbed preparation and vegetation establishment will be accomplished with farm equipment. Soil amendments will be applied according to local FOTG guidance. This scenario does not include follow-up maintenance operations such as weed control. mowing, etc. Resource concerns include: Wildfire hazard from excessive biomass accumulation, Soil erosion, and Excessive sediment in surface waters.

Before Situation:

Tract, field, or farm lacks adequate firebreaks to either reduce the spread of wildfires or contain a prescribed burn.

After Situation:

The property is adequately protected from wildfire or can be safely prescribe burned. Wildlife habitat will also be enhanced and the potential for erosion from the firebreak is minimized.

Scenario Feature Measure: Length of firebreak

Scenario Unit: Feet

Scenario Typical Size: 3,000

Scenario Cost: $1,365.73 **Scenario Cost/Unit:** $0.46

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$50.98	4	$203.92
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	1.5	$30.44
Lime application	953	Lime application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$9.65	1.5	$14.48
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	1.5	$9.71
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	1.5	$15.87
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	4	$149.24
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	1.5	$23.66
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	5	$115.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	4	$89.32
Materials						
One Species, Cool Season, Introduced Perennial Grass	2313	Introduced, cool season perennial grass. Includes material and shipping only.	Acre	$32.72	1.5	$49.08
Lime, ENM	75	Fertilizer: Limestone Spread on field.	Ton	$58.25	1	$58.25
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.51	70	$35.70
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.82	70	$57.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 395 - Stream Habitat Improvement and Management

Scenario: #1 - Wood placement, Unanchored, On-site sources

Scenario Description:

This scenario involves placement of large wood (logs, root wads, log structures) into a stream channel in order to improve aquatic habitat that currently does not meet quality criteria for stream species habitat. Typical stream reach = 100 feet. A stream assessment (i.e. Stream Visual Assessment Protocol or other approved assessment) documents habitat components lacking for aquatic species (i.e. large wood, pools). Site has sufficient resources to drop wood existing on-site to be anchored in the streambank. A project design for wood placement will be based on assessment of the target stream reach characteristics and those of a suitable reference reach. Large wood/trees with rootwads intact should be placed in streams to create pool habitat according to NRCS engineering specifications and with close review & approval of a fish habitat biologist and geomorphologist to ensure safety and stability of project.

Before Situation:

In this stream reach, habitat for fish, aquatic insects and/or other stream species is sub-optimal as determined by the NRCS Stream Visual Assessment Protocol score of less than 5 overall. The site does not have adequate food, cover, and perhaps habitat connectivity for desired species. Riparian vegetation quality and/or quantity may also be compromised to the extent that the riparian area and floodplain are not functioning to provide necessary stream and riparian habitat components, such as large wood.

After Situation:

Stream habitat within the project reach is improving as a result of placing logs, root wads, and/or wood structures in the channel and/or along the stream bank. Pool habitat in the reach is improved, and hiding cover, food availability and refuge habitat for all stream species is improving. The planned activity will meet the current 395 standard, and facilitating practice standards utilized, including timing of work windows required for protected aquatic and riparian species, and protecting/restoring vegetation and substrates of/to areas impacted by heavy equipment.

Scenario Feature Measure: 100 foot stream reach

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $3,892.88 **Scenario Cost/Unit:** $3,892.88

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	8	$1,530.96
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	16	$610.24
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	8	$300.16
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	8	$879.52
Materials						
Shrub, seedling or transplant, bare root, 18"-36"	1507	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.58	30	$17.40
Compost	265	A mixture of decaying organic matter, as from leaves and manure, used to improve soil structure and provide nutrients.	Ton	$64.61	1	$64.61
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 395 - Stream Habitat Improvement and Management

Scenario: #2 - Wood placement, Unanchored, Off-site sources

Scenario Description:

This scenario involves placement of large wood (logs, root wads, log structures) into a stream channel in order to improve aquatic habitat that currently does not meet quality criteria for stream species habitat. Typical stream reach = 100 feet. A stream assessment (i.e. Stream Visual Assessment Protocol or other approved assessment) documents habitat components lacking for aquatic species (i.e. large wood, pools). The land owner does not have sufficient timber resources to obtain wood from their own parcel(s). Logs/root wads must be purchased and transported in from an off-site location. A project design for wood placement will be based on assessment of the target stream reach characteristics and those of a suitable reference reach. Large wood/trees with rootwads intact should be placed in streams to create pool habitat according to NRCS engineering specifications and with close review & approval of a fish habitat biologist and geomorphologist to ensure safety and stability of project.

Before Situation:

In this stream reach, habitat for fish, aquatic insects and/or other stream species is sub-optimal as determined by the NRCS Stream Visual Assessment Protocol score of less than 5 overall. The site does not have adequate food, cover, and perhaps habitat connectivity for desired species. Riparian vegetation quality and/or quantity may also be compromised to the extent that the riparian area and floodplain are not functioning to provide necessary stream and riparian habitat components, such as large wood.

After Situation:

Stream habitat within the project reach is improving as a result of placing logs, root wads, and/or wood structures in the channel and/or along the stream bank. Pool habitat in the reach is improved, and hiding cover, food availability and refuge habitat for all stream species is improving. The planned activity will meet the current 395 standard, and facilitating practice standards utilized, including timing of work windows required for protected aquatic and riparian species, and protecting/restoring vegetation and substrates of/to areas impacted by heavy equipment.

Scenario Feature Measure: 100 foot stream reach

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $9,531.13 **Scenario Cost/Unit:** $9,531.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	16	$1,555.04
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	8	$1,530.96
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	8	$879.52
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	24	$900.48
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	16	$610.24
Materials						
Log, un-anchored	2035	Price of log picked up at the Mill. Includes material only.	Ton	$40.21	70	$2,814.70
Shrub, seedling or transplant, bare root, 18"-36"	1507	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.58	30	$17.40
Root Wad	2045	Tree stump buried into the streambank with the roots left exposed. Includes material only.	Ton	$8.91	20	$178.20
Compost	265	A mixture of decaying organic matter, as from leaves and manure, used to improve soil structure and provide nutrients.	Ton	$64.61	1	$64.61

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 395 - Stream Habitat Improvement and Management

Scenario: #3 - Anchored wood placement from on-site sources

Scenario Description:

This scenario involves placement of large wood (logs, root wads, log structures) into a stream channel in order to improve aquatic habitat that currently does not meet quality criteria for stream species habitat. Typical stream reach = 100 feet. A stream assessment (i.e. Stream Visual Assessment Protocol or other approved assessment) documents habitat components lacking for aquatic species (i.e. large wood, pools). The land owners parcel has sufficient resources to obtain wood to be anchored in the stream. Timber is not purchased and does not require long-distance hauling; some hauling across and around clients property is assumed necessary in this scenario. A project design for wood placement will be based on assessment of the target stream reach characteristics and those of a suitable reference reach. Large wood/trees with rootwads intact should be placed in streams to create pool habitat according to NRCS engineering specifications and with close review & approval of a fish habitat biologist. Boulders placed to provide ballast shall only be used if the geomorphic setting and project design demand this component.

Before Situation:

In this stream reach, habitat for fish, aquatic insects and/or other stream species is sub-optimal as determined by an approved stream assessment (i.e., SVAP, WHEG, other Agency assessments). The site does not have adequate food, cover, and perhaps habitat connectivity for desired species. Riparian vegetation quality and/or quantity may also be compromised to the extent that the riparian area and floodplain are not functioning to provide necessary stream and riparian habitat components, such as large wood.

After Situation:

Stream habitat within the project reach is improving as a result of placing logs, root wads, and/or wood structures in the channel and/or along the stream bank. Pool habitat in the reach is improved, and hiding cover, food availability and refuge habitat for all stream species is improving. The planned activity will meet the current 395 standard, and facilitating practice standards utilized, including timing of work windows required for protected aquatic and riparian species, and protecting/restoring vegetation and substrates of/to areas impacted by heavy equipment.

Scenario Feature Measure: 100 foot stream reach

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $7,924.26 **Scenario Cost/Unit:** $7,924.26

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	8	$777.52
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	8	$1,530.96
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	8	$879.52
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	12	$494.76
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	16	$600.32
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	16	$610.24
Materials						
Steel cable grips, lockable, 1/4"	2181	Lockable wire rope grips for 1/4" galvanized steel cable. Materials and shipping only.	Each	$5.88	10	$58.80
Shrub, seedling or transplant, bare root, 18"-36"	1507	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.58	30	$17.40

Materials

Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$32.69	15	$490.35
Compost	265	A mixture of decaying organic matter, as from leaves and manure, used to improve soil structure and provide nutrients.	Ton	$64.61	1	$64.61
Cable, Galvanized steel	2182	Galvanized steel aircraft cable in 7 x 19 strand core. Materials and shipping only.	Foot	$0.47	100	$47.00
Boulder	1761	Rock boulders (approximately 5 ft dia. 6.67 Tons) Inlcudes materials and delivery (up to 100 miles) only.	Ton	$34.32	40	$1,372.80

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 395 - Stream Habitat Improvement and Management

Scenario: #4 - Anchored wood placement from off-site sources

Scenario Description:

This scenario involves placement of large wood (logs, root wads, log structures) into a stream channel in order to improve aquatic habitat that currently does not meet quality criteria for stream species habitat. Typical stream reach = 100 feet. A stream assessment (i.e. Stream Visual Assessment Protocol or other approved assessment) documents habitat components lacking for aquatic species (i.e. large wood, pools). The land owner does not have sufficient timber resources to obtain wood from their own parcel(s). Logs/root wads must be purchased and transported in from an off-site location. A project design for wood placement will be based on assessment of the target stream reach characteristics and those of a suitable reference reach. Large wood and root wads placed into the stream will mimic genus, age, and size of mature trees found in intact, reference riparian areas in the MLRA where the project is located. Large wood/trees with rootwads intact should be placed in streams to create pool habitat according to NRCS engineering specifications and with close review & approval of a fish habitat biologist. Boulders placed to provide ballast shall only be used if the geomorphic setting and project design demand this component.

Before Situation:

In this stream reach, habitat for fish, aquatic insects and/or other stream species is sub-optimal as determined by an approved stream assessment (i.e., SVAP, WHEG, other Agency assessments). The site does not have adequate food, cover, and perhaps habitat connectivity for desired species. Riparian vegetation quality and/or quantity may also be compromised to the extent that the riparian area and floodplain are not functioning to provide necessary stream and riparian habitat components, such as large wood.

After Situation:

Stream habitat within the project reach is improving as a result of placing logs, root wads, and/or wood structures in the channel and/or along the stream bank. Pool habitat in the reach is improved, and hiding cover, food availability and refuge habitat for all stream species is improving. The planned activity will meet the current 395 standard, and facilitating practice standards utilized, including timing of work windows required for protected aquatic and riparian species, and protecting/restoring vegetation and substrates of/to areas impacted by heavy equipment.

Scenario Feature Measure: 100 foot stream reach

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $15,139.04 **Scenario Cost/Unit:** $15,139.04

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	16	$1,555.04
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	16	$3,061.92
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	32	$1,220.48
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	32	$1,200.64
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	8	$879.52
Materials						
Log, un-anchored	2035	Price of log picked up at the Mill. Includes material only.	Ton	$40.21	70	$2,814.70
Cable, Galvanized steel	2182	Galvanized steel aircraft cable in 7 x 19 strand core. Materials and shipping only.	Foot	$0.47	100	$47.00
Root Wad	2045	Tree stump buried into the streambank with the roots left exposed. Includes material only.	Ton	$8.91	20	$178.20
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$32.69	15	$490.35

Materials

Steel, rebar	1832	Steel rebar, grade 60. Materials only.	Pound	$0.57	50	$28.50
Boulder	1761	Rock boulders (approximately 5 ft dia. 6.67 Tons) Inlcudes materials and delivery (up to 100 miles) only.	Ton	$34.32	40	$1,372.80
Shrub, seedling or transplant, bare root, 18"-36"	1507	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.58	30	$17.40
Compost	265	A mixture of decaying organic matter, as from leaves and manure, used to improve soil structure and provide nutrients.	Ton	$64.61	1	$64.61
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	30	$1,169.10
Steel cable grips, lockable, 1/4"	2181	Lockable wire rope grips for 1/4" galvanized steel cable. Materials and shipping only.	Each	$5.88	10	$58.80

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 395 - Stream Habitat Improvement and Management

Scenario: #5 - Instream rock placement

Scenario Description:

This scenario describes the implementation of a stream habitat improvement and management project that places individual boulders or boulder clusters, or rock structures in or adjacent to the stream channel as habitat components. A project design for boulder placement will be based on assessment of the target stream reach characteristics and those of a suitable reference reach. These characteristics include channel geometry, channel slope, stream bottom substrate size and composition, and the geomorphic setting influencing the channel form, pattern and profile. Large rocks/boulders placed in the stream channel will mimic geologic material sizes typically present in the watershed or observed in intact, reference stream reaches in the MLRA where the project is located. Boulders should be placed in streams to create pool habitat and hydraulic complexity according to NRCS engineering specifications and with close review & approval of a fish habitat biologis onsite during implementation of the project design. Spawning gravel placement should be placed to restore spawning area substrates potentially disturbed by rock placement. The planned activity will meet the current 395 standard, and facilitating practice standards utilized. Implementation will result in the improvement of instream habitat complexity, hiding and resting cover, spawning habitat, and/or increased food availability for fish and other stream species. Payment for implementation is to defray the costs of stream habitat assessment, and project implementation. Records demonstrating implementation of this scenario will address resource concerns for stream species of concern will be required.

Before Situation:

In this stream reach, habitat for fish, aquatic insects and other stream species is sub-optimal as determined by the NRCS Stream Visual Assessment Protocol score of less than 5 overall. The site does not have adequate food, cover, and perhaps habitat connectivity for desired species. Riparian vegetation quality and/or quantity may be also compromised to the extent that the riparian area and floodplain are not functioning to provide necessary stream and riparian habitat components, such as large wood, leaf matter, and shade.

After Situation:

Stream habitat within the project reach is improving as a result of placing boulders or constructing rock structures in the channel and/or along the stream bank. Hydraulic complexity of the habitat in the reach is increased, and hiding cover, food availability and refuge habitat for stream species is improving. Streambank vegetation is increasing and contributing to stability of the streambanks.

Scenario Feature Measure: 100 foot stream reach

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $19,350.46 **Scenario Cost/Unit:** $19,350.46

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	16	$3,061.92
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	8	$777.52
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	80	$3,051.20
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	24	$900.48
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	24	$2,638.56
Materials						
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$32.69	20	$653.80
Boulder	1761	Rock boulders (approximately 5 ft dia. 6.67 Tons) Inlcudes materials and delivery (up to 100 miles) only.	Ton	$34.32	60	$2,059.20
Cuttings, woody, large size	1309	Woody pole cuttings or posts 2" to 6" in diameter and 6' long. Includes materials and shipping only.	Each	$18.38	30	$551.40

Materials

Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	120	$4,676.40

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 395 - Stream Habitat Improvement and Management

Scenario: #6 - Rock and wood structures

Scenario Description:

This scenario describes the implementation of a stream habitat improvement and management project where practices are focused on instream habitat improvement with a combination of rock AND wood structures. This senario involves placement of large wood and rock structures into a stream channel in order to improve aquatic habitat that currently does not meet quality criteria for stream species habitat. A stream assessment (i.e. Stream Visual Assessment Protocol) should be conducted in order to document habitat components (such as large wood, pools) are not currently present in the stream or are limited for aquatic species. A project design for placement of habitat structures (boulders, boulder clusters, wood, wood structures) will be based on assessment of (a) the target stream reach characteristics and (b) those of a suitable reference reach. These characteristics include channel geometry, channel slope, stream bottom substrate size and composition, and the geomorphic setting influencing the channel form, pattern and profile. Large rocks/boulders placed in the stream channel will mimic geologic material sizes typically present in the watershed or observed in intact, reference stream reaches in the MLRA where the project is located. Rock boulder sizes should also reflect the geomorphic setting of the stream reach. Large wood placed into the stream under this scenario should be similar in species, age, and size (diameter) as trees found in the surrounding riparian area, to the extent possible. Wood, boulders and/or boulder clusters will be placed in the stream to create pool habitat and hydraulic complexity according to NRCS engineering specifications and with close review & approval of a fish habitat biologist onsite during the planning and implementation of the project. This scenario involves restoring one acre of stream. The planned activity will meet the current 395 standard, and facilitating practice standards utilized. Implementation will result in the improvement of instream habitat complexity, hiding and resting cover, and/or increased food availability for fish and other stream species. Payment for implementation is to defray the costs of project implementation. Records demonstrating implementation of this scenario will address resource concerns for stream species of concern will be required.

Before Situation:

In this stream reach, habitat for fish, aquatic insects and/or other stream species is sub-optimal as determined by the NRCS Stream Visual Assessment Protocol score of less than 5. The site does not have adequate food, cover, and perhaps habitat connectivity for desired species. Riparian vegetation quality and/or quantity may also be compromised to the extent that the riparian area and floodplain are not functioning to provide necessary stream habitat components, such as large wood and off-channel refuge habitat.

After Situation:

Stream habitat within the project reach is improving as a result of placing logs, rocks, or constructing wood and rock structures in the channel and/or along the stream bank. Pool habitat in the reach is improved, and hiding cover, food availability and refuge habitat for all stream species is improving.

Scenario Feature Measure: 100 foot stream reach

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $20,738.91 **Scenario Cost/Unit:** $20,738.91

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	16	$1,555.04
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	16	$3,061.92
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	16	$369.28
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	32	$1,200.64
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	8	$879.52

Labor

Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	32	$1,220.48

Materials

Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$32.69	7	$228.83
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	17	$653.65
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	60	$2,338.20
Compost	265	A mixture of decaying organic matter, as from leaves and manure, used to improve soil structure and provide nutrients.	Ton	$64.61	1	$64.61
Cuttings, woody, large size	1309	Woody pole cuttings or posts 2" to 6" in diameter and 6' long. Includes materials and shipping only.	Each	$18.38	300	$5,514.00
Steel, rebar	1832	Steel rebar, grade 60. Materials only.	Pound	$0.57	8	$4.56
Log, un-anchored	2035	Price of log picked up at the Mill. Includes material only.	Ton	$40.21	30	$1,206.30
Root Wad	2045	Tree stump buried into the streambank with the roots left exposed. Includes material only.	Ton	$8.91	10	$89.10
Boulder	1761	Rock boulders (approximately 5 ft dia. 6.67 Tons) Inlcudes materials and delivery (up to 100 miles) only.	Ton	$34.32	40	$1,372.80

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 396 - Aquatic Organism Passage

Scenario: #1 - Earthen Dam Removal

Scenario Description:

Full or partial removal of an earthen dam to restore aquatic organism passage, improve water quality, and promote functional river ecology and geomorphology. Removal is completed with an assortment of equipment, including tracked excavators outfitted with hydraulic chisels, hammers and/or buckets with "thumbs", bull dozers, skid steers, cranes, front-end loaders, and dump trucks. Disturbed areas are revegetated with a mix of site-adapted species. Seeding should be contracted under 342 Critical Area Planting Scenario does not include additional measures needed in the active channel and floodplain to account for post-removal changes to stream plan, pattern, or profile, or reclamation of any former impounded areas. Additional structural measures may be necessary to address constructed features associated with the removed dam including canals, raceways, adjacent spillways, navigation locks, access and maintenance roads, or similar civil works.

RESOURCE CONCERNS: INADEQUATE HABITAT FOR FISH AND WILDLIFE –Habitat degradation; EXCESS WATER – Ponding, flooding, seasonal high water table, seeps, and drifted snow; WATER QUALITY DEGRADATION – Elevated water temperature.
Assoicated Practices include (326) Clearing and Snagging, (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment, (395) Stream Habitat Improvement and Management, (410) Grade Stabilization Structure, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection, (587) Structure for Water Control

Before Situation:

A channel-spanning earthen dam no longer has functional use, may be failing, or creates a hazard to downstream capital infrastructure or communities. The dam blocks upstream aquatic organism migration, and downstream migrants may be diverted into hydraulic structures that increase mortality or result in migration delays or dead-ends. The dam disrupts the downstream cycling and transport of sediment, woody material and nutrients. The pool created by the dam may impair water quality by increasing temperatures, capturing fine sediment--sometimes laden with heavy metals or other pollutants--later mobilized by high flow events, and creating slackwater habitat for invasive aquatic vegetation. Non-native or exotic fish species inhabit the pool and predate upon and/or displace native fish.

After Situation:

The existing dam is removed and reach geometry and slope are restored to pre-dam conditions to the fullest extent practicable. Aquatic organism passage and river ecology and geomorphic conditions are restored to pre-dam conditions to the fullest extent practicable. Resource Concerns are addressed within the context of the site. Typical scenario is for the removal of a dam that is 8' high by 4' wide and 200' long and for removal of abutments and assoicated materials.

Scenario Feature Measure: Cubic Yards of concrete removed

Scenario Unit: Cubic Yard

Scenario Typical Size: 250

Scenario Cost: $45,298.54 **Scenario Cost/Unit:** $181.19

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	40	$4,991.20
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	64	$6,220.16
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	64	$12,247.68
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$308.64	3	$925.92
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	8	$1,708.72
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	64	$1,477.12

Labor

Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	80	$8,795.20
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	40	$1,649.20
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	168	$6,303.36

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 396 - Aquatic Organism Passage

Scenario: #2 - Concrete Dam Removal

Scenario Description:

Full or partial removal of a concrete dam to restore aquatic organism passage, improve water quality, and promote functional river ecology and geomorphology. Removal is completed with an assortment of equipment, including tracked excavators outfitted with hydraulic chisels, hammers and/or buckets with "thumbs", bull dozers, skid steers, cranes, front-end loaders, and dump trucks. Disturbed areas are revegetated with a mix of site-adapted species. Seeding should be contracted under 342 Critical Area Planting Scenario does not include additional measures needed in the active channel and floodplain to account for post-removal changes to stream plan, pattern, or profile, or reclamation of any former impounded areas. Additional structural measures may be necessary to address constructed features associated with the removed dam including canals, raceways, adjacent spillways, navigation locks, access and maintenance roads, or similar civil works.

RESOURCE CONCERNS: INADEQUATE HABITAT FOR FISH AND WILDLIFE –Habitat degradation; EXCESS WATER – Ponding, flooding, seasonal high water table, seeps, and drifted snow; WATER QUALITY DEGRADATION – Elevated water temperature.
Assoicated Practices include (326) Clearing and Snagging, (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment, (395) Stream Habitat Improvement and Management, (410) Grade Stabilization Structure, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection, (587) Structure for Water Control

Before Situation:

A channel-spanning concrete dam no longer has functional use, may be failing, or creates a hazard to downstream capital infrastructure or communities. The dam blocks upstream aquatic organism migration, and downstream migrants may be diverted into hydraulic structures that increase mortality or result in migration delays or dead-ends. The dam disrupts the downstream cycling and transport of sediment, woody material and nutrients. The pool created by the dam may impair water quality by increasing temperatures, capturing fine sediment--sometimes laden with heavy metals or other pollutants--later mobilized by high flow events, and creating slackwater habitat for invasive aquatic vegetation. Non-native or exotic fish species inhabit the pool and predate upon and/or displace native fish.

After Situation:

The existing dam is removed and reach geometry and slope are restored to pre-dam conditions to the fullest extent practicable. Aquatic organism passage and river ecology and geomorphic conditions are restored to pre-dam conditions to the fullest extent practicable. Resource Concerns are addressed within the context of the site. Typical scenario is for the removal of a dam that is 8' high by 4' wide and 200' long and for removal of abutments and assoicated materials.

Scenario Feature Measure: Cubic Yards of concrete removed

Scenario Unit: Cubic Yard

Scenario Typical Size: 250

Scenario Cost: $54,418.14 **Scenario Cost/Unit:** $217.67

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	64	$12,247.68
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	64	$7,985.92
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$308.64	3	$925.92
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	24	$5,126.16
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	64	$6,220.16
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	48	$1,979.04
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	80	$8,795.20

Labor

General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	128	$2,954.24
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	192	$7,203.84

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 396 - Aquatic Organism Passage

Scenario: #3 - Concrete Dam Removal with Blasting

Scenario Description:

Full or partial removal of a concrete dam on a site requiring blasting to break up the concrete structure prior to removal. Removal of the dam will restore aquatic organism passage, improve water quality, and promote functional river ecology and geomorphology. Removal is completed with an assortment of equipment, including tracked excavators outfitted with hydraulic chisels, hammers and/or buckets with "thumbs", bull dozers, skid steers, cranes, front-end loaders, and dump trucks. Disturbed areas are revegetated with a mix of site-adapted species. Seeding should be contracted under 342 Critical Area Planting Scenario does not include additional measures needed in the active channel and floodplain to account for post-removal changes to stream plan, pattern, or profile, or reclamation of any former impounded areas. Additional structural measures may be necessary to address constructed features associated with the removed dam including canals, raceways, adjacent spillways, navigation locks, access and maintenance roads, or similar civil works.

RESOURCE CONCERNS: INADEQUATE HABITAT FOR FISH AND WILDLIFE –Habitat degradation; EXCESS WATER – Ponding, flooding, seasonal high water table, seeps, and drifted snow; WATER QUALITY DEGRADATION – Elevated water temperature.
Assoicated Practices include (326) Clearing and Snagging, (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment, (395) Stream Habitat Improvement and Management, (410) Grade Stabilization Structure, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection, (587) Structure for Water Control

Before Situation:

A channel-spanning concrete dam no longer has functional use, may be failing, or creates a hazard to downstream capital infrastructure or communities. The dam blocks upstream aquatic organism migration, and downstream migrants may be diverted into hydraulic structures that increase mortality or result in migration delays or dead-ends. The dam disrupts the downstream cycling and transport of sediment, woody material and nutrients. The pool created by the dam may impair water quality by increasing temperatures, capturing fine sediment--sometimes laden with heavy metals or other pollutants--later mobilized by high flow events, and creating slackwater habitat for invasive aquatic vegetation. Non-native or exotic fish species inhabit the pool and predate upon and/or displace native fish.

After Situation:

The existing dam is removed and reach geometry and slope are restored to pre-dam conditions to the fullest extent practicable. Aquatic organism passage and river ecology and geomorphic conditions are restored to pre-dam conditions to the fullest extent practicable. Resource Concerns are addressed within the context of the site. Typical scenario is for the removal of a dam that is 8' high by 4' wide and 200' long (237 cubic yards) and for removal of abutments and assoicated materials.

Scenario Feature Measure: Cubic Yards of concrete removed

Scenario Unit: Cubic Yard

Scenario Typical Size: 237

Scenario Cost: $57,849.64 **Scenario Cost/Unit:** $244.09

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	40	$4,991.20
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	64	$12,247.68
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	30	$6,407.70
Drilling & Blasting Rock, Open Face.	1396	Open Face drilling & blasting of rock (typically a min. 225 CY, Max 1500 CY). Includes all equipment, labor and supplies to complete the blast.	Cubic Yard	$14.60	237	$3,460.20
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$308.64	3	$925.92
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	64	$6,220.16
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	48	$1,979.04

Labor

General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	240	$5,539.20
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	168	$6,303.36
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	80	$8,795.20

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 396 - Aquatic Organism Passage

Scenario: #4 - Roughened Channel

Scenario Description:

Roughened channels, rock ramps, or bypass channels, are constructed features that provide passage around an instream barrier or in place of a removed barrier. Roughened Channels are constructed with an assortment of equipment used for excavation, placing material, and delivering and removing material. Removed materials are trucked away and disposed or recycled off-site, unless excavated native streambed material can be used in fishway construction. Scenario does not include additional measures needed in the active channel and floodplain or at an existing dam necessary to control flow associated with nature-like fishway.

RESOURCE CONCERNS: INADEQUATE HABITAT FOR FISH AND WILDLIFE –Habitat degradation; EXCESS WATER – Ponding, flooding, seasonal high water table, seeps, and drifted snow; WATER QUALITY DEGRADATION – Elevated water temperature; EROSION– Excessive bank erosion from streams shorelines or water conveyance channels
Assoicated Practices (326) Clearing and Snagging, (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment, 580 Streambank and Shoreline Protection, (395) Stream Habitat Improvement and Management, (410) Grade Stabilization Structure, (582) Open Channel, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection, (587) Structure for Water Control580 Streambank and Shoreline Protection

Before Situation:

An instream barrier prevents upstream migration of native aquatic organisms and no support exists for removal.

After Situation:

A roughened channel is constructed in place of a removed barrier or around an existing barrier. The fishway is designed to mimic the adjacent natural stream, and is constructed of rock and/or large woody material that provides quality passage conditions for a number of species and geomorphic stability over a range of flows. Resource Concerns are addressed within the context of the site. Typical scenario is for a 20' wide by 200' long roughened channel.

Scenario Feature Measure: Square feet of constructed fishway (bankfull width X total length)

Scenario Unit: Square Foot

Scenario Typical Size: 4,000

Scenario Cost: $99,101.02 **Scenario Cost/Unit:** $24.78

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$308.64	3	$925.92
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	80	$15,309.60
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	30	$6,407.70
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	80	$7,775.20
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	160	$6,003.20
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	64	$2,638.72
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	240	$5,539.20
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	80	$8,795.20

Materials

Materials

Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$25.76	400	$10,304.00
Boulder	1761	Rock boulders (approximately 5 ft dia. 6.67 Tons) Inlcudes materials and delivery (up to 100 miles) only.	Ton	$34.32	60	$2,059.20
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$32.69	990	$32,363.10

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 396 - Aquatic Organism Passage

Scenario: #5 - CMP Culvert, <=8ft

Scenario Description:

A corrugated metal (galvanized steel or aluminum) pipe culvert (CMP) less than or equal to 8' in diameter of any shape (round, elliptical, or squash) used at a road-stream crossing to provide aquatic organism passage (AOP) and promote stream ecological and geomorphic function.

CMPs are installed with an assortment of equipment used for excavation, placing material, and delivering and removing material. Construction elements generally include an assortment of rock used to create riffles, cascades, or riffle-pool sequences. This work would be contracted under open channel or stream channel stabilization. Stream dewatering and diversion around the work site is often required, and temporary road closure or re-routing may also be required. Channel bed material within the culvert barrel varies according to prevailing stream characteristics at the crossing site. Other actions include construction staking and signage, soil erosion and pollution control, removal and disposal of the old culvert, and topsoil conservation for site reclamation. Disturbed areas are revegetated with a mix of site-adapted species. Scenario does not include additional measures needed to address channel incision, bank stability, and other factors associated with the presence of the stream crossing.

RESOURCE CONCERNS: INADEQUATE HABITAT FOR FISH AND WILDLIFE –Habitat degradation; EXCESS WATER – Ponding, flooding, seasonal high water table, seeps, and drifted snow; WATER QUALITY DEGRADATION – Elevated water temperature; SOIL EROSION– Excessive bank erosion from streams shorelines or water conveyance channels
Assoicated Practices include: (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment;(395) Stream Habitat Improvement and Management; (410) Grade Stabilization Structure, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection

Before Situation:

An existing undersized culvert creates an upstream passage blockage to fish and other aquatic orgnasims. The existing crossing does not meet State or Federal fish passage guidance.

After Situation:

The undersized culvert is replaced with a CMP sized and designed in accordance to State, Federal and NRCS fish passage guidnace and requirements. Resource Concerns are addressed within the context of the site. Typical sceanrio is for a 6' diameter pipe with 4' of fill over the top. 15' road top width with 2.5:1 slopes for a total pipe length of 65'.

Scenario Feature Measure: Foot of pipe length

Scenario Unit: Linear Foot

Scenario Typical Size: 65

Scenario Cost: $44,944.58 **Scenario Cost/Unit:** $691.46

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	56	$10,716.72
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	10	$2,135.90
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	56	$5,442.64
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	40	$1,649.20
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	80	$8,795.20
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	112	$4,202.24

Labor

General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	80	$1,846.40

Materials

Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$32.69	40	$1,307.60
Pipe, CMP, 14-12 gauge, weight priced	1589	14 and 12 gauge galvanized helical corrugated metal pipe priced by the weight of the pipe materials. Materials only.	Pound	$0.75	6370	$4,777.50
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$25.76	120	$3,091.20

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 396 - Aquatic Organism Passage

Scenario: #6 - CMP Culvert <=8ft, Foundation Modification

Scenario Description:

A corrugated metal (galvanized steel or aluminum) pipe culvert (CMP) less than 8' in diameter of any shape (round, elliptical, or squash) used at a road-stream crossing or within an existing levee to provide aquatic organism passage (AOP) and restore or promote estuary ecological and hydrogeomorphic function. Often associated with installation of a Self Regulating Tidegate (SRT) or on projects located in alluvial, estuarine, or tidally influenced areas, where soils are considered "soft" with low bearing capacity and high potential for settlement or consolidation. These projects typically require a large quantity of over-excavation to remove unsuitable soils, backfill with engineered fill material, and manual compaction to support a new culvert/structure for fish passage.

CMPs are installed with an assortment of equipment, sequencing, and methods used when working in aquatic soil environments such as over excavation, placing engineered fill material, and using a high degree of hand compaction to acheive the desired results. Geotechnical investigation is required to utilize this scenario. On site geotechnical testing is required during construction to ensure the required compaction is achieved. Construction in tidal enviroments offers additional challenges with daily and seasonal low tide requirements. Dewatering and diversion around the work site is often required, and temporary road closure or re-routing may also be required. Channel bed material within the culvert barrel varies according to prevailing stream characteristics at the crossing site and is not needed in estuary environments. Other actions include construction staking and signage, soil erosion and pollution control, removal and disposal of the old culvert, and topsoil conservation for site reclamation. Disturbed areas are revegetated with a mix of site-adapted species. Scenario does not include additional measures needed to address channel incision, bank stability, and other factors associated with the presence of the stream crossing.

RESOURCE CONCERNS: INADEQUATE HABITAT FOR FISH AND WILDLIFE –Habitat degradation; EXCESS WATER – Ponding, flooding, seasonal high water table, seeps, and drifted snow; WATER QUALITY DEGRADATION – Elevated water temperature; SOIL EROSION– Excessive bank erosion from streams shorelines or water conveyance channels
Assoicated Practices include: (587) Structure for Water Control (SRT), (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment;(395) Stream Habitat Improvement and Management; (410) Grade Stabilization Structure, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection

Before Situation:

An existing undersized culvert creates an upstream passage blockage to fish and other aquatic orgnasims. In estuary environments, the existing WCS is undersized or failing and does not allow adequate fish passage or passage of tidal hydrology. The existing structure does not meet State or Federal fish passage guidance.

After Situation:

The undersized culvert/structure is replaced with a CMP sized and designed in accordance to State, Federal and NRCS fish passage guidance and requirements. In estuary enviroments, a SRT will be installed seperately under 587 Structure for Water Control. Resource Concerns are addressed within the context of the site. For streams, fish passage and other stream geomorphic process such as natural sediment and woody debris transport will be restored. For tidal environments, partial fish passage will be restored along with partial tidal hydrology to a level that will not cause off site flooding concerns. Typical sceanrio is for a 6' diameter pipe with 4' of fill over the top. 15' road top width with 2.5:1 slopes for a total pipe length of 40 ft.

Scenario Feature Measure: Foot of pipe length

Scenario Unit: Linear Foot

Scenario Typical Size: 45

Scenario Cost: $38,698.36 **Scenario Cost/Unit:** $859.96

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	40	$7,654.80
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	10	$2,135.90
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	40	$3,887.60

Labor

Labor

Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	80	$8,795.20
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	80	$1,846.40
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	80	$3,001.60
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	40	$1,649.20

Materials

Pipe, CMP, 14-12 gauge, weight priced	1589	14 and 12 gauge galvanized helical corrugated metal pipe priced by the weight of the pipe materials. Materials only.	Pound	$0.75	3920	$2,940.00
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$25.76	120	$3,091.20
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$32.69	42	$1,372.98
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	50	$1,343.50

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 396 - Aquatic Organism Passage

Scenario: #7 - CMP Culvert, >8ft

Scenario Description:

A corrugated metal (galvanized steel or aluminum) pipe culvert (CMP) greater than 8' in diameter of any shape (round, elliptical, or squash) used at a road-stream crossing to provide aquatic organism passage (AOP) and promote stream ecological and geomorphic function.

CMPs are installed with an assortment of equipment used for excavation, placing material, and delivering and removing material. Construction elements generally include an assortment of rock used to create riffles, cascades, or riffle-pool sequences. Stream dewatering and diversion around the work site is often required, and temporary road closure or re-routing may also be required. Channel bed material within the culvert barrel varies according to prevailing stream characteristics at the crossing site. Other actions include construction staking and signage, soil erosion and pollution control, removal and disposal of the old culvert, and topsoil conservation for site reclamation. Disturbed areas are revegetated with a mix of site-adapted species. Scenario does not include additional measures needed to address channel incision, bank stability, and other factors associated with the presence of the stream crossing.

RESOURCE CONCERNS: INADEQUATE HABITAT FOR FISH AND WILDLIFE –Habitat degradation; EXCESS WATER – Ponding, flooding, seasonal high water table, seeps, and drifted snow; WATER QUALITY DEGRADATION – Elevated water temperature; SOIL EROSION– Excessive bank erosion from streams shorelines or water conveyance channels
Assoicated Practices include: (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment;(395) Stream Habitat Improvement and Management; (410) Grade Stabilization Structure, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection

Before Situation:

An existing undersized culvert creates an upstream passage blockage to fish and other aquatic orgnasims. The existing crossing does not meet State or Federal fish passage guidance.

After Situation:

The undersized culvert is replaced with a CMP sized and designed in accordance to State, Federal and NRCS fish passage guidance and requirements. Resource Concerns are addressed within the context of the site. Typical sceanrio is for a 10' diameter pipe with 4' of fill over the top. 15' road top width with 2.5:1 slopes for a total pipe length of 85'.

Scenario Feature Measure: Foot of pipe length

Scenario Unit: Linear Foot

Scenario Typical Size: 85

Scenario Cost: $65,830.64 **Scenario Cost/Unit:** $774.48

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	64	$6,220.16
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	25	$5,339.75
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	64	$12,247.68
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	120	$2,769.60
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	80	$8,795.20
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	128	$4,802.56

Labor

Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	64	$2,638.72

Materials

Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$32.69	67	$2,190.23
Pipe, CMP, 14-12 gauge, weight priced	1589	14 and 12 gauge galvanized helical corrugated metal pipe priced by the weight of the pipe materials. Materials only.	Pound	$0.75	18700	$14,025.00
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$25.76	226	$5,821.76

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 396 - Aquatic Organism Passage

Scenario: #8 - Bottomless Culvert <= 8ft span

Scenario Description:

A multi-plate galvanized steel or aluminum culvert (arch or box) with a span of 8' or less is installed at a road-stream crossing to provide aquatic organism passage (AOP) and promote stream ecological and geomorphic function. They commonly attach to preformed reinforced or poured-in-place concrete footings.

CMPs are installed with an assortment of equipment used for excavation, placing material, and delivering and removing material. Construction elements generally include an assortment of rock used to create riffles, cascades, or riffle-pool sequences. This work would be contracted under open channel or stream channel stabilization. Stream dewatering and diversion around the work site is often required, and temporary road closure or re-routing may also be required. Channel bed material within the culvert barrel varies according to prevailing stream characteristics at the crossing site. Other actions include construction staking and signage, soil erosion and pollution control, removal and disposal of the old culvert, and topsoil conservation for site reclamation. Disturbed areas are revegetated with a mix of site-adapted species. Scenario does not include additional measures needed to address channel incision, bank stability, and other factors associated with the presence of the stream crossing.

RESOURCE CONCERNS: INADEQUATE HABITAT FOR FISH AND WILDLIFE –Habitat degradation; EXCESS WATER – Ponding, flooding, seasonal high water table, seeps, and drifted snow; WATER QUALITY DEGRADATION – Elevated water temperature; SOIL EROSION– Excessive bank erosion from streams shorelines or water conveyance channels
Assoicated Practices include: (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment;(395) Stream Habitat Improvement and Management; (410) Grade Stabilization Structure, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection

Before Situation:

An existing undersized culvert creates an upstream passage blockage to fish and other aquatic orgnasims. The existing crossing does not meet State or Federal fish passage guidance.

After Situation:

The undersized culvert is replaced with a with a bottomless arch or box culvert sized and designed in accordance to State, Federal and NRCS fish passage guidnace and requirements. Resource Concerns are addressed within the context of the site. Typical sceanrio is for a 6' span 10 gauge multiplate arch culvert with a rise of 3' 2" with 4' of fill over the top. 15' road top width with 2.5:1 slopes for a total pipe length of 50'.

Scenario Feature Measure: Foot of pipe length

Scenario Unit: Linear Foot

Scenario Typical Size: 50

Scenario Cost: $53,421.77 **Scenario Cost/Unit:** $1,068.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	80	$15,309.60
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	10	$2,135.90
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	80	$7,775.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	80	$1,846.40
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	80	$8,795.20

Labor

Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	40	$1,649.20
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	160	$6,003.20

Materials

Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$32.69	40	$1,307.60
Culvert, Multi-Plate arch	1979	Multi-plate arch culvert, typically 7 Gauge corrugated plate. Includes metal arch materials only, does not include footings.	Pound	$1.45	4029	$5,842.05
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$25.76	69	$1,777.44

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 396 - Aquatic Organism Passage

Scenario: #9 - Bottomless Culvert >8ft span

Scenario Description:

A multi-plate galvanized steel or aluminum culvert (arch or box) with a span of greater than 8' is installed at a road-stream crossing to provide aquatic organism passage (AOP) and promote stream ecological and geomorphic function. They commonly attach to preformed reinforced or poured-in-place concrete footings.

CMPs are installed with an assortment of equipment used for excavation, placing material, and delivering and removing material. Construction elements generally include an assortment of rock used to create riffles, cascades, or riffle-pool sequences. This work would be contracted under open channel or stream channel stabilization. Stream dewatering and diversion around the work site is often required, and temporary road closure or re-routing may also be required. Channel bed material within the culvert barrel varies according to prevailing stream characteristics at the crossing site. Other actions include construction staking and signage, soil erosion and pollution control, removal and disposal of the old culvert, and topsoil conservation for site reclamation. Disturbed areas are revegetated with a mix of site-adapted species. Scenario does not include additional measures needed to address channel incision, bank stability, and other factors associated with the presence of the stream crossing.

RESOURCE CONCERNS: INADEQUATE HABITAT FOR FISH AND WILDLIFE –Habitat degradation; EXCESS WATER – Ponding, flooding, seasonal high water table, seeps, and drifted snow; WATER QUALITY DEGRADATION – Elevated water temperature; SOIL EROSION– Excessive bank erosion from streams shorelines or water conveyance channels
Assoicated Practices include: (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment;(395) Stream Habitat Improvement and Management; (410) Grade Stabilization Structure, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection

Before Situation:

An existing undersized culvert creates an upstream passage blockage to fish and other aquatic orgnasims. The existing crossing does not meet State or Federal fish passage guidance.

After Situation:

The undersized culvert is replaced with a with a bottomless arch or box culvert sized and designed in accordance to State, Federal and NRCS fish passage guidnace and requirements. Resource Concerns are addressed within the context of the site. Typical sceanrio is for a 10' span 10 gauge multiplate arch culvert with a rise of 5' 3" with 4' of fill over the top. 15' road top width with 2.5:1 slopes for a total pipe length of 60'.

Scenario Feature Measure: Foot of pipe length

Scenario Unit: Linear Foot

Scenario Typical Size: 60

Scenario Cost: $66,756.47 **Scenario Cost/Unit:** $1,112.61

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	80	$15,309.60
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	30	$6,407.70
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	80	$7,775.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	160	$3,692.80
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	160	$6,003.20
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	40	$1,649.20

Labor

Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	80	$8,795.20

Materials

Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$25.76	81	$2,086.56
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$32.69	67	$2,190.23
Culvert, Multi-Plate arch	1979	Multi-plate arch culvert, typically 7 Gauge corrugated plate. Includes metal arch materials only, does not include footings.	Pound	$1.45	8184	$11,866.80

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 396 - Aquatic Organism Passage

Scenario: #10 - Concrete Box Culvert

Scenario Description:

A four-sided precast concrete box (square or rectangular) culvert used at a road-stream crossing to provide aquatic organism passage (AOP) and promote stream ecological and geomorphic function. Concrete headwalls and/or wingwalls may be necessary in shorter installations and/or where fill/roadway cover is limited or the stream alignment is not perpendicular to the road axis.

Concrete box culverts are delivered in sections and assembled onsite, and require adequate bed compaction throughout the crossing section. They are installed with an assortment of equipment used for excavation, placing material, and delivering and removing material. Stream dewatering and diversion around the work site is often required, and temporary road closure or re-routing may also be required. Channel bed material within the culvert barrel varies according to prevailing stream characteristics at the crossing site. The new streambed is set at a slope that matches the design longitudinal profile, and backfilled with a bed mixture that mimics adjacent stream characteristics with special attention to channel pattern. The roadway is replaced and any necessary armoring and revegetating material is placed at the culvert inlet and outlet where it intersects the road fill prism. Other actions include construction staking and signage, soil erosion and pollution control, removal and disposal of the old culvert, and topsoil conservation for site reclamation. Disturbed areas are revegetated with a mix of site-adapted species. Scenario does not include additional measures needed to address channel incision, bank stability, and other factors associated with the presence of the stream crossing.

RESOURCE CONCERNS: INADEQUATE HABITAT FOR FISH AND WILDLIFE –Habitat degradation; EXCESS WATER – Ponding, flooding, seasonal high water table, seeps, and drifted snow; WATER QUALITY DEGRADATION – Elevated water temperature; SOIL EROSION– Excessive bank erosion from streams shorelines or water conveyance channels
Assoicated Practices include: (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment;(395) Stream Habitat Improvement and Management; (410) Grade Stabilization Structure, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection

Before Situation:

An existing undersized culvert creates an upstream passage blockage to fish and other aquatic orgnasims. The existing crossing does not meet State or Federal fish passage guidance.

After Situation:

The undersized culvert is replaced with a concrete box culvert sized and designed in accordance to State, Federal and NRCS fish passage guidnace and requirements. Resource Concerns are addressed within the context of the site. Typical sceanrio is for a 6' by 6' x 40' long concrete box culvert.

Scenario Feature Measure: Foot of culvert length

Scenario Unit: Linear Foot

Scenario Typical Size: 40

Scenario Cost: $75,007.43 **Scenario Cost/Unit:** $1,875.19

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	30	$6,407.70
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	80	$7,775.20
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	80	$15,309.60
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	160	$6,003.20
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	80	$3,298.40
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	240	$5,539.20

Labor

Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	120	$13,192.80

Materials

Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$32.69	75	$2,451.75
Culvert, box, 6' x 6'	1837	Precast concrete box culvert, 6'X6'. Typically in 4' sections. Includes materials only.	Foot	$351.24	40	$14,049.60

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 396 - Aquatic Organism Passage

Scenario: #11 - Bridge, Treated Timber

Scenario Description:

A channel-spanning structure that carries a road or trailway across a river or stream. Constructed of timber and i-beams bridges are attached at either end to prefabricated, reinforced and poured-in-place, or piling abutments capped/surrounded with concrete. Bridge decking is timber. Bridge design is completed to conform to loading requirements and site conditions. The bridge deck is designed to rest on abutments placed on the adjacent floodplain.

Bridge components are delivered to the site and assembled by a combination of equipment and manual labor. They are installed with an assortment of equipment used for excavation, placing material, delivering and removing material, and lifting bridge components from delivery trucks onto the constructed bridge support elements. Other actions include construction staking and signage, soil erosion and pollution control, removal and disposal of the old culvert (if applicable), and topsoil conservation for site reclamation. Channel diversion or dewatering is required since an existing blockage will be removed for bridge construction. Disturbed areas are revegetated with a mix of site-adapted species. Scenario does not include additional measures needed to address channel incision, bank stability, and other factors associated with the presence of the bridge crossing.

RESOURCE CONCERNS: INADEQUATE HABITAT FOR FISH AND WILDLIFE –Habitat degradation; EXCESS WATER – Ponding, flooding, seasonal high water table, seeps, and drifted snow; WATER QUALITY DEGRADATION – Elevated water temperature; SOIL EROSION– Excessive bank erosion from streams shorelines or water conveyance channels
Assoicated Practices: (326) Clearing and Snagging, (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment; (395) Stream Habitat Improvement and Management, (410) Grade Stabilization Structure, (582) Open Channel, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection

Before Situation:

An existing undersized culvert creates an upstream passage blockage to fish and other aquatic orgnasims. The existing crossing does not meet State or Federal fish passage guidance.

After Situation:

The undersized culvert is replaced with a timber bridge placed on precast concrete abutments. The bridge deck is composed of timber planks, and elevated, continuous railings run down each side connecting one abutment to its counterpart on the opposite bank. Signs on either approach indicate bridge capacity and weight restrictions. Because the bridge spans the active channel and sits atop the adjacent floodplain surface, geomorphic and ecological functions are preserved through the crossing site, enhancing AOP, water quality, and culvert longevity. Resource Concerns are addressed within the context of the site. Typical Scenario is for a 30' span bridge 15' wide on precast concrete abutments.

Scenario Feature Measure: Linear feet of bridge deck

Scenario Unit: Linear Foot

Scenario Typical Size: 30

Scenario Cost: $50,525.66 **Scenario Cost/Unit:** $1,684.19

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	18	$9,150.66
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	40	$7,654.80
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	50	$10,679.50
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	40	$1,500.80
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	120	$2,769.60

Labor

Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	24	$989.52
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	80	$8,795.20
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	40	$1,525.60

Materials

Steel, structural steel members	1779	Structural steel, includes materials and fabrication.	Pound	$1.08	6000	$6,480.00

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 396 - Aquatic Organism Passage

Scenario: #12 - Bridge, Rail Car

Scenario Description:

A channel-spanning structure constructed from a used rail car that has been rated by a qualified licensed engineer (P.E.) for bridge capacity and weight restrictions. Bridge design is completed to conform to loading requirements and site conditions. The bridge deck is designed to rest on abutments placed on the adjacent floodplain.

Bridge components are delivered to the site and assembled by a combination of equipment and manual labor. They are installed with an assortment of equipment used for excavation, placing material, delivering and removing material, and lifting bridge components from delivery trucks onto the constructed bridge support elements. Other actions include construction staking and signage, soil erosion and pollution control, removal and disposal of the old culvert (if applicable), and topsoil conservation for site reclamation. Channel diversion or dewatering is required since an existing blockage will be removed for bridge construction. Disturbed areas are revegetated with a mix of site-adapted species. Scenario does not include additional measures needed to address foundations on soft soils, channel incision, bank stability, and other factors associated with the presence of the bridge crossing.

RESOURCE CONCERNS: INADEQUATE HABITAT FOR FISH AND WILDLIFE –Habitat degradation; EXCESS WATER – Ponding, flooding, seasonal high water table, seeps, and drifted snow; WATER QUALITY DEGRADATION – Elevated water temperature; SOIL EROSION– Excessive bank erosion from streams shorelines or water conveyance channels
Assoicated Practices: (326) Clearing and Snagging, (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment; (395) Stream Habitat Improvement and Management, (410) Grade Stabilization Structure, (582) Open Channel, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection.

Before Situation:

An existing undersized culvert creates an upstream passage blockage to fish and other aquatic orgnasims. The existing crossing does not meet State or Federal fish passage guidance.

After Situation:

The undersized culvert is replaced with a rail car bridge placed on precast concrete abutments. The bridge deck is composed of timber planks, and elevated, continuous railing, as determined by a licensed engineer. Signs on either approach indicate bridge capacity and weight restrictions. Because the bridge spans the active channel and sits atop the adjacent floodplain surface, geomorphic and ecological functions are preserved through the crossing site, enhancing AOP, water quality, and culvert longevity. Resource Concerns are addressed within the context of the site. Typical Scenario is for a 30' span bridge 14' wide on precast concrete abutments.

Scenario Feature Measure: Linear feet of bridge deck

Scenario Unit: Linear Foot

Scenario Typical Size: 30

Scenario Cost: $71,926.44 **Scenario Cost/Unit:** $2,397.55

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	18	$9,150.66
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	40	$7,654.80
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	50	$10,679.50
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	20	$824.60
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	40	$1,500.80

Labor

General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	120	$2,769.60
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	80	$8,795.20

Materials

Railcar Bridge	2261	A 'pre assembeled' bridge constructed from a used rail car with a railing. The structure has been evaluated by a PE and modified as needed to provide structural stability for highway loadings. Typical loadings are HS 20. Typical widths are 14', length.	Foot	$985.71	30	$29,571.30

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 396 - Aquatic Organism Passage

Scenario: #13 - Bridge, Manufactured

Scenario Description:

A channel-spanning structure constructure from a manufactured concrete or steel bridge structure that has been certified by a PE that carries a road or trailway across a river or stream. Bridge design is completed to conform to loading requirements and site conditions. The bridge deck is designed to rest on abutments placed on the adjacent floodplain.

Bridge components are delivered to the site and assembled by a combination of equipment and manual labor. They are installed with an assortment of equipment used for excavation, placing material, delivering and removing material, and lifting bridge components from delivery trucks onto the constructed bridge support elements. Other actions include construction staking and signage, soil erosion and pollution control, removal and disposal of the old culvert (if applicable), and topsoil conservation for site reclamation.Channel diversion or dewatering is required since an existing blockage will be removed for bridge construction. Disturbed areas are revegetated with a mix of site-adapted species. Scenario does not include additional measures needed to address channel incision, bank stability, and other factors associated with the presence of the bridge crossing.

RESOURCE CONCERNS: INADEQUATE HABITAT FOR FISH AND WILDLIFE –Habitat degradation; EXCESS WATER – Ponding, flooding, seasonal high water table, seeps, and drifted snow; WATER QUALITY DEGRADATION – Elevated water temperature; SOIL EROSION– Excessive bank erosion from streams shorelines or water conveyance channels
Assoicated Practices: (326) Clearing and Snagging, (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment; (395) Stream Habitat Improvement and Management, (410) Grade Stabilization Structure, (582) Open Channel, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection

Before Situation:

An existing undersized culvert creates an upstream passage blockage to fish and other aquatic orgnasims. The existing crossing does not meet State or Federal fish passage guidance.

After Situation:

The undersized culvert is replaced with a manufacturered bridge placed on precast concrete abutments. The bridge deck is composed of concrete or steel and elevated, continuous railings run down each side connecting one abutment to its counterpart on the opposite bank. Signs on either approach indicate bridge capacity and weight restrictions. Because the bridge spans the active channel and sits atop the adjacent floodplain surface, geomorphic and ecological functions are preserved through the crossing site, enhancing AOP, water quality, and culvert longevity. Resource Concerns are addressed within the context of the site. Typical Scenario is for a 30' span bridge 15' wide on precast concrete abutments.

Scenario Feature Measure: Linear feet of bridge deck

Scenario Unit: Linear Foot

Scenario Typical Size: 30

Scenario Cost: $71,753.64 **Scenario Cost/Unit:** $2,391.79

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	50	$10,679.50
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	40	$7,654.80
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	18	$9,150.66
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	80	$8,795.20
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	20	$824.60

Labor

General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	120	$2,769.60
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	40	$1,500.80

Materials

Bridge, steel or concrete, pre-Manufactured Bridge	2193	A premanufactured steel or precast prestressed concrete bridge rated for an HS 25 highway loading. Typical width is 14', length is variable. Includes railing system. Includes materials and shipping only.	Square Foot	$65.33	450	$29,398.50

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 396 - Aquatic Organism Passage

Scenario: #15 - Step Pool Weir

Scenario Description:

Step pool wiers are constructed features that provide passage around an instream barrier or in place of a removed barrier.

Step Pool Weirs are constructed with an assortment of equipment used for excavation, placing material, and delivering and removing material. CDisturbed areas are revegetated with a mix of site-adapted species, and access control and signage are provided. Scenario does not include additional measures needed in the active channel and floodplain or at an existing dam necessary to control flow associated with nature-like fishway.

RESOURCE CONCERNS: INADEQUATE HABITAT FOR FISH AND WILDLIFE –Habitat degradation; EXCESS WATER – Ponding, flooding, seasonal high water table, seeps, and drifted snow; WATER QUALITY DEGRADATION – Elevated water temperature; EROSION– Excessive bank erosion from streams shorelines or water conveyance channels
Assoicated Practices (326) Clearing and Snagging, (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment, 580 Streambank and Shoreline Protection, (395) Stream Habitat Improvement and Management, (410) Grade Stabilization Structure, (582) Open Channel, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection, (587) Structure for Water Control580 Streambank and Shoreline Protection

Before Situation:

An instream barrier prevents upstream migration of native aquatic organisms and no support exists for removal. Similarly, an instream barrier is removed, and interested parties require maintenance of an upstream pool or pond.

After Situation:

A step pool weir is constructed in place of a removed barrier. The step pool weir is constructed of rock that provides quality passage conditions for a number of species and geomorphic stability over a range of flows. Resource Concerns are addressed within the context of the site. The typical scenario is for a 35' wide channel 100 feet long with weirs every 10'.

Scenario Feature Measure: Cubic yds of material

Scenario Unit: Cubic Yard

Scenario Typical Size: 800

Scenario Cost: $89,406.56 **Scenario Cost/Unit:** $111.76

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	64	$6,220.16
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	10	$2,135.90
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	64	$12,247.68
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	80	$8,795.20
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	40	$1,649.20
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	80	$1,846.40
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	128	$4,802.56
Materials						

Materials

Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$32.69	292	$9,545.48
Boulder	1761	Rock boulders (approximately 5 ft dia. 6.67 Tons) Inlcudes materials and delivery (up to 100 miles) only.	Ton	$34.32	1200	$41,184.00

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 410 - Grade Stabilization Structure

Scenario: #1 - Check Dams

Scenario Description:

Typical setting is on a 40-acre pasture/hayland field having a slope of 5 to 10 percent where ephemeral gullies have formed. Typical installation consists of stabilizing/regrading the gully and installing six check dams with a top width of 3', average height of 2.5', 19' length, and 2:1 side slopes, ; containing an average of 21 tons of rock for a total of 126 tons. The check dams are underlain with geotextile fabric. Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as water quality degradation and soil erosion-concentrated flow erosion.

Before Situation:

The operator presently has erosion gullies forming and/or worsening on the farmland and impacting the useable area and the downstream water quality. Erosion from the gullies is allowing soil and possibly nutrients to be transported to downstream receiving waters degrading water quality and causing soil loss.

After Situation:

Area is stabilized. The advancement and/or formation of gullies is stopped, soil from gullies no longer leaves the farm, useable farm area is increased, sedimentation and other pollution hazards are decreased, and water quality downstream is protected. Any needed vegetation of disturbed areas use Critical Area Planting (342).

Scenario Feature Measure: Tons of rock installed

Scenario Unit: Ton

Scenario Typical Size: 126

Scenario Cost: $6,432.12 **Scenario Cost/Unit:** $51.05

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, large equipment, 50 ft	1222	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$1.53	160	$244.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	84	$5,489.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: **410 - Grade Stabilization Structure**

Scenario: **#2 - Embankment, Pipe <= 6 inch**

Scenario Description:

An earthen embankment dam with a principal spillway pipe of 6 inches or less. Assessment shows anti-seep collars or sand diaphragms are not required. To stabilized the grade and control erosion in natural or artificial channels, to prevent the formation or advancing of gullies, and to enhance environmental quality and reduce pollution hazards. Applied in areas where the concentration and flow velocity of water require structures to stabilize the grade in channels or to control gully erosion. Cost estimate is based upon a typical amount of earthfill of 2,000 cubic yards, and 80 feet of pipe 6" PVC pipe with a canopy inlet. A small, non-lined plunge pool protects the outlet channel. Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.

Before Situation:

The operator presently has gullies forming and/or worsening on the farmland and impacting the useable area and the downstream water quality. Erosion from the gullies is allowing soil and possibly nutrients to be transported to downstream receiving waters degrading water quality and causing soil loss.

After Situation:

Area is stabilized. The advancement and/or formation of gullies is stopped, soil from gullies no longer leaves the farm, useable farm area is increased, sedimentation and other pollution hazards are decreased, and water quality downstream is protected. Any needed re-vegetation of disturbed areas use Critical Area Planting (342). Other associated practices such as; Pond (378), Dam (402), Fence (382), Pumping Plant (533), Watering Facility (614), and Livestock Pipeline (516) will use the corresponding Standard(s) as appropriate.

Scenario Feature Measure: Cubic Yards of Earthfill

Scenario Unit: Cubic Yard

Scenario Typical Size: 2,000

Scenario Cost: $11,706.48 **Scenario Cost/Unit:** $5.85

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	5	$572.40
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	2000	$8,800.00
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	20	$115.60
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	5	$187.60
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	20	$762.80
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80
Materials						
Pipe, PVC, 6", SCH 40	980	Materials: - 6" - PVC - SCH 40 - ASTM D1785	Foot	$6.55	80	$524.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 410 - Grade Stabilization Structure

Scenario: #3 - Embankment, Pipe 8-12 inch

Scenario Description:

An earthen embankment dam with a principle spillway pipe between 8 and 12 inches, anti-seep collars or sand diaphragm, and excavated plunge pool basin. Installed to stabilized the grade and control erosion in natural or artificial channels, to prevent the formation or advancing of gullies, and to enhance environmental quality and reduce pollution hazards. Applied in areas where the concentration and flow velocity of water require structures to stabilize the grade in channels or to control gully erosion. Cost estimate is based upon a typical amount of earthfill of 2,500 cubic yards, 90 feet of 10" pace, pipe with a canopy inlet, and 3 cubic yard sand diaphragm. A non-lined plunge pool protects the outlet channel. Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.

Before Situation:

The operator presently has gullies forming and/or worsening on the farmland and impacting the useable area and the downstream water quality. Erosion from the gullies is allowing soil and possibly nutrients to be transported to downstream receiving waters degrading water quality and causing soil loss.

After Situation:

Area is stabilized. The advancement and/or formation of gullies is stopped, soil from gullies no longer leaves the farm, useable farm area is increased, sedimentation and other pollution hazards are decreased, and water quality downstream is protected. Any needed re-vegetation of disturbed areas use Critical Area Planting (342). Other associated practices such as; Pond (378), Dam (402), Fence (382), Pumping Plant (533), Watering Facility (614), and Livestock Pipeline (516) will use the corresponding Standard(s) as appropriate.

Scenario Feature Measure: Cubic Yards of Earthfill

Scenario Unit: Cubic Yard

Scenario Typical Size: 2,500

Scenario Cost: $17,130.82 **Scenario Cost/Unit:** $6.85

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	2500	$11,000.00
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	10	$1,144.80
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	29	$167.62
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	30	$692.40
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	10	$375.20
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	30	$1,144.20
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	3	$115.35
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.35	60	$81.00
Pipe, PVC, 10", SCH 80	1351	Materials: - 10" - PVC - SCH 80 - ASTM D1785	Foot	$20.29	90	$1,826.10
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Mobilization

Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	1	$70.87

Practice: 410 - Grade Stabilization Structure

Scenario: #4 - Embankment, Pipe >12 inch

Scenario Description:

An earthen embankment dam with a principle spillway pipe greater than 12 inches. Installed to stabilized the grade and control erosion in natural or artificial channels, to prevent the formation or advancing of gullies, and to enhance environmental quality and reduce pollution hazards. Applied in areas where the concentration and flow velocity of water require structures to stabilize the grade in channels or to control gully erosion. Cost estimate is based upon a typical amount of earthfill of 2,500 cubic yards, smooth steel drop inlet principle spillway with a 7 ft riser and 90 ft barrel, and 82 Square feet of anti-seep collars. A rock lined plunge pool protects the outlet channel. Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.

Before Situation:

The operator presently has gullies forming and/or worsening on the farmland and impacting the useable area and the downstream water quality. Erosion from the gullies is allowing soil and possibly nutrients to be transported to downstream receiving waters degrading water quality and causing soil loss.

After Situation:

Area is stabilized. The advancement and/or formation of gullies is stopped, soil from gullies no longer leaves the farm, useable farm area is increased, sedimentation and other pollution hazards are decreased, and water quality downstream is protected. Any needed re-vegetation of disturbed areas use Critical Area Planting (342). Other associated practices such as; Pond (378), Dam (402), Fence (382), Pumping Plant (533), Watering Facility (614), and Livestock Pipeline (516) will use the corresponding Standard(s) as appropriate.

Scenario Feature Measure: Cubic Yards of Earthfill

Scenario Unit: Cubic Yard

Scenario Typical Size: 2,500

Scenario Cost: $21,546.26 **Scenario Cost/Unit:** $8.62

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	129	$745.62
Concrete, CIP, formless, non reinforced	36	Non reinforced concrete cast-in-placed without forms by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	1	$160.90
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	2	$1,016.74
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	2500	$11,000.00
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	13	$1,488.24
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	13	$487.76
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	42	$969.36
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	38	$1,449.32
Materials						
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.85	30	$25.50

Materials

Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	14	$914.90
Steel, Plate, ⅛"	1047	Flat Steel Plate, ⅛" thick, materials only.	Square Foot	$4.74	82	$388.68
Pipe, Steel, 12", Std Wt, USED	1356	Materials: - USED - 12" - Steel Std Wt	Foot	$23.33	90	$2,099.70
Pipe, Steel, 16", Std Wt, USED	1357	Materials: - USED - 16" - Steel Std Wt	Foot	$30.77	7	$215.39

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	1	$70.87

Practice: 410 - Grade Stabilization Structure

Scenario: #6 - Pipe Drop, Plastic

Scenario Description:

A full flow pipe drop (ie: riser and barrel) grade stabilization structure designed and constructed using plastic pipe without anti-seep collars. This is typically a earthen dry dam structure with no permanent storage (water or sediment), however some structures may have some permanent pool / storage but do not have 35 years of sediment life. Payment rate is based upon the riser weir length (Diameter x 3.14) in feet times the length of the pipe barrel in (feet). Installed to stabilized the grade and control erosion in natural or artificial channels, to prevent the formation or advancing of gullies, and to enhance environmental quality and reduce pollution hazards. Applied in areas where the concentration and flow velocity of water require structures to stabilize the grade in channels or to control gully erosion.
Cost estimate is based upon 6 ft high 18" (1.5') PVC riser with a 40 ft long barrel (1.5' x 3.14 x 40' = 188 SF). Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.

Before Situation:

The operator presently has gullies forming and/or worsening on the farmland and impacting the useable area and the downstream water quality. Erosion from the gullies is allowing soil and possibly nutrients to be transported to downstream receiving waters degrading water quality and causing soil loss.

After Situation:

Area is stabilized. The advancement and/or formation of gullies is stopped, soil from gullies no longer leaves the farm, useable farm area is increased, sedimentation and other pollution hazards are decreased, and water quality downstream is protected. Any needed re- vegetation of disturbed areas use Critical Area Planting (342). Other associated practices such as; Pond (378), Dam (402), Fence (382), Channel Bed Stabilization (584), Dike (356), Grassed Waterway (412), Structure for Water Control (587), and Irrigation Canal or Lateral (320) will use the corresponding Standard(s) as appropriate.

Scenario Feature Measure: Riser Weir Length x Barrel Length

Scenario Unit: Square Foot

Scenario Typical Size: 188

Scenario Cost: $5,099.49 **Scenario Cost/Unit:** $27.12

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	100	$440.00
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	20	$115.60
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	1	$508.37
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	2	$228.96
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	2	$75.04
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Coupling, PVC, Tee, 24x18, SCH 40	1374	Materials: - Tee, 24"x18" - PVC - SCH 40 - ASTM D1785	Each	$1,626.91	1	$1,626.91
Pipe, PVC, 24", ASTM-2241, SDR 26	1945	Materials: -24" -PVC - ASTM 2241, SDR 26	Foot	$38.81	6	$232.86
Pipe, PVC, 18", SCH 40	1373	Materials: - 18" - PVC - SCH 40 - ASTM D1785	Foot	$33.99	40	$1,359.60

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	1	$70.87

Practice: 410 - Grade Stabilization Structure

Scenario: #7 - Pipe Drop, Steel

Scenario Description:

A full flow pipe drop (ie: riser and barrel) grade stabilization structure designed and constructed with a metal anti-seep collar. This is typically a earthen dry dam structure with no permanent storage (water or sediment), however some structures may have some permanent pool / storage but do not have 35 years of sediment life. Payment rate is based upon the riser weir length (Diameter x 3.14) in feet times the length of the pipe barrel in (feet). Installed to stabilized the grade and control erosion in natural or artificial channels, to prevent the formation or advancing of gullies, and to enhance environmental quality and reduce pollution hazards. Applied in areas where the concentration and flow velocity of water require structures to stabilize the grade in channels or to control gully erosion. Cost estimate is based upon a smooth steel pipe drop structure with a 36", 12' tall riser and a 100' long 30" barrel (Riser Weir length x Barrel Length = 3ft x 3.14 x 30ft = 940). Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.

Before Situation:

The operator presently has gullies forming and/or worsening on the farmland and impacting the useable area and the downstream water quality. Erosion from the gullies is allowing soil and possibly nutrients to be transported to downstream receiving waters degrading water quality and causing soil loss.

After Situation:

Area is stabilized. The advancement and/or formation of gullies is stopped, soil from gullies no longer leaves the farm, useable farm area is increased, sedimentation and other pollution hazards are decreased, and water quality downstream is protected. Any needed re- vegetation of disturbed areas use Critical Area Planting (342). Other associated practices such as; Pond (378), Dam (402), Fence (382), Channel Bed Stabilization (584), Dike (356), Grassed Waterway (412), Structure for Water Control (587), and Irrigation Canal or Lateral (320) will use the corresponding Standard(s) as appropriate.

Scenario Feature Measure: Riser Weir Length x Barrel Length

Scenario Unit: Square Foot

Scenario Typical Size: 940

Scenario Cost: $14,864.92 **Scenario Cost/Unit:** $15.81

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	600	$2,640.00
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	100	$578.00
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	4	$457.92
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	4	$150.08
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	11	$419.54
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80
Materials						
Steel, Plate, ⅛"	1047	Flat Steel Plate, ⅛" thick, materials only.	Square Foot	$4.74	30	$142.20
Pipe, Steel, 30", Std Wt, USED	1361	Materials: - USED - 30" - Steel Std Wt	Foot	$82.66	100	$8,266.00
Steel, Plate, 3/8"	1375	Flat steel plate, 3/8" thickness. Materials only.	Square Foot	$14.43	9	$129.87
Pipe, Steel, 36", Std Wt, USED	1362	Materials: - USED - 36" - Steel Std Wt	Foot	$105.53	12	$1,266.36
Mobilization						

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	1	$70.87

Practice: 410 - Grade Stabilization Structure

Scenario: #8 - Weir Drop Structures

Scenario Description:

A Straight, semicircular, or Box Drop structure composed of metal or reinforced concrete used to stabilized the grade and control erosion in natural or artificial channels, to prevent the formation or advancing of gullies, and to enhance environmental quality and reduce pollution hazards. Applied in areas where the concentration and flow velocity of water require structures to stabilize the grade in channels or to control gully erosion. Cost estimate is based upon a semicircular steel toe wall structure with a drop of 3ft and weir length of 30ft (90 square feet). The unit of payment measurement is defined as weir length times drop in "feet". The drop (feet) is defined as the structure inlet crest elevation minus the control outlet elevation (ie: outlet apron elevation).Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.

Before Situation:

The operator presently has gullies forming and/or worsening on the farmland and impacting the useable area and the downstream water quality. Erosion from the gullies is allowing soil and possibly nutrients to be transported to downstream receiving waters degrading water quality and causing soil loss.

After Situation:

Area is stabilized. The advancement and/or formation of gullies is stopped, soil from gullies no longer leaves the farm, useable farm area is increased, sedimentation and other pollution hazards are decreased, and water quality downstream is protected. Any needed re-vegetation of disturbed areas use Critical Area Planting (342). Other associated practices such as; Pond (378), Dam (402), Fence (382), Channel Bed Stabilization (584), Dike (356), Grassed Waterway (412), Structure for Water Control (587), Subsurface Drain (606), and Underground Outlet (620) will use the corresponding Standard(s) as appropriate.

Scenario Feature Measure: Feet of Weir length times Drop Height

Scenario Unit: Square Foot

Scenario Typical Size: 90

Scenario Cost: $9,326.07 **Scenario Cost/Unit:** $103.62

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	40	$94.80
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	9	$4,575.33
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	9	$22.05
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	5	$572.40
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	75	$330.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	30	$692.40
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	10	$381.40
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	5	$187.60
Materials						

Materials

Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	3	$116.91
Corrugated Steel, 12 Gauge, galvanized	1376	Corrugated Steel, 12 gauge, 3" by 1" corrugations, galvanized, meets ASTM A 929. Materials only.	Square Foot	$7.25	212	$1,537.00
Pipe, CMP, 12", 14 Gauge	1377	12" - Corrugated Steel Pipe. Galvanized, uncoated. 14 Gauge. Materials only.	Foot	$9.77	2	$19.54
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$25.76	11	$283.36

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 410 - Grade Stabilization Structure

Scenario: #9 - Rock Drop Structures

Scenario Description:

A Straight Drop structure constructed of rock riprap held in place by galvanized wire, such as, gabion baskets, fence panels, or "sausage" baskets. These structures are used to stabilized the grade and control erosion in natural or artificial channels, to prevent the formation or advancing of gullies, and to enhance environmental quality and reduce pollution hazards. Applied in areas where the concentration and flow velocity of water require structures to stabilize the grade in channels or to control gully erosion. Cost estimate is based upon a gabion wall structure with a drop of 3ft and weir length of 8ft (48 square feet). The unit of payment measurement is defined as weir length times drop in "feet". The drop (feet) is defined as the structure inlet crest elevation minus the control outlet elevation (ie: outlet apron elevation).Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.

Before Situation:

The operator presently has gullies forming and/or worsening on the farmland and impacting the useable area and the downstream water quality. Erosion from the gullies is allowing soil and possibly nutrients to be transported to downstream receiving waters degrading water quality and causing soil loss.

After Situation:

Area is stabilized. The advancement and/or formation of gullies is stopped, soil from gullies no longer leaves the farm, useable farm area is increased, sedimentation and other pollution hazards are decreased, and water quality downstream is protected. Any needed re-vegetation of disturbed areas use Critical Area Planting (342). Other associated practices such as; Pond (378), Dam (402), Fence (382), Channel Bed Stabilization (584), Dike (356), Grassed Waterway (412), Structure for Water Control (587), Subsurface Drain (606), and Underground Outlet (620) will use the corresponding Standard(s) as appropriate.

Scenario Feature Measure: Feet of Weir length times Drop Height

Scenario Unit: Square Foot

Scenario Typical Size: 48

Scenario Cost: $3,717.25 **Scenario Cost/Unit:** $77.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	23	$56.35
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	7	$16.59
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	5	$572.40
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	40	$176.00
Tractor, agricultural, 210 HP	1201	Agricultural tractor with horsepower range of 190 to 240. Equipment and power unit costs. Labor not included.	Hour	$101.72	3	$305.16
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	10	$412.30
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	5	$187.60
Materials						
Gabion basket or mat	1378	Gabion baskets or mats installed and filled on grade, includes materials, transport, equipment, and labor, does not include geotextile fabric.	Cubic Yard	$178.11	7	$1,246.77

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 410 - Grade Stabilization Structure

Scenario: #10 - Log Drop Structures

Scenario Description:

A Straight Drop structure constructed using bioengineering principles. In this instance the drop structure is constructed of logs, rock riprap, and earthfill. These structures are used to stabilized the grade and control erosion in natural or artificial channels, to prevent the formation or advancing of gullies, and to enhance environmental quality and reduce pollution hazards. Applied in areas where the concentration and flow velocity of water require structures to stabilize the grade in channels or to control gully erosion. Cost estimate is based upon an 8 foot weir length and 3 foot drop. The unit of payment measurement is each. Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.

Before Situation:

The operator presently has gullies forming and/or worsening on the farmland and impacting the useable area and the downstream water quality. Erosion from the gullies is allowing soil and possibly nutrients to be transported to downstream receiving waters degrading water quality and causing soil loss.

After Situation:

Area is stabilized using using an engineered structure utilizing natural materials (bioengineered). The advancement and/or formation of gullies is stopped, soil from gullies no longer leaves the farm, useable farm area is increased, sedimentation and other pollution hazards are decreased, and water quality downstream is protected. Any needed re-vegetation of disturbed areas use Critical Area Planting (342). Other associated practices such as; Pond (378), Dam (402), Fence (382), Channel Bed Stabilization (584), Dike (356), Grassed Waterway (412), Structrue for Water Control (587), Subsurface Drain (606), and Underground Outlet (620) will use the corresponding Standard(s) as appropriate.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $5,357.52 **Scenario Cost/Unit:** $5,357.52

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	1	$37.31
Trailer, flatbed, small	1505	Small flatbed trailer (typically less than 30' in length) pulled by a pickup to transport materials and equipment. Truck not included.	Hour	$6.52	1	$6.52
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	40	$176.00
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	12	$1,373.76
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	10	$23.70
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	11	$26.95
Tractor, agricultural, 210 HP	1201	Agricultural tractor with horsepower range of 190 to 240. Equipment and power unit costs. Labor not included.	Hour	$101.72	20	$2,034.40
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	4	$25.28
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	5	$206.15
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	12	$450.24
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	20	$461.60

Labor

Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	1	$22.33

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 410 - Grade Stabilization Structure

Scenario: #11 - Sheet Pile

Scenario Description:

Upland channel has degraded and become disconnected from the floodplain. Sheet piles are installed every 30 feet providing a stair stepping effect with an approximate drop between each structure of less than 1 foot.. Eroded areas between sheet piles are then filled in with adjacent material form the floodplain, restoring the channel to pre-eroded grade. Some fill material is placed at the end of the sheet pile to force larger flows away from the sheet pile edges and out onto the floodplain. Disturbed areas are re-vegetated for erosion control and upland habitat improvement. Assoc practices are 342-Critical Area Planting and 612-Tree/Shrub Establishement.

Before Situation:

Typical upland gully/channel is trapezoidal in shape, with a 10-foot bottom width and a 30-foot top width. Channel has eroded approximately 10-feet below it orginal grade. Side slopes are variable and may or may not be actively eroding.

After Situation:

This scenario represents the treatment of a 500 foot long reach using PVC sheet pile structures that are installed every 20-feet across the existing channe/gully. The sheet piles are keyed into undisturbed material both vertically and horizontally. The areas between the sheet piles are filled in with earth material taken from the adjacent flooplain. The compacted effort of the fill material is minimal. Rock rip is placed just downstream of each sheet pile structure to prevent downstream scour.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 25

Scenario Cost: $159,996.00 **Scenario Cost/Unit:** $6,399.84

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Sheet piling, PVC, 15'	1338	PVC sheet pile, panels or barrier driven up to 15 feet and left in place. Includes materials, equipment and labor.	Square Foot	$14.20	10000	$142,000.00
Excavation, common earth, large equipment, 50 ft	1222	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$1.53	3000	$4,590.00
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	3000	$10,830.00
Materials						
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$25.76	100	$2,576.00

Practice: 412 - Grassed Waterway

Scenario: #1 - Base Waterway

Scenario Description:

A grassed waterway that is a shaped or graded channel and is established with suitable vegetation to carry surface water at a non-erosive velocity to a stable outlet. Waterways area measured from top of bank to top of bank. Costs include excavation and associated work to construct the overall shape and grade of the waterway. Typical practice is 1200 ' long, 12' bottom, 8:1 side slopes, 1.5' depth, half excavation and is is typically installed using a dozer.
Resource Concerns: Concentrated Flow Erosion (Classic Gully & Ephemeral Erosion) and Excessive Sediment in surface waters.
Use Critical Area Planting (342) for establishment of waterway vegetation. If erosion control blankets or mulching for seedbed establishment/protection are needed, use conservation practice Mulching (484). Drainage tile, if needed, will be installed according to Subsurface Drain (606). Outlets, if needed will be installed using Structure for Water Control (587). If inlet Structures are needed with the drainage tile, then those will be installed using Underground Outlet (620).

Before Situation:

Excessive sedimentation and soil erosion as a result from ephemeral or classic gully erosion. Gully has formed in field as a result of excessive runoff and/or poor cropping techniques. Runoff from concentrated flows, terrarces, diversions, or water control structures or similar practices is in need of a suitable, stable outlet.

After Situation:

A grassed waterway is installed (shaped or graded channel) and is established with suitable vegetation to carry surface water at a non-erosive velocity to a stable outlet. Runoff is conveyed from terraces, diversions, or other water concentrations without causing erosion or flooding. Water quality and gully erosion is protected and/or improved.

Scenario Feature Measure: Acre of Waterway

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $1,583.51 **Scenario Cost/Unit:** $1,583.51

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, large equipment, 50 ft	1222	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$1.49	800	$1,192.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	4	$99.84
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	1	$42.23
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$249.44	1	$249.44

Practice: 412 - Grassed Waterway

Scenario: #2 - Waterway with Checks

Scenario Description:

A grassed waterway that is a shaped or graded channel and is established with suitable vegetation to carry surface water at a non-erosive velocity to a stable outlet. Fabric or stone checks are installed every 100 feet along the length of the waterway perpendicular to waterflow and are 2/3 the waterway top width to reduce maintenance and provide temporary protection until vegetation is established. Fabric Checks are installed 18" deep with 12" laid over on the surface. (Alternatively, rock checks could be installed). Typical practice is 1200 ' long, 12' bottom, 8:1 side slopes, 1.5' depth, half excavation. Waterway area measured from top of bank to top of bank. Costs include excavation and associated work to construct the overall shape and grade of the waterway.
Resource Concerns: Concentrated Flow Erosion (Classic Gully & Ephemeral Erosion) and Excessive Sediment in surface waters.
Use Critical Area Planting (342) for establishment of waterway vegetation. If erosion control blankets or mulching for seedbed establishment/protection are needed, use conservation practice Mulching (484). Drainage tile, if needed, will be installed according to Subsurface Drain (606). Outlets, if needed will be installed using Structure for Water Control (587). If inlet Structures are needed with the drainage tile, then those will be installed using Underground Outlet (620).

Before Situation:

Excessive sedimentation and soil erosion as a result from ephemeral or classic gully erosion. Gully has formed in field as a result of excessive runoff and/or poor cropping techniques. Runoff from concentrated flows, terrarces, diversions, or water control structures or similar practices is in need of a suitable, stable outlet.

After Situation:

A grassed waterway is installed (shaped or graded channel) and is established with suitable vegetation to carry surface water at a non-erosive velocity to a stable outlet. Runoff is conveyed from terraces, diversions, or other water concentrations without causing erosion or flooding. Water quality and gully erosion is protected and/or improved.

Scenario Feature Measure: Acre of Waterway

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $2,465.99 **Scenario Cost/Unit:** $2,465.99

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.62	33	$185.46
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.30	33	$75.90
Excavation, common earth, large equipment, 50 ft	1222	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$1.49	800	$1,192.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	12	$299.52
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	2	$84.46
Materials						
Geotextile, non-woven, light weight	1209	Non-woven less than 8 ounce/square yard geotextile with staple anchoring. Materials and shipping only.	Square Yard	$1.08	132	$142.56
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$249.44	1	$249.44
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$68.88	1	$68.88

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$167.77	1	$167.77

Practice: 422 - Hedgerow Planting

Scenario: #1 - Single Row

Scenario Description:

A single row of woody vegetation is planted in a linear design. Hedgerow is used on any land type where it is necessary to address one or more of the following resource concerns: Inadequate Habitat for Fish and Wildlife, reduce emissions of particulate matter; reduce objectionable odors; soil erosion; soil quality degradation. One row of shrubs and/or trees are planted based on State Technical guidance. Some non-competitive tall herbaceous vegetation may also be included. Average height of hedgerow will be at least 3 feet and will extend 15 feet wide at maturity.

Before Situation:

One or more of the following resource concerns are identified on the site: soil is lost to sheet and rill erosion; sediments are deposited into surface waters; there is lack of wildlife or pollinator habitat; air or soil quality issues are present.

After Situation:

A single-row hedgerow is installed to resolve the identified resource concerns.

Scenario Feature Measure: Length of Hedgerow

Scenario Unit: Feet

Scenario Typical Size: 800

Scenario Cost: $1,995.80 **Scenario Cost/Unit:** $2.49

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tractor, agricultural, 30 HP	1501	Agricultural tractor with horsepower range of less than 50. Equipment and power unit costs. Labor not included.	Hour	$7.61	22	$167.42
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.22	22	$246.84
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.52	0.25	$2.88
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.21	0.25	$1.55
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	0.75	$7.65
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	22	$549.12
Materials						
Three Species Mix, Native Forb	2333	Native forb mix. Includes material and shipping only.	Acre	$545.96	0.25	$136.49
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.12	266	$563.92
Shrub, seedling or transplant, bare root, 18"-36"	1507	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.54	266	$143.64
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.28	12	$3.36
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.43	12	$5.16
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$167.77	1	$167.77

Practice: **422 - Hedgerow Planting**

Scenario: **#2 - Single Row in Rugged Terrain**

Scenario Description:

A single row of woody vegetation is planted in a linear design on difficult or rugged terrain. Rugged terrain is defined as having greater than 30% slope or on rocky soils requiring additional time for installation. Hedgerow is used on any land type where it is necessary to address one or more of the following resource concerns: Inadequate Habitat for Fish and Wildlife, reduce emissions of particulate matter; reduce objectionable odors; soil erosion; soil quality degradation. One row of shrubs and/or trees are planted based on State Technical guidance. Some non-competitive tall herbaceous vegetation may also be included. Average height of hedgerow will be at least 3 feet and will extend 15 feet wide at maturity.

Before Situation:

One or more of the following resource concerns are identified on the site: soil is lost to sheet and rill erosion; sediments are deposited into surface waters; there is lack of wildlife or pollinator habitat; air or soil quality issues are present.

After Situation:

A single-row hedgerow is installed to resolve the identified resource concerns.

Scenario Feature Measure: Length of Hedgerow

Scenario Unit: Feet

Scenario Typical Size: 800

Scenario Cost: $2,445.08 **Scenario Cost/Unit:** $3.06

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	0.75	$7.65
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.22	22	$246.84
Tractor, agricultural, 30 HP	1501	Agricultural tractor with horsepower range of less than 50. Equipment and power unit costs. Labor not included.	Hour	$7.61	22	$167.42
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.52	0.25	$2.88
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.21	0.25	$1.55
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	40	$998.40
Materials						
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.12	266	$563.92
Three Species Mix, Native Forb	2333	Native forb mix. Includes material and shipping only.	Acre	$545.96	0.25	$136.49
Shrub, seedling or transplant, bare root, 18"-36"	1507	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.54	266	$143.64
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.43	12	$5.16
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.28	12	$3.36
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$167.77	1	$167.77

Practice: 422 - Hedgerow Planting

Scenario: #3 - Single Row, with Wind Protection

Scenario Description:

A single row of woody vegetation is planted in a linear design. A fence (typically a slatted wood snow fence, or equivalent) is installed adjacent to plantings that is sufficient to protect seedlings from windblown sand during establishment. Hedgerow with seedling protection is typically used on or adjacent to cropland where wind erosion is a primary resource concern. Additional benefits may be realized for one or more of the following resource concerns: Inadequate Habitat for Fish and Wildlife, reduce objectionable odors; soil quality degradation. One row of shrubs and/or trees are planted based on State Technical guidance. Some non-competitive tall herbaceous vegetation may also be included. Average height of hedgerow will be at least 3 feet and will extend 15 feet wide at maturity.

Before Situation:

Windblown sand and silt is a problem making it difficult to establish young seedlings. Additionally, one or more of the following resource concerns are identified on the site: soil is lost to sheet and rill erosion; sediments are deposited into surface waters; there is lack of wildlife or pollinator habitat; air or soil quality issues are present.

After Situation:

A single-row hedgerow is installed with an adjacent fence that will protect seedlings from windblown sand damage during establishment. Identified resource concerns are treated.

Scenario Feature Measure: Length of Hedgerow

Scenario Unit: Feet

Scenario Typical Size: 800

Scenario Cost: $3,075.48 **Scenario Cost/Unit:** $3.84

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	0.75	$7.65
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.21	0.25	$1.55
Tractor, agricultural, 30 HP	1501	Agricultural tractor with horsepower range of less than 50. Equipment and power unit costs. Labor not included.	Hour	$7.61	22	$167.42
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.22	22	$246.84
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.52	0.25	$2.88
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	30	$748.80
Materials						
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.12	266	$563.92
Shrub, seedling or transplant, bare root, 18"-36"	1507	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.54	266	$143.64
Snow Fence	1307	Wooden slatted fence used for control of snow accumulation and dune protection. Materials only.	Foot	$1.10	800	$880.00
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.28	12	$3.36
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.43	12	$5.16
Three Species Mix, Native Forb	2333	Native forb mix. Includes material and shipping only.	Acre	$545.96	0.25	$136.49
Mobilization						

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$167.77	1	$167.77

Practice: 422 - Hedgerow Planting

Scenario: #4 - Double Row, Both Woody

Scenario Description:

Two rows of woody vegetation are planted in a linear design. Hedgerow is used on any land type where it is necessary to address one or more of the following resource concerns: Inadequate Habitat for Fish and Wildlife, reduce emissions of particulate matter; reduce objectionable odors; soil erosion; soil quality degradation. Two rows of shrubs and/or trees are planted based on State Technical guidance. Some non-competitive tall herbaceous vegetation may also be included. Average height of hedgerow will be at least 3 feet and will extend 15 feet wide at maturity.

Before Situation:

One or more of the following resource concerns are identified on the site: soil is lost to sheet and rill erosion; sediments are deposited into surface waters; there is lack of wildlife or pollinator habitat; air or soil quality issues are present.

After Situation:

A hedgerow is installed in a design that will resolve the identified resource concerns.

Scenario Feature Measure: Length of Hedgerow

Scenario Unit: Feet

Scenario Typical Size: 800

Scenario Cost: $3,821.07 **Scenario Cost/Unit:** $4.78

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.52	0.5	$5.76
Tractor, agricultural, 30 HP	1501	Agricultural tractor with horsepower range of less than 50. Equipment and power unit costs. Labor not included.	Hour	$7.61	36	$273.96
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.21	0.5	$3.11
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	1.5	$15.30
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.22	36	$403.92
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	36	$898.56
Materials						
Three Species Mix, Native Forb	2333	Native forb mix. Includes material and shipping only.	Acre	$545.96	0.5	$272.98
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.43	25	$10.75
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.28	25	$7.00
Shrub, seedling or transplant, bare root, 18"-36"	1507	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.54	266	$143.64
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.12	426	$903.12
Shrub, seedling or transplant, potted, 1/2 to 1 gal.	1526	Potted shrub, 1/2 to 1 gal. Includes materials and shipping only.	Each	$4.47	160	$715.20
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$167.77	1	$167.77

Practice: 422 - Hedgerow Planting

Scenario: #5 - Double Row, Both Woody, Rugged Terrain

Scenario Description:

Two rows of woody vegetation are planted in a linear design on difficult or rugged terrain. Rugged terrain is defined as having greater than 30% slope or on rocky soils requiring additional time for installation. Hedgerow is used on any land type where it is necessary to address one or more of the following resource concerns: Inadequate Habitat for Fish and Wildlife, reduce emissions of particulate matter; reduce objectionable odors; soil erosion; soil quality degradation. Two rows of shrubs and/or trees are planted based on State Technical guidance. Some non-competitive tall herbaceous vegetation may also be included. Average height of hedgerow will be at least 3 feet and will extend 15 feet wide at maturity.

Before Situation:

One or more of the following resource concerns are identified on the site: soil is lost to sheet and rill erosion; sediments are deposited into surface waters; there is lack of wildlife or pollinator habitat; air or soil quality issues are present.

After Situation:

A hedgerow is installed in a design that will resolve the identified resource concerns.

Scenario Feature Measure: Length of Hedgerow

Scenario Unit: Feet

Scenario Typical Size: 800

Scenario Cost: $4,336.43 **Scenario Cost/Unit:** $5.42

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.21	0.5	$3.11
Tractor, agricultural, 30 HP	1501	Agricultural tractor with horsepower range of less than 50. Equipment and power unit costs. Labor not included.	Hour	$7.61	52	$395.72
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	1.5	$15.30
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.52		
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.22	36	$403.92
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	52	$1,297.92
Materials						
Shrub, seedling or transplant, potted, 1/2 to 1 gal.	1526	Potted shrub, 1/2 to 1 gal. Includes materials and shipping only.	Each	$4.47	160	$715.20
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.28	25	$7.00
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.12	426	$903.12
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.43	25	$10.75
Three Species Mix, Native Forb	2333	Native forb mix. Includes material and shipping only.	Acre	$545.96	0.5	$272.98
Shrub, seedling or transplant, bare root, 18"-36"	1507	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.54	266	$143.64
Mobilization						

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$167.77	1	$167.77

Practice: 422 - Hedgerow Planting

Scenario: #6 - Double Row, Both Woody, Wind Protected

Scenario Description:

Two rows of woody vegetation is planted in a linear design. A fence (typically a slatted wood snow fence, or equivalent) is installed adjacent to plantings that is sufficient to protect seedlings from windblown sand during establishment. Hedgerow with seedling protection is typically used on or adjacent to cropland where wind erosion is a primary resource concern. Additional benefits may be realized for one or more of the following resource concerns: Inadequate Habitat for Fish and Wildlife, reduce objectionable odors; soil quality degradation. Two rows of shrubs and/or trees are planted based on State Technical guidance. Some non-competitive tall herbaceous vegetation may also be included. Average height of hedgerow will be at least 3 feet and will extend 15 feet wide at maturity.

Before Situation:

Windblown sand and silt is a problem making it difficult to establish young seedlings. Additionally, one or more of the following resource concerns are identified on the site: soil is lost to sheet and rill erosion; sediments are deposited into surface waters; there is lack of wildlife or pollinator habitat; air or soil quality issues are present.

After Situation:

A double-row hedgerow is installed with an adjacent fence that will protect seedlings from windblown sand damage during establishment. Identified resource concerns are treated.

Scenario Feature Measure: Length of Hedgerow

Scenario Unit: Feet

Scenario Typical Size: 800

Scenario Cost: $4,900.75 **Scenario Cost/Unit:** $6.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	1.5	$15.30
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.22	36	$403.92
Tractor, agricultural, 30 HP	1501	Agricultural tractor with horsepower range of less than 50. Equipment and power unit costs. Labor not included.	Hour	$7.61	36	$273.96
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.21	0.5	$3.11
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.52	0.5	$5.76
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	44	$1,098.24
Materials						
Three Species Mix, Native Forb	2333	Native forb mix. Includes material and shipping only.	Acre	$545.96	0.5	$272.98
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.12	426	$903.12
Shrub, seedling or transplant, potted, 1/2 to 1 gal.	1526	Potted shrub, 1/2 to 1 gal. Includes materials and shipping only.	Each	$4.47	160	$715.20
Shrub, seedling or transplant, bare root, 18"-36"	1507	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.54	266	$143.64
Snow Fence	1307	Wooden slatted fence used for control of snow accumulation and dune protection. Materials only.	Foot	$1.10	800	$880.00
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.28	25	$7.00

Materials

Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.43	25	$10.75

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$167.77	1	$167.77

Practice: 422 - Hedgerow Planting

Scenario: #7 - Three Rows for Pollinators, Two Herbaceous

Scenario Description:

A three-row hedgerow is installed with one middle row as woody vegetation (tree/shrub) and the outer rows herbaceous/forbs. This scenario can be inplemented in areas where pollinator habitat is an additional wildlife habitat concern. Forbs planting consists of planting a single four foot wide row along each edge of the hedgerow. Providing optimal conditions for pollinators requires planting different flowering plants, shrubs or forbs so that there are species in bloom early (late winter-spring), mid season (Spring- early Summer), and late season (Summer-Fall). Typically a mixture of 5 or more species is planted to improve diversity so that pollen and nector are available as long as possible, ensuring bloomage at all times. Tillage is used to prepare the site for planting; forbs are planted by both drilling and plugging bunchgrasses. Follow specific State guidance for drilling and plugging rates. Flowering trees and shrubs adapted for local climatic and edaphic conditions are planted as the center row with strips of forbs on both sides.
Additional resource concerns addressed: reduce emissions of particulate matter; reduce objectionable odors; soil erosion; soil quality degradation.

Before Situation:

Pollen and nector sources are lacking or are only availble for part of the growing season. Large cropland tracks lack undisturbed areas for ground nesting bees

After Situation:

Flowering plants supply pollen and nector throughout the growing season. Undisturbed areas provide nesting sites for bees and other native pollinators.

Scenario Feature Measure: Length of Hedgerow

Scenario Unit: Feet

Scenario Typical Size: 800

Scenario Cost: $2,718.11 **Scenario Cost/Unit:** $3.40

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	0.75	$7.65
Tractor, agricultural, 30 HP	1501	Agricultural tractor with horsepower range of less than 50. Equipment and power unit costs. Labor not included.	Hour	$7.61	36	$273.96
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.21	0.25	$1.55
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.22	36	$403.92
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$19.56	0.15	$2.93
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	36	$898.56
Materials						
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.12	266	$563.92
Shrub, seedling or transplant, bare root, 18"-36"	1507	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.54	266	$143.64
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.28	12	$3.36
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.43	12	$5.16
Three Species Mix, Native Forb	2333	Native forb mix. Includes material and shipping only.	Acre	$545.96	0.45	$245.68
Mobilization						

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$167.77	1	$167.77

Practice: 422 - Hedgerow Planting

Scenario: #8 - Three Rows for Pollinators, Two Herbaceous, Rugged Terrain

Scenario Description:

A three-row hedgerow is installed with one middle row as woody vegetation (tree/shrub) and the outer rows herbaceous/forbs on rugged terrain. Rugged terrain is defined as having greater than 30% slope or on rocky soils requiring additional time for installation. This scenario can be inplemented in areas where pollinator habitat is an additional wildlife habitat concern. Forbs planting consists of planting a single four foot wide row along each edge of the hedgerow. Providing optimal conditions for pollinators requires planting different flowering plants, shrubs or forbs so that there are species in bloom early (late winter-spring), mid season (Spring- early Summer), and late season (Summer-Fall). Typically a mixture of 5 or more species is planted to improve diversity so that pollen and nector are available as long as possible, ensuring bloomage at all times. Tillage is used to prepare the site for planting; forbs are planted by both drilling and plugging bunchgrasses. Follow specific State guidance for drilling and plugging rates. Flowering trees and shrubs adapted for local climatic and edaphic conditions are planted as the center row with strips of forbs on both sides.
Additional resource concerns addressed: reduce emissions of particulate matter; reduce objectionable odors; soil erosion; soil quality degradation.

Before Situation:

Pollen and nector sources are lacking or are only availble for part of the growing season. Large cropland tracks lack undisturbed areas for ground nesting bees

After Situation:

Flowering plants supply pollen and nector throughout the growing season. Undisturbed areas provide nesting sites for bees and other native pollinators.

Scenario Feature Measure: Length of Hedgerow

Scenario Unit: Feet

Scenario Typical Size: 800

Scenario Cost: $3,174.09 **Scenario Cost/Unit:** $3.97

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.21	0.25	$1.55
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.22	36	$403.92
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$19.56	0.15	$2.93
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	0.75	$7.65
Tractor, agricultural, 30 HP	1501	Agricultural tractor with horsepower range of less than 50. Equipment and power unit costs. Labor not included.	Hour	$7.61	50	$380.50
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	50	$1,248.00
Materials						
Three Species Mix, Native Forb	2333	Native forb mix. Includes material and shipping only.	Acre	$545.96	0.45	$245.68
Shrub, seedling or transplant, bare root, 18"-36"	1507	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.54	266	$143.64
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.28	12	$3.36
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.43	12	$5.16
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.12	266	$563.92

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$167.77	1	$167.77

Practice: 422 - Hedgerow Planting

Scenario: #9 - Three Rows, Woody

Scenario Description:

Three rows of woody vegetation are planted in a linear design. Hedgerow is used on any land type where it is necessary to address one or more of the following resource concerns: Inadequate Habitat for Fish and Wildlife, reduce emissions of particulate matter; reduce objectionable odors; soil erosion; soil quality degradation. Three rows of shrubs and/or trees are planted based on State Technical guidance. Some non-competitive tall herbaceous vegetation may also be included. Average height of hedgerow will be at least 3 feet and will extend 15 feet wide at maturity.

Before Situation:

One or more of the following resource concerns are identified on the site: soil is lost to sheet and rill erosion; sediments are deposited into surface waters; there is lack of wildlife or pollinator habitat; air or soil quality issues are present.

After Situation:

A hedgerow is installed in a design that will resolve the identified resource concerns.

Scenario Feature Measure: Length of Hedgerow

Scenario Unit: Feet

Scenario Typical Size: 800

Scenario Cost: $5,494.67 **Scenario Cost/Unit:** $6.87

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.22	58	$650.76
Tractor, agricultural, 30 HP	1501	Agricultural tractor with horsepower range of less than 50. Equipment and power unit costs. Labor not included.	Hour	$7.61	58	$441.38
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.52	0.5	$5.76
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.21	0.5	$3.11
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	1.5	$15.30
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	58	$1,447.68
Materials						
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.43	25	$10.75
Three Species Mix, Native Forb	2333	Native forb mix. Includes material and shipping only.	Acre	$545.96	0.5	$272.98
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.12	693	$1,469.16
Shrub, seedling or transplant, potted, 1/2 to 1 gal.	1526	Potted shrub, 1/2 to 1 gal. Includes materials and shipping only.	Each	$4.47	160	$715.20
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.28	25	$7.00
Shrub, seedling or transplant, bare root, 18"-36"	1507	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.54	533	$287.82
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$167.77	1	$167.77

Practice: 428 - Irrigation Ditch Lining

Scenario: #1 - Concrete Lining

Scenario Description:

Construct quarter mile of concrete (2.5 inch in thickness) lining in an existing ditch alignment to convey water from the source of supply to a field or fields in a farm distribution system. Typical scenario includes filling the old ditch with on-site fill material, compacting, and constructing an 8 ft pad with on site fill material. This scenario does not include any check or outlets gates. A trapezoidal trencher forms the ditch (typical cross-section: 1 ft bottom, 2 ft depth including freeboard, and 1:1 side slope) and lining with concrete slip forms (total width = 7.32 ft).
Resource Concerns: Insufficient water - Inefficient use of irrigation water; Soil erosion - Excessive bank erosion from streams shorelines or channels.
Associated Practices: 320-Irrigation Canal or Lateral; 388-Irrigation Field Ditch; 443-Irrigation System, Surface or Subsurface Water; 533-Pumping Plant; 430-Irrigation Pipeline; 587-Structure for Water Control.

Before Situation:

Leaky and erosive earthen irrigation ditch.

After Situation:

Impervious lining prevents seepage, reduces energy use and improves water quality and irrigation efficiency.

Scenario Feature Measure: Surface Area of Lining

Scenario Unit: Square Yard

Scenario Typical Size: 1,074

Scenario Cost: $17,407.02 **Scenario Cost/Unit:** $16.21

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formless, non reinforced	36	Non reinforced concrete cast-in-placed without forms by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	75	$12,067.50
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	782	$3,440.80
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	368	$872.16
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	4	$1,026.56

Practice: **428 - Irrigation Ditch Lining**

Scenario: **#2 - Flexible Lining**

Scenario Description:

Construct quarter mile of uncovered flexible membrane (30mil HDPE) lining in an existing ditch alignment to convey water from the source of supply to a field or fields in a farm distribution system. Typical scenario includes subgrade preparation via clearing & grubbing, shaping old channel with no bedding or geotextile cushion to place, and placing membrane with 8 inch tuck/anchor on each side (total liner width = 8 ft). Scenario assumes typical trapezoidal ditch (1 ft bottom, 2 ft depth including freeboard, and 1:1 side slope).
Resource Concerns: Insufficient water - Inefficient use of irrigation water; Soil erosion - Excessive bank erosion from streams shorelines or channels.
Associated Practices: 320-Irrigation Canal or Lateral; 388-Irrigation Field Ditch; 443-Irrigation System, Surface or Subsurface Water; 533-Pumping Plant; 430-Irrigation Pipeline; 587-Structure for Water Control.

Before Situation:

Leaky and erosive earthen irrigation ditch.

After Situation:

Impervious lining prevents seepage, reduces energy use and improves water quality and irrigation efficiency.

Scenario Feature Measure: Surface Area of Lining

Scenario Unit: Square Yard

Scenario Typical Size: 1,173

Scenario Cost: $10,876.00 **Scenario Cost/Unit:** $9.27

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	16	$899.36
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	48	$1,979.04
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	48	$1,107.84
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	16	$357.28
Materials						
Synthetic Liner, 30 mil	1238	Synthetic 30 mil HDPE, LLDPE, EPDM, etc. membrane liner material. Includes materials and shipping only.	Square Foot	$0.57	10560	$6,019.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 428 - Irrigation Ditch Lining

Scenario: #3 - Semi Rigid HDPE Prefab Liner

Scenario Description:

This scenario is to be used only when concrete or flexible linings are not available, or when engineer determines that conditions require a rigid lining. Construct quarter mile (1320') of uncovered semi-rigid HDPE liner in an existing ditch alignment to convey water from the source of supply to a field or fields in a farm distribution system. Typical scenario includes subgrade preparation via clearing & grubbing, shaping old channel to place,and placing edge anchors as required for installation. Scenario assumes typical trapezoidal ditch (1 ft bottom, 2 ft depth including freeboard, and 1:1 side slope). Total width is 8 ft.
Resource Concerns: Insufficient water - Inefficient use of irrigation water; Soil erosion - Excessive bank erosion from streams shorelines or channels.

Associated Practices: 320-Irrigation Canal or Lateral; 388-Irrigation Field Ditch; 443-Irrigation System, Surface or Subsurface Water; 533-Pumping Plant; 430-Irrigation Pipeline; 587-Structure for Water Control.

Before Situation:

Leaky and erosive earthen irrigation ditch.

After Situation:

Impervious lining prevents seepage, reduces energy use and improves water quality and irrigation efficiency.

Scenario Feature Measure: Surface Area of Lining

Scenario Unit: Square Yard

Scenario Typical Size: 1,173

Scenario Cost: $54,570.96 **Scenario Cost/Unit:** $46.52

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	782	$3,440.80
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	368	$872.16
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	50	$1,154.00
Materials						
Ditch liner, HDPE, semi-rigid, 24" depth	2374	Semi-rigid, corrugated HDPE ditch liner, 24" depth. Materials only.	Foot	$37.20	1320	$49,104.00

Practice: 430 - Irrigation Pipeline

Scenario: #1 - PVC <4", Typical Install

Scenario Description:

Description: Below ground installation of PVC pipeline with a diameter of <4". Scenario covers the trenching in normal soils, placement of pipe with a diameter of 4" or less, all fittings, thrust blocks and appurtances and backfill & final grading of the trench.
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.Typical scenario is to construct 1/4 mile (1,320 feet) of 3", Class 160, PVC pipeline with appurtenances, installed below ground with a minimum of 2 feet of ground cover. The unit is weight of pipe material in pounds. 1,320 feet of 3", Class 160 PVC gasketed IPS pipe weighs 0.96 lb/ft, or a total of 1,267 pounds. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity) for a total weght of 1,395. Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 1,267

Scenario Cost: $5,444.19 **Scenario Cost/Unit:** $4.30

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.39	1320	$1,834.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	32	$738.56
Materials						
Pipe, PVC, dia. < 18", weight priced	1323	Polyvinyl Chloride (PVC) pressure rated pipe priced by the weight of the pipe materials for pipes with diameters less than 18". Materials only.	Pound	$1.69	1395	$2,357.55
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 430 - Irrigation Pipeline

Scenario: #2 - PVC <4", Difficult Install

Scenario Description:

Description: Below ground installation of PVC pipeline with a diameter of <4" in rocky soils. Scenario covers the trenching in rocky soils, placement of pipe with a diameter of 4" or less, all fittings, thrust blocks and appurtances and backfill & final grading of the trench.
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.Typical scenario is to construct 1/4 mile (1,320 feet) of 3", Class 160, PVC pipeline with appurtenances, installed below ground with a minimum of 2 feet of ground cover. Site has rocky soils requiring rock ripping for the excavation and import of 25% of the fill needed for backfill of the tranch. The unit is weight of pipe material in pounds. 1,320 feet of 3", Class 160 PVC gasketed IPS pipe weighs 0.96 lb/ft, or a total of 1,267 pounds. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity) for a total weght of 1,395. Cost of appurtenances does not include flow meters or backflow preventers.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 1,267

Scenario Cost: $9,517.16 **Scenario Cost/Unit:** $7.51

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	395	$967.75
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	395	$1,959.20
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	100	$181.00
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.32	200	$64.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	45	$1,038.60
Materials						
Pipe, PVC, dia. < 18", weight priced	1323	Polyvinyl Chloride (PVC) pressure rated pipe priced by the weight of the pipe materials for pipes with diameters less than 18". Materials only.	Pound	$1.69	1395	$2,357.55
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	50	$1,922.50
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	4	$1,026.56

Practice: 430 - Irrigation Pipeline

Scenario: #3 - PVC 4"-12", Typical Install

Scenario Description:

Description: Below ground installation of PVC pipeline with a diameter between 4" and 12". Scenario covers the trenching in normal soils, placement of pipe with a diameter of 4" to 12", all fittings, thrust blocks and appurtances and backfill & final grading of the trench.
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.Typical scenario is to construct 1/4 mile (1,320 feet) of 6", Class 160, PVC pipeline with appurtenances, installed below ground with a minimum of 2 feet of ground cover. The unit is weight of pipe material in pounds. 1,320 feet of 6", Class 160 PVC gasketed IPS pipe weighs 3.4 lb/ft, or a total of 4,488 pounds. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity) for a total weight of 4937. Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 4,488

Scenario Cost: $11,430.17 **Scenario Cost/Unit:** $2.55

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.39	1320	$1,834.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	32	$738.56
Materials						
Pipe, PVC, dia. < 18", weight priced	1323	Polyvinyl Chloride (PVC) pressure rated pipe priced by the weight of the pipe materials for pipes with diameters less than 18". Materials only.	Pound	$1.69	4937	$8,343.53
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 430 - Irrigation Pipeline

Scenario: #4 - PVC 4"-12", Difficult Install

Scenario Description:

Description: Below ground installation of PVC pipeline with a diameter between 4" and 12" in rocky soils. Scenario covers the trenching in rocky soils, placement of pipe with a diameter of 4" to 12", all fittings, thrust blocks and appurtances and backfill & final grading of the trench.
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.Typical scenario is to construct 1/4 mile (1,320 feet) of 6", Class 160, PVC pipeline with appurtenances, installed below ground with a minimum of 2 feet of ground cover. Site has rocky soils requiring rock ripping for the excavation and import of 25% of the fill needed for backfill of the tranch. The unit is weight of pipe material in pounds. 1,320 feet of 6", Class 160 PVC gasketed IPS pipe weighs 3.4 lb/ft, or a total of 4,488 pounds. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity) for a total weight of 4937. Cost of appurtenances does not include flow meters or backflow preventers.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 4,488

Scenario Cost: $15,503.14 **Scenario Cost/Unit:** $3.45

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	395	$967.75
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.32	200	$64.00
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	100	$181.00
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	395	$1,959.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	45	$1,038.60
Materials						
Pipe, PVC, dia. < 18", weight priced	1323	Polyvinyl Chloride (PVC) pressure rated pipe priced by the weight of the pipe materials for pipes with diameters less than 18". Materials only.	Pound	$1.69	4937	$8,343.53
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	50	$1,922.50
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	4	$1,026.56

Practice: 430 - Irrigation Pipeline

Scenario: #5 - PVC >12", Typical Install

Scenario Description:

Description: Below ground installation of PVC pipeline with a diameter greater than 12". Scenario covers the trenching in normal soils, placement of pipe with a diameter greater than 12", all fittings, thrust blocks and appurtances and backfill & final grading of the trench.
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.Typical scenario is to construct 1/4 mile (1,320 feet) of 15", Class 125, PVC pipeline with appurtenances, installed below ground with a minimum of 2 feet of ground cover. The unit is weight of pipe material in pounds. 1,320 feet of 15", Class 125 PVC gasketed PIP pipe weighs 14.92 lb/ft, or a total of 19,694 pounds. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity) for a total weight of 21,664 lbs. Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 19,694

Scenario Cost: $42,022.00 **Scenario Cost/Unit:** $2.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.15	1320	$4,158.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	32	$738.56
Materials						
Pipe, PVC, dia. < 18", weight priced	1323	Polyvinyl Chloride (PVC) pressure rated pipe priced by the weight of the pipe materials for pipes with diameters less than 18". Materials only.	Pound	$1.69	21664	$36,612.16
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 430 - Irrigation Pipeline

Scenario: #6 - PVC >12", Difficult Install

Scenario Description:

Description: Below ground installation of PVC pipeline with a diameter greater than 12" in rocky soils. Scenario covers the trenching in normal soils, placement of pipe with a diameter of greater than 12", all fittings, thrust blocks and appurtances and backfill & final grading of the trench.
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.Typical scenario is to construct 1/4 mile (1,320 feet) of 15", Class 160, PVC pipeline with appurtenances, installed below ground with a minimum of 2 feet of ground cover. Site has rocky soils requiring rock ripping for the excavation and import of 25% of the fill needed for backfill of the tranch. The unit is weight of pipe material in pounds. 1,320 feet of 15", Class 125 PVC gasketed PIP pipe weighs 14.92 lb/ft, or a total of 19,694 pounds. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity) for a total weight of 21,664 lbs. Cost of appurtenances does not include flow meters or backflow preventers.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 19,694

Scenario Cost: $45,967.92 **Scenario Cost/Unit:** $2.33

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	220	$398.20
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.32	440	$140.80
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	880	$2,156.00
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	880	$4,364.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	55	$1,269.40
Materials						
Pipe, PVC, dia. < 18", weight priced	1323	Polyvinyl Chloride (PVC) pressure rated pipe priced by the weight of the pipe materials for pipes with diameters less than 18". Materials only.	Pound	$1.69	21664	$36,612.16
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	4	$1,026.56

Practice: 430 - Irrigation Pipeline

Scenario: #7 - HDPE <4", Typical Install

Scenario Description:

Description: Below ground installation of HDPE pipeline with a diameter of less than 4". HDPE is manufactured in sizes (nominal diameter) from ½-inch to 24-inch;
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use Typical scenario size is 3-inch. Construct 1/4 mile (1,320 feet) of 3-inch, Class 160 HDPE pipeline with appurtenances, installed below ground with a minimum 2 feet of ground cover. The unit is weight of pipe material in pounds. 1,320 feet of 3-inch, Class 130 (SDR-13.5), HDPE weighs 1.36 lb/ft, or a total of 1,795 pounds. Appurtenances include: fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity) for a total weight of 1,975. Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 1,795

Scenario Cost: $8,668.16 **Scenario Cost/Unit:** $4.83

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Fuser for HDPE Pipe	1383	Fusing machine for 1" to 12" diameter HDPE pipe joints. Equipment costs only. Does not include labor.	Hour	$22.97	16	$367.52
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.39	1320	$1,834.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	32	$738.56
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.64	1975	$5,214.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 430 - Irrigation Pipeline

Scenario: #8 - HDPE <4", Difficult Intsall

Scenario Description:

Description: Below ground installation of HDPE pipeline with a diameter of less than 4" installed in rocky soils. HDPE is manufactured in sizes (nominal diameter) from ½-inch to 24-inch;
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use Typical scenario size is 3-inch. Construct 1/4 mile (1,320 feet) of 3-inch, Class 160 HDPE pipeline with appurtenances, installed below ground with a minimum 2 feet of ground cover. Site has rocky soils requiring rock ripping for the excavation and import of 25% of the fill needed for backfill of the tranch. The unit is weight of pipe material in pounds. 1,320 feet of 3- inch, Class 130 (SDR-13.5), HDPE weighs 1.36 lb/ft, or a total of 1,795 pounds. Appurtenances include: fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity) for a total weight of 1,975. Cost of appurtenances does not include flow meters or backflow preventers.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 1,795

Scenario Cost: $10,283.12 **Scenario Cost/Unit:** $5.73

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.32	200	$64.00
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	392	$960.40
Fuser for HDPE Pipe	1383	Fusing machine for 1" to 12" diameter HDPE pipe joints. Equipment costs only. Does not include labor.	Hour	$22.97	16	$367.52
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	100	$181.00
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	392	$1,944.32
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	45	$1,038.60
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.64	1975	$5,214.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 430 - Irrigation Pipeline

Scenario: #9 - HDPE 4-12", Typical Install

Scenario Description:

Description: Below ground installation of HDPE pipeline with a diameter beween 4" and 12". HDPE is manufactured in sizes (nominal diameter) from ½-inch to 24-inch;
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use. Typical scenario size is 6-inch. Construct 1/4 mile (1,320 feet) of 6-inch, Class 160 HDPE pipeline with appurtenances, installed below ground with a minimum 2 feet of ground cover. The unit is weight of pipe material in pounds. 1,320 feet of 6-inch, Class 160, HDPE weighs 4.87 lb/ft, or a total of 6,432 pounds. Appurtenances include: fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity) for a total weighet of 7,076 lbs. Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 6,432

Scenario Cost: $22,134.80 **Scenario Cost/Unit:** $3.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Fuser for HDPE Pipe	1383	Fusing machine for 1" to 12" diameter HDPE pipe joints. Equipment costs only. Does not include labor.	Hour	$22.97	16	$367.52
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.39	1320	$1,834.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	32	$738.56
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.64	7076	$18,680.64
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 430 - Irrigation Pipeline

Scenario: #10 - HDPE 4-12", Difficult Install

Scenario Description:

Description: Below ground installation of HDPE pipeline with a diameter beween 4" and 12" with installation in rocky soils. HDPE is manufactured in sizes (nominal diameter) from ½-inch to 24-inch;
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use. Typical scenario size is 6-inch. Construct 1/4 mile (1,320 feet) of 6-inch, Class 160 HDPE pipeline with appurtenances, installed below ground with a minimum 2 feet of ground cover. Site has rocky soils requiring rock ripping for the excavation and import of 25% of the fill needed for backfill of the tranch. The unit is weight of pipe material in pounds. 1,320 feet of 6- inch, Class 160, HDPE weighs 4.87 lb/ft, or a total of 6,432 pounds. Appurtenances include: fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity) for a total weighet of 7,076 lbs. Cost of appurtenances does not include flow meters or backflow preventers.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 6,432

Scenario Cost: $23,449.72 **Scenario Cost/Unit:** $3.65

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	392	$1,944.32
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	100	$181.00
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.32	200	$64.00
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	392	$960.40
Fuser for HDPE Pipe	1383	Fusing machine for 1" to 12" diameter HDPE pipe joints. Equipment costs only. Does not include labor.	Hour	$22.97	16	$367.52
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	32	$738.56
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.64	7076	$18,680.64
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 430 - Irrigation Pipeline

Scenario: #11 - HDPE >12", Typical Install

Scenario Description:

Description: Below ground installation of HDPE pipeline with a diameter greater 12". HDPE is manufactured in sizes (nominal diameter) from ½-inch to 24-inch;
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use Typical scenario size is 15-inch. Construct 1/4 mile (1,320 feet) of 15-inch, Clas160 (SDR11), HDPE pipeline with appurtenances, installed below ground with a minimum 2 feet of ground cover. The unit is weight of pipe material in pounds. 1,320 feet of 15-inch, Clas160 (SDR11), HDPE weighs 28.26 lb/ft for a total weight of 37,303 lbs. Appurtenances include: fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity) for a total weight of 41,034 lbs. Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 37,303

Scenario Cost: $111,783.92 **Scenario Cost/Unit:** $3.00

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Fuser for HDPE Pipe	1383	Fusing machine for 1" to 12" diameter HDPE pipe joints. Equipment costs only. Does not include labor.	Hour	$22.97	16	$367.52
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.39	1320	$1,834.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	32	$738.56
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.64	41034	$108,329.76
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 430 - Irrigation Pipeline

Scenario: #12 - HDPE >12", Difficult Install

Scenario Description:

Description: Below ground installation of HDPE pipeline with a diameter greater 12" in rocky soils. HDPE is manufactured in sizes (nominal diameter) from ½-inch to 24-inch;
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use Typical scenario size is 15-inch. Construct 1/4 mile (1,320 feet) of 15-inch, Class 130 (SDR-13.5), HDPE pipeline with appurtenances, installed below ground in rocky soils with a minimum 2 feet of ground cover. Site has rocky soils requiring rock ripping for the excavation and import of 25% of the fill needed for backfill of the tranch. The unit is weight of pipe material in pounds. 1,320 feet of 15-inch, Class 130 (SDR-13.5), HDPE weighs 28.26 lb/ft for a total weight of 37,303 lbs. Appurtenances include: fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity) for a total weight of 41,034 lbs. Cost of appurtenances does not include flow meters or backflow preventers.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 37,303

Scenario Cost: $117,539.76 **Scenario Cost/Unit:** $3.15

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	880	$2,156.00
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	880	$4,364.80
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.32	440	$140.80
Fuser for HDPE Pipe	1383	Fusing machine for 1" to 12" diameter HDPE pipe joints. Equipment costs only. Does not include labor.	Hour	$22.97	16	$367.52
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	220	$398.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	55	$1,269.40
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.64	41034	$108,329.76
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 430 - Irrigation Pipeline

Scenario: #13 - Surface HDPE <4"

Scenario Description:

Description: On-ground surface installation of HDPE (Iron Pipe Size & Tubing) pipeline with a diameter of less than 4". HDPE (IPS & Tubing) is manufactured in sizes (nominal diameter) from ½-inch to 24-inch.
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.and typical scenario size is 3-inch. Construct 1/4 mile (1,320 feet) of 3-inch, Class 200 (SDR-9.0), HDPE pipeline with appurtenances, installed on the ground surface. The unit is weight of pipe material in pounds. 1,320 feet of 2-inch, Class 200 (SDR-9.0), HDPE weighs 1.615 lb/ft, or a total of 2132 pounds. Appurtenances include: fittings, air vents, pressure relief valves, anchors, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 15% of pipe material quantity) for a total weight of 2,452 lbs. Cost of appurtenances does not include flow meters or backflow preventers.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 2,132

Scenario Cost: $7,168.06 **Scenario Cost/Unit:** $3.36

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Fuser for HDPE Pipe	1383	Fusing machine for 1" to 12" diameter HDPE pipe joints. Equipment costs only. Does not include labor.	Hour	$22.97	8	$183.76
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	16	$369.28
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.64	2452	$6,473.28
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	2	$141.74

Practice: 430 - Irrigation Pipeline

Scenario: #14 - Surface HDPE 4"-12"

Scenario Description:

Description: On-ground surface installation of HDPE (Iron Pipe Size & Tubing) pipeline with a diameter between 4" and 12". HDPE (IPS & Tubing) is manufactured in sizes (nominal diameter) from ½-inch to 24-inch.
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.and typical scenario size is 10-inch. Construct 1/4 mile (1,320 feet) of 10-inch, Class 200 (SDR-9.0), HDPE pipeline with appurtenances, installed on the ground surface. The unit is weight of pipe material in pounds. 1,320 feet of 10-inch, Class 200 (SDR-9.0), HDPE weighs 15.22 lb/ft, or a total of 20,091 pounds. Appurtenances include: fittings, air vents, pressure relief valves, anchors, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 15% of pipe material quantity) for a total weight of 23,104. Cost of appurtenances does not include flow meters or backflow preventers.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 20,091

Scenario Cost: $61,689.34 **Scenario Cost/Unit:** $3.07

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Fuser for HDPE Pipe	1383	Fusing machine for 1" to 12" diameter HDPE pipe joints. Equipment costs only. Does not include labor.	Hour	$22.97	8	$183.76
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	16	$369.28
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.64	23104	$60,994.56
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	2	$141.74

Practice: 430 - Irrigation Pipeline

Scenario: #15 - Surface HDPE >12"

Scenario Description:

Description: On-ground surface installation of HDPE (Iron Pipe Size & Tubing) pipeline with a diameter greater than 12". HDPE (IPS & Tubing) is manufactured in sizes (nominal diameter) from ½-inch to 24-inch.
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.and typical scenario size is 15-inch. Construct 1/4 mile (1,320 feet) of 16-inch, Class 200 (SDR-9.0), HDPE pipeline with appurtenances, installed on the ground surface. The unit is weight of pipe material in pounds. 1,320 feet of 16-inch, Class 200 (SDR-9.0), HDPE weighs 33.74 lb/ft, or a total of 44,537 pounds. Appurtenances include: fittings, air vents, pressure relief valves, anchors, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 15% of pipe material quantity) for a total weight of 51,217 lbs. Cost of appurtenances does not include flow meters or backflow preventers.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 44,537

Scenario Cost: $135,907.66 **Scenario Cost/Unit:** $3.05

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Fuser for HDPE Pipe	1383	Fusing machine for 1" to 12" diameter HDPE pipe joints. Equipment costs only. Does not include labor.	Hour	$22.97	8	$183.76
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	16	$369.28
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.64	51217	$135,212.88
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	2	$141.74

Practice: 430 - Irrigation Pipeline

Scenario: #16 - HDPE (Corrugated Plastic Pipe)

Scenario Description:

Description: Below ground installation of HDPE (Corrugated Plastic Pipe) pipeline. HDPE (CPP) Twin-Wall is manufactured in sizes (nominal diameter) from 4-inch to 60-inch; typical practice sizes range from 12-inch to 24-inch; and typical scenario size is 18-inch.
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use. Construct 1/8 mile (660 feet) of 18-inch, Twin-Wall, HDPE Corrugated Plastic Pipe (CPP) with a smooth interior, and appurtenances, installed below ground with a minimum 2 feet of ground cover. The unit is in weight of pipe material in pounds. 660 feet of 18-inch, Twin-Wall, HDPE CPP weighs 6.40 lb/ft, or a total of 4,224 pounds. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity) for a total weight of 4646 pounds. Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 4,224

Scenario Cost: $12,855.12 **Scenario Cost/Unit:** $3.04

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Earth, 30" x 48"	1384	Trenching, earth, 30" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.65	660	$2,409.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	64	$1,477.12
Materials						
Pipe, HDPE, corrugated single wall, ≤ 12" weight priced Compound	1380	High Density Polyethylene (HDPE) compound manufactured into single wall corrugated pipe or tubing. Materials only.	Pound	$1.82	4646	$8,455.72
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 430 - Irrigation Pipeline

Scenario: #17 - Surface Steel (Iron Pipe Size)

Scenario Description:

Description: On-ground surface installation of Steel (Iron Pipe Size) pipeline. Steel (IPS) is manufactured in sizes (nominal diameter) from ½-inch to 36-inch; typical practice sizes range from 2-inch to 18-inch; and typical scenario size is 2-inch.
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use. Construct 1/4 mile (1,320 feet) of 2-inch, Schedule 40, Galvanized Steel Pipe with appurtenances, installed on the ground surface. The unit is weight of pipe material in pounds. 1,320 feet of 2-inch, Schedule 40, Galvanized Steel Pipe weighs 3.653 lb/ft, or a total of 4,822 pounds . Appurtenances include: couplings, fittings, air vents, pressure relief valves, anchors, expansion joints, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 15% of pipe material quantity) for a total weight of 5545 pounds. Cost of appurtenances does not include flow meters or backflow preventers.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 4,822

Scenario Cost: $10,201.64 **Scenario Cost/Unit:** $2.12

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	48	$1,107.84
Materials						
Pipe, steel, smooth wall, galvanized, weight priced	1381	Steel manufactured into galvanized smooth wall pipe	Pound	$1.64	5545	$9,093.80

Practice: 430 - Irrigation Pipeline

Scenario: #18 - Steel (Corrugated Steel Pipe)

Scenario Description:

Description: Below ground installation of Corrugated Steel Pipe (CSP) pipeline. Steel (CSP) is manufactured in sizes (nominal diameter) from 12-inch to 72-inch; typical practice sizes range from 12-inch to 24-inch; and typical scenario size is 18-inch.
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use. Construct 1/8 mile (660 feet) of 18-inch, 14-gauge, Galvanized Corrugated Steel Pipe (CSP) with appurtenances, installed below ground with a minimum 2 feet of ground cover. The unit is weight of pipe material in pounds. 660 feet of 18-inch, 14-gauge, Galvanized CSP weighs 18.0 lb/ft, or a total of 11,800 pounds. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 11,880

Scenario Cost: $15,015.18 **Scenario Cost/Unit:** $1.26

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Earth, 30" x 48"	1384	Trenching, earth, 30" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.65	660	$2,409.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	80	$1,846.40
Materials						
Pipe, CMP, 14-12 gauge, weight priced	1589	14 and 12 gauge galvanized helical corrugated metal pipe priced by the weight of the pipe materials. Materials only.	Pound	$0.75	13662	$10,246.50
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 430 - Irrigation Pipeline

Scenario: #19 - Surface Aluminum (Aluminum Irrigation Pipe)

Scenario Description:

Description: On-ground surface installation of Aluminum Irrigation Pipe (AIP) pipeline. AIP is manufactured in sizes (nominal diameter) from 2-inch to 12-inch; typical practice sizes range from 6-inch to 12-inch; and typical scenario size is 8-inch.
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use. Construct 1/8 mile (660 feet) of 8-inch, 0.050-inch wall, Aluminum Irrigation Pipe (AIP) with appurtenances, installed on the ground surface. The unit is weight of pipe in pounds of pipe material. 660 feet of 8-inch, 0.050-inch wall, AIP weighs 1.47 lb/ft, or a total of 970 pounds. Appurtenances include: couplings, fittings, air vents, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity) for a total weight of 1,067 lbs. Cost of appurtenances does not include flow meters or backflow preventers.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 970

Scenario Cost: $5,613.24 **Scenario Cost/Unit:** $5.79

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	25	$577.00
Materials						
Pipe, aluminum, smooth wall, weight priced	1382	Aluminum manufactured into smooth wall pipe	Pound	$4.72	1067	$5,036.24

Practice: 430 - Irrigation Pipeline

Scenario: #20 - Cast-In-Place Concrete pipe, Typical Installation

Scenario Description:

Description: Below ground installation of cast-in-place concrete pipeline without border check risers. Scenario covers the trenching in normal soils, placement of pipe with a diameter of 30" and larger, all fittings, thrust blocks and appurtances and backfill & final grading of the trench.
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.Typical scenario is to construct 1,300 feet) of 36" cast-in-place concrete pipeline with appurtenances. The unit is length of pipe in feet. 1,300 feet of 36" and 5" wall thickness is 234 yd3. Appurtenances include: air vents, incidential risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Linear Foot

Scenario Typical Size: 1,300

Scenario Cost: $47,237.18 **Scenario Cost/Unit:** $36.34

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Earth, 30" x 48"	1384	Trenching, earth, 30" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.65	1300	$4,745.00
Concrete, CIP, formless, non reinforced	36	Non reinforced concrete cast-in-placed without forms by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	258	$41,512.20
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 430 - Irrigation Pipeline

Scenario: #21 - Cast-In-Place Concrete pipe, High fitting ratio

Scenario Description:

Description: Below ground installation of cast-in-place concrete pipeline with border check risers and valves. Scenario covers the trenching in normal soils, placement of pipe with a diameter of 30" and larger, all fittings, thrust blocks and appurtances and backfill & final grading of the trench.
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.Typical scenario is to construct 1,300 feet) of 36" cast-in-place concrete pipeline with appurtenances. The unit is length of pipe in feet. 1,300 feet of 36" and 5" wall thickness is 234 yd3. Appurtenances include: air vents, incidential and border check turnout risers, and inline valves, and are included in the cost of pipe material (additional 50% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Linear Foot

Scenario Typical Size: 1,300

Scenario Cost: $63,931.88 **Scenario Cost/Unit:** $49.18

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Earth, 30" x 48"	1384	Trenching, earth, 30" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.65	1300	$4,745.00
Concrete, CIP, formless, non reinforced	36	Non reinforced concrete cast-in-placed without forms by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	351	$56,475.90
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	75	$1,731.00
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 430 - Irrigation Pipeline

Scenario: #22 - PVC, High fitting ratio

Scenario Description:

Description: Below ground installation of PVC pipeline with a large number of fittings, risers or valves. Scenario covers the trenching in normal soils, placement of pipe with a diameter of 4" to 12", all fittings, thrust blocks and appurtances and backfill & final grading of the trench.
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.Typical scenario is to construct 1/4 mile (1,320 feet) of 6", Class 160, PVC pipeline with a higher than typical number of appurtenances, installed below ground with a minimum of 2 feet of ground cover. The unit is weight of pipe material in pounds. 1,320 feet of 6", Class 160 PVC gasketed IPS pipe weighs 3.4 lb/ft, or a total of 4,488 pounds. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 50% of pipe material quantity) for a total weight of 6,732 lbs. Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 4,488

Scenario Cost: $14,879.16 **Scenario Cost/Unit:** $3.32

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.39	1320	$1,834.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	50	$1,154.00
Materials						
Pipe, PVC, dia. < 18", weight priced	1323	Polyvinyl Chloride (PVC) pressure rated pipe priced by the weight of the pipe materials for pipes with diameters less than 18". Materials only.	Pound	$1.69	6732	$11,377.08
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 430 - Irrigation Pipeline

Scenario: #23 - Stream/road crossing

Scenario Description:

Description: Below ground installation of pipeline requiring boring under a road or stream. Scenario covers excavation to place directional drill, drilling under road or stream and placement of 'sleeve pipe', placement of PVC pipe, all fittings, thrust blocks and appurtances and backfill & final grading of the trench.
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Fields on the far side of a stream or road are inaccessable for irrigation or an above ground pipeline or temporary pipeline is used to cross a stream or a temporary pipeline is placed through a road culvert to cross a road. Manure may leak during application at fittings, there is an increased risk of discharge to a stream or far fields are not accessable for application of irrigation water.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use. Typical scenario is for boring 100' under a road with a 10" steel casing pipe and a 8" inner PVC pipe. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers.

Scenario Feature Measure: Length of Boring

Scenario Unit: Foot

Scenario Typical Size: 100

Scenario Cost: $18,329.09 **Scenario Cost/Unit:** $183.29

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Horizontal Boring, > 3" diameter	1132	Includes equipment, labor and setup.	Foot	$52.53	100	$5,253.00
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	60	$147.00
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	60	$108.60
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	20	$461.60
Materials						
Pipe, PVC, dia. < 18", weight priced	1323	Polyvinyl Chloride (PVC) pressure rated pipe priced by the weight of the pipe materials for pipes with diameters less than 18". Materials only.	Pound	$1.69	605	$1,022.45
Pipe, steel, smooth wall, galvanized, weight priced	1381	Steel manufactured into galvanized smooth wall pipe	Pound	$1.64	6443	$10,566.52
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 430 - Irrigation Pipeline

Scenario: #24 - Above Ground, Ultra UV Resistant PVC

Scenario Description:

Description: Above ground installation of an ultra UV resistant PVC pipeline. PVC pipe is constructed for above ground conditions with restrained joints, special materials that are UV resistant, and more impact resistant/harder than typical PVC pipe. Pipe lengths are connected using a gasketed system, and locking restraining ties. Pipe installations may be temporary or permanent, and can be removed at the end of the irrigation season. Scenario covers placement of pipe with a diameter of 2" to 12", all fittings, and appurtances. Typical installation applies to special conditions such as very difficult soil/rock excavation conditions, environmental or cultural resource restraints that do not allow ground disturbance, road crossings, and temporary piping needs only for use during the irrigation season.
Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use.
Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface & Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation:

Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation:

Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use. Typical scenario is to construct 1/4 mile (1,320 feet) of 6", Class 160, PVC pipeline with appurtenances, installed above ground. The unit is weight of pipe material in pounds. 1,320 feet of 6", Class 160 PVC gasketed IPS pipe weighs 3.6 lb/ft, or a total of 4,752 pounds. Appurtenances include: couplings, fittings, air vents, pressure relief valves, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity) for a total weight of 5228 lbs. Cost of appurtenances does not include flow meters or backflow preventers.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 4,752

Scenario Cost: $12,309.87 **Scenario Cost/Unit:** $2.59

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.39	1320	$1,834.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	60	$1,384.80
Materials						
Pipe, PVC, dia. < 18", weight priced	1323	Polyvinyl Chloride (PVC) pressure rated pipe priced by the weight of the pipe materials for pipes with diameters less than 18". Materials only.	Pound	$1.69	5227	$8,833.63
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 436 - Irrigation Reservoir

Scenario: #1 - Embankment Dam

Scenario Description:

The reservoir, created by an embankment built across a natural depression, with an 18" diameter principal spillway outlet through the embankment, is controlled by a canal-style gate. Outlet can also serve as overflow protection with a 12" diameter standpipe and tee to the 18" pipe. Any watershed runoff will be diverted around reservoir. Typical size: Built with approximately 4,500 cubic yards of material; about 19.9 feet high and 200 feet long and hold approximately 1,000,000 gallons (3 acre-feet). The top of berm will be about 10 feet wide and the embankment side slopes will be 2.5 H to 1 V up and down stream.
Resource concern: Insufficient Water - Inefficient use of irrigation water.
Associated practices include: 521 - Pond Sealing or Lining (various); 320 - Irrigation Canal or Lateral; 430 - Irrigation Pipeline; 428 - Irrigation Ditch Lining; 533 - Pumping Plant; 440 series - Irrigation Systems; 378 - Pond; 447 - Irrigation System, Tailwater Recovery; 484 - Mulching; and 342 - Critical Area Planting.

Before Situation:

Current system relies on an intermittent or low-flow rate water source. This results in untimely and/or inefficient water application.
Divert water around - no spillway

After Situation:

This is an embankment, installed across a natural off-stream intermittent watercourse, used to store water for subsequent irrigation. It will be used to accumulate and store water for timely and efficient application of water through an irrigation system The water source could be a well, irrigation district pipeline, and/or a pump from a stream. It is designed to deliver water by gravity to an open ditch or non-pressurized pipeline, generally in excess of 5 cfs. All earthen materials will be from on-site sources.

Scenario Feature Measure: Volume of Compacted Eartfill

Scenario Unit: Cubic Yards

Scenario Typical Size: 4,500

Scenario Cost: $24,371.27 **Scenario Cost/Unit:** $5.42

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	4500	$19,800.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	8	$329.84
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	16	$369.28
Materials						
Pipe, HDPE, CPT, Double Wall, Soil Tight, 18"	1245	Pipe, Corrugated HDPE Double Wall, 18" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$10.94	120	$1,312.80
Screw gate, cast iron, 18" diameter, 10/0 head	1917	18" diameter cast iron screw (canal) gate rated at 10 seating head 0 feet unseating head. Materials only.	Each	$1,046.56	1	$1,046.56
Coupling, HDPE CPT Dual Wall, Tee, 18"x18"x12"	1921	Tee, 18"x18"x12" - HDPE CPT Tee. Materials only.	Each	$277.21	1	$277.21
Pipe, HDPE, CPT, Double Wall, Soil Tight, 12"	1244	Pipe, Corrugated HDPE Double Wall, 12" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$7.10	36	$255.60
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 436 - Irrigation Reservoir

Scenario: #2 - Embankment Reservoir

Scenario Description:

This is a small rectangular embankment reservoir with a 10" diameter principal spillway through the embankment controlled by a canal-type gate. It is designed to accumulate, store, and deliver water by gravity to an open ditch or non-pressurized pipeline, in excess of 5 cfs. Typical size: Inside dimension of about 375 feet square, with 12 feet of fill and about 1600 feet total length of embankment (along the centerline). The embankment top is about 10 feet wide and the side slopes will no steeper than 2.5 H to 1 V inside and out. Built with approximately 28,500 cubic yards of on-site material. Maximum water depth of 10 feet with 2 feet of freeboard and no auxiliary spillway. Volume is approximately 30 ac-ft (10,000,000 gallons).
Resource Concern: Insufficient Water - Inefficient use of irrigation water.
Associated Practices: 521 - Pond Sealing or Lining (various); 320 - Irrigation Canal or Lateral; 430 - Irrigation Pipeline; 428 - Irrigation Ditch Lining; 533 - Pumping Plant; 440 series - Irrigation Systems; 447 - Irrigation System, Tailwater Recovery; 378 - Pond; 484 - Mulching; and 342 - Critical Area Planting.

Before Situation:

Current system relies on an intermittent or low-flow rate water source. This results in untimely and/or inefficient water application.

After Situation:

The square reservoir will be built on a relatively flat site and be used to accumulate and store water for timely application through an irrigation system. The water source could be a stream, an irrigation well, or an irrigation district canal.

Scenario Feature Measure: Volume of Compacted Earthfill

Scenario Unit: Cubic Yards

Scenario Typical Size: 28,500

Scenario Cost: $126,601.20 **Scenario Cost/Unit:** $4.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	28500	$125,400.00
Materials						
Catwalk, metal	1918	Metal pedestrian walk way giving access to the valve on a structure, typically 3' wide with railing. Materials only.	Foot	$60.06	20	$1,201.20

Practice: 436 - Irrigation Reservoir

Scenario: #3 - Excavated Tailwater Pit

Scenario Description:

This is an excavated pit with a control structure. It is designed to accumulate, store, deliver or regulate water for a surface irrigation system.

Resource concern: Insufficient Water - Inefficient use of irrigation water.
Associated Practices: 521 - Pond Sealing or Lining (various); 320 - Irrigation Canal or Lateral; 430 - Irrigation Pipeline; 428 - Irrigation Ditch Lining; 533 - Pumping Plant; 440 series - Irrigation Systems; 447 - Irrigation System, Tailwater Recovery; 378 - Pond; 484 - Mulching; and 342 - Critical Area Planting.

Before Situation:

Current system relies on an intermittent or low-flow rate water source. This results in untimely and/or inefficient water application.

After Situation:

An excavated regulating reservoir will be built on a relatively flat site and be used to accumulate and store water for timely application through an irrigation system. The water source could be a stream or an irrigation district canal.
Typical sizing for this scenario calculations: A bottom width of 20 ft and length of 1,250 feet. The side slopes will be no steeper than 1.5 H to 1 V inside and out. Built with approximately 20,000 cubic yards of on-site material. Maximum water depth of 10 feet with 1 feet of freeboard. Volume is approximately 12 ac-ft (3,950,303 gallons).

Scenario Feature Measure: Volume of Earth Excavated

Scenario Unit: Cubic Yards

Scenario Typical Size: 19,600

Scenario Cost: $46,452.00 **Scenario Cost/Unit:** $2.37

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	19600	$46,452.00

Practice: 436 - Irrigation Reservoir

Scenario: #4 - Steel Tank

Scenario Description:

A 20,000 Gallon, above ground, enclosed fabricated Steel or bottomless Corrugated Metal (with plastic liner and cover) tank with fittings, is installed on 6" of well compacted drain rock support pad with sand padding (CM tank), to store water from a reliable source for irrigation of an area less than 5 acres. The scenario assumes the typical dimensions of the tank are 24 feet in diameter and 6 feet tall. The scenario also assumes a 28 feet diameter gravel base pad to extend a minimum of 2 feet past the base of tank for adequate foundation support. This cost estimate scenario is for cost of the tank and pad only and does not include the cost for pumps, pipe, or fittings for the pipeline.
Resource Concern: Insufficient Water - Inefficient use of irrigation water.
Associated Practices: 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 533 - Pumping Plant; 447 - Irrigation System, Tailwater Recovery.

Before Situation:

Insufficient volume of water to complete an irrigation cycle at the required flow rate.

After Situation:

An above ground, enclosed fabricated steel or bottomless corrugated metal tank (with plastic liner and cover), capable of withstanding the elements, is used to accumulate and store water between irrigation cycles for a small irrigation system. This allows for an improved flow rate and timing of water application. Sources of water could be a well, a domestic water system, a very large roof area, a water ram , or a pump drawing water from a stream.

Scenario Feature Measure: Volume of Tank Storage

Scenario Unit: Gallons

Scenario Typical Size: 20,000

Scenario Cost: $28,016.19 **Scenario Cost/Unit:** $1.40

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	16	$693.12
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	80	$1,846.40
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	40	$1,649.20
Materials						
Tank, Corrugated Metal Storage, 20,000 gallon	1920	20,000 gallon capacity enclosed corrugated Metal Storage tank. Includes delivery to the site and anchoring material.	Each	$23,314.19	1	$23,314.19
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 436 - Irrigation Reservoir

Scenario: #5 - Plastic Tank

Scenario Description:

A 3,000 Gallon, above-ground, High Density Polyethylene plastic enclosed tank, is installed on 6" of well-compacted drain rock or a 4" thick reinforced concrete support pad, to store water from a reliable source for irrigation of an area less than one acre. The scenario assumes the typical dimensions of the tank are 102" in diameter and 93" tall. The scenario also assumes a 126" diameter gravel base or concrete pad to extend a minimum of 12" past the base of tank for adequate foundation support. This cost estimate scenario is for cost of the tank and pad only and does not include estimate for pumps, pipe, or connecting fittings.
Resource Concern: Insufficient Water - Inefficient use of irrigation water.
Associated Practices: 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 533 - Pumping Plant; 447 - Irrigation System, Tailwater Recovery.

Before Situation:

Insufficient volume of water to complete an irrigation cycle at the required flow rate.

After Situation:

An above-ground plastic tank, constructed to withstand the elements, is used to accumulate and store water between irrigation cycles for a very small irrigation system. This allows for an improved flow rate and timing of water application. Sources of water could be a well, a domestic water system, a large roof area, a water ram , or a pump drawing water from a stream.

Scenario Feature Measure: Volume of Tank Storage

Scenario Unit: Gallons

Scenario Typical Size: 3,000

Scenario Cost: $4,448.24 **Scenario Cost/Unit:** $1.48

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	8	$346.56
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	32	$738.56
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	8	$300.16
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	16	$659.68
Materials						
Tank, Poly Enclosed Storage, >1,000	1075	Water storage tanks. Includes materials and shipping only.	Gallon	$0.63	3000	$1,890.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 436 - Irrigation Reservoir

Scenario: #6 - Fiberglass Tank

Scenario Description:

A 10,000 Gallon above ground, enclosed, fiberglass tank, is installed on 6" of well compacted drain rock support pad. The tank is used to store water from a reliable source for irrigation of areas less than 3 acres. The scenario assumes the typical dimensions of the tank are 15 feet in diameter and 8 feet tall. The scenario also assumes a 19 feet diameter gravel base pad to extend a minimum of 2 feet past the base of tank for adequate foundation support. This cost estimate scenario is for cost of the tank and pad only and does not include estimate for pumps, pipe, fittings for the pipeline, or catchment area.
Resource Concern: Insufficient Water - Inefficient use of irrigation water.
Associated Practices: 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 533 - Pumping Plant; 447 - Irrigation System, Tailwater Recovery.

Before Situation:

Insufficient volume of water to complete an irrigation cycle at the required flow rate.

After Situation:

A large fiberglass enclosed tank, capable of withstanding the elements, is used to accumulate and store water between irrigation cycles for a very small irrigation system. This allows for an improved flow rate and timing of water application and better efficiency. Sources of water could be a well, a domestic water system, a very large roof area, a water ram , or a pump drawing water from a stream.

Scenario Feature Measure: Volume of Tank Storage

Scenario Unit: Gallons

Scenario Typical Size: 10,000

Scenario Cost: $10,938.64 **Scenario Cost/Unit:** $1.09

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	8	$346.56
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	32	$1,319.36
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	40	$923.20
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	8	$300.16
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	6	$161.22
Tank, Fiberglass Enclosed Storage, 10,000 gallon	1919	10,000 gallon capacity enclosed fiberglass water storage tank. Includes tank anchoring materials and delivery.	Each	$7,888.14	1	$7,888.14

Practice: 441 - Irrigation System, Microirrigation

Scenario: #1 - Vegetation Establishment

Scenario Description:

A micro-irrigation system, provide irrigation for upland wildlife habitat restoration sites, critical area planting sites and windrows. Drip tape, tubing or microsprayers may be used.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, Degraded Plant Condition - Undesirable plant productivity and health, Water Quality Degradation - Excessive sediment in surface waters, and Inefficient Energy Use - Equipment and facilities.

Associated Practices: 533-Pumping Plant, 449-Irrigation Water Management, 430-Irrigation Pipeline, 610-Salinity & Sodic Soil Management, 328-Conservation Crop Rotation, and 590-Nutrient Management.

Before Situation:

An upland wildlife habitat site has insufficent water to support planted vegetation.

After Situation:

A surface placed microirrigation system is utilized to provide highly efficient irrigation to an upland wildlife site. Water applications are reduced and runoff eliminated. Offsite water quality is improved, and on site water use is reduced. The typical system is a permanent system, installed on a 1 acre wildlife habitat site with above ground drip tubing. Total drip tubing installed is1,600 lf. This system typically includes a filter system, PE tubing laterals, PE (above ground) manifolds, and submains, valves, fittings, emitters, etc. Does not include Pump, Power source, Water source (well or reservoir).

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $558.31 **Scenario Cost/Unit:** $558.31

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Micro Irrigation, screen filter, < 100 gpm	1617	Screen filter for Micro Irrigation used in small systems. Includes filter. No controls are included or needed.	Each	$46.31	1	$46.31
Micro Irrigation, surface drip tubing	1488	Tubing is installed above ground for surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tubing has emitters built in.	Foot	$0.32	1600	$512.00

Practice: 441 - Irrigation System, Microirrigation

Scenario: #2 - Orchard-vineyard, 10ac or less

Scenario Description:

A micro-irrigation system to provide irrigation for orchards, vineyards and similar sites where irrigated area is 10 acres or less. Drip tape, tubing or microsprayers may be used.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, Degraded Plant Condition - Undesirable plant productivity and health, Water Quality Degradation - Excessive sediment in surface waters, and Inefficient Energy Use - Equipment and facilities.

Associated Practices: 533-Pumping Plant, 449-Irrigation Water Management, 430-Irrigation Pipeline, 610-Salinity & Sodic Soil Management, 328-Conservation Crop Rotation, and 590-Nutrient Management.

Before Situation:

A vineyard has an inefficient surface flood irrigation system causing irrigation water loss that impacts water quality and water quantity.

After Situation:

A surface placed microirrigation system is utilized to provide highly efficient irrigation to an orchard. Water applications are reduced and runoff eliminated. Offsite water quality is improved, and on site water use is reduced. The typical system is a permanent system, installed on a 7 acre orchard on the ground surface. The orchard has a plant spacing of 15 feet x 20 feet. Laterals are spaced 20 feet apart.This system utilizes emitters at each tree or plant as the water application device. This system typically includes a filter system, PE tubing laterals, PVC manifolds, and submains, valves, fittings, emitters, etc. This practice applies to systems designed to discharge < 60 gal/hr at each individual lateral discharge point. Does not include Pump, Power source, Water source (well or reservoir).

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 7

Scenario Cost: $17,274.29 **Scenario Cost/Unit:** $2,467.76

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	$1,419.30	1	$1,419.30
Materials						
Pipe, PVC, dia. < 18", weight priced	1323	Polyvinyl Chloride (PVC) pressure rated pipe priced by the weight of the pipe materials for pipes with diameters less than 18". Materials only.	Pound	$1.69	456	$770.64
Micro Irrigation, disk filter	1483	Disk filter for Micro irrigation system. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	$3,340.28	2	$6,680.56
Micro Irrigation, surface drip tubing	1488	Tubing is installed above ground for surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tubing has emitters built in.	Foot	$0.32	15246	$4,878.72
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07

Practice: 441 - Irrigation System, Microirrigation

Scenario: #3 - Orchard-vineyard, >10ac

Scenario Description:

A micro-irrigation system to provide irrigation for orchards, vineyards and similar sites where irrigated area is greater than 10 acres. Drip tape, tubing or microsprayers may be used.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, Degraded Plant Condition - Undesirable plant productivity and health, Water Quality Degradation - Excessive sediment in surface waters, and Inefficient Energy Use - Equipment and facilities.

Associated Practices: 533-Pumping Plant, 449-Irrigation Water Management, 430-Irrigation Pipeline, 610-Salinity & Sodic Soil Management, 328-Conservation Crop Rotation, and 590-Nutrient Management.

Before Situation:

A vineyard has an inefficient surface flood irrigation system causing irrigation water loss that impacts water quality and water quantity.

After Situation:

A surface placed microirrigation system is utilized to provide highly efficient irrigation to an orchard. Water applications are reduced and runoff eliminated. Offsite water quality is improved, and on site water use is reduced. The typical system is a permanent system, installed on a 40 acre orchard on the ground surface. The orchard has a plant spacing of 15 feet x 20 feet. Laterals are spaced 20 feet apart.This system utilizes emitters at each tree or plant as the water application device. This system typically includes a filter system, PE tubing laterals, PVC manifolds, and submains, valves, fittings, emitters, etc. This practice applies to systems designed to discharge < 60 gal/hr at each individual lateral discharge point. Does not include Pump, Power source, Water source (well or reservoir).

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $54,602.41 **Scenario Cost/Unit:** $1,365.06

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	$1,419.30	1	$1,419.30
Materials						
Pipe, PVC, dia. < 18", weight priced	1323	Polyvinyl Chloride (PVC) pressure rated pipe priced by the weight of the pipe materials for pipes with diameters less than 18". Materials only.	Pound	$1.69	3926	$6,634.94
Micro Irrigation, media filter	1482	Sand or media filter for Micro irrigation system. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	$4,939.89	3	$14,819.67
Micro Irrigation, surface drip tubing	1488	Tubing is installed above ground for surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tubing has emitters built in.	Foot	$0.32	87120	$27,878.40
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07
Micro Irrigation, screen filter, ≥ 100 gpm	1484	Screen filter for Micro irrigation system with 100 gpm or greater capacity. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	$325.03	1	$325.03

Practice: 441 - Irrigation System, Microirrigation

Scenario: #4 - Orchard-vineyard, durable tubing replace

Scenario Description:

Replacement of orchard or vineyard micro-irrigation system components that have exceeded 15 years of service OR that do not meet current 441 practice standard criteria. Replace above ground durable tubing, emitters or sprayers with new durable tubing, emitters or sprayers.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, Degraded Plant Condition - Undesirable plant productivity and health, Water Quality Degradation - Excessive sediment in surface waters, and Inefficient Energy Use - Equipment and facilities.

Associated Practices: 533-Pumping Plant, 449-Irrigation Water Management, 430-Irrigation Pipeline, 610-Salinity & Sodic Soil Management, 328-Conservation Crop Rotation, and 590-Nutrient Management.

Before Situation:

An existing micro-irrigation system includes deteriorated or outdated components resulting in substandard unforminty and/or inadequate irrigation control.

After Situation:

The repaired/upgraded microirrigation system provides more control of water applications. Typical upgrade includes replacement of durable lateral tubing. Offsite water quality is improved, and on site water use may be reduced.

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $27,878.40 **Scenario Cost/Unit:** $696.96

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Micro Irrigation, surface drip tubing	1488	Tubing is installed above ground for surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tubing has emitters built in.	Foot	$0.32	87120	$27,878.40

Practice: 441 - Irrigation System, Microirrigation

Scenario: #5 - Small Acreage

Scenario Description:

A micro-irrigation system to provide irrigation for smaller acreages such as nurseries, hoophouses, and greenhouses. Drip tape, tubing or microsprayers may be used.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, Degraded Plant Condition - Undesirable plant productivity and health, Water Quality Degradation - Excessive sediment in surface waters, and Inefficient Energy Use - Equipment and facilities.

Associated Practices: 533-Pumping Plant, 449-Irrigation Water Management, 430-Irrigation Pipeline, 610-Salinity & Sodic Soil Management, 328-Conservation Crop Rotation, and 590-Nutrient Management.

Before Situation:

A small cropland site is irrigated with an inefficent system resulting in excessive water use and decreased plant health and vigor.

After Situation:

A surface placed microirrigation system is utilized to provide highly efficient irrigation to the site. Water applications are reduced and runoff eliminated. Offsite water quality is improved, and on site water use is reduced. The typical system is a permanent system, installed on a 2 acre row crop site. System includes 2" PVC manifold with above ground drip tubing. Row spacing is 6' With a total of 300' of width planted (accounting for additional access pathways needed for harvesting, ect) for a total length of tubing of 10,000 ft or tubing. This system typically includes a filter system, PE tubing laterals, PVC manifolds, and submains, valves, fittings, emitters, etc. Does not include Mainline, Pump, Power source, Water source (well or reservoir).

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 2

Scenario Cost: $8,595.68 **Scenario Cost/Unit:** $4,297.84

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	$1,419.30	1	$1,419.30
Materials						
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.35	300	$405.00
Micro Irrigation, screen filter, < 100 gpm	1617	Screen filter for Micro Irrigation used in small systems. Includes filter. No controls are included or needed.	Each	$46.31	1	$46.31
Micro Irrigation, surface drip tubing	1488	Tubing is installed above ground for surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tubing has emitters built in.	Foot	$0.32	10000	$3,200.00
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07

Practice: 441 - Irrigation System, Microirrigation

Scenario: #6 - Row Crop, Buried Manifold

Scenario Description:

A micro-irrigation system, provide irrigation for row crop fields utilizing buried manifold line. Drip tape, tubing or microsprayers may be used. System valves are automated.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, Degraded Plant Condition - Undesirable plant productivity and health, Water Quality Degradation - Excessive sediment in surface waters, and Inefficient Energy Use - Equipment and facilities.

Associated Practices: 533-Pumping Plant, 449-Irrigation Water Management, 430-Irrigation Pipeline, 610-Salinity & Sodic Soil Management, 328-Conservation Crop Rotation, and 590-Nutrient Management.

Before Situation:

A small cropland site is irrigated with an inefficent system resulting in excessive water use and decreased plant health and vigor.

After Situation:

A microirrigation system is utilized to provide highly efficient irrigation to the site. Water applications are reduced and runoff eliminated. Offsite water quality is improved, and on site water use is reduced. The typical system is a permanent system, installed on a 20 acre row crop site. System includes 3" PVC manifold with above ground drip tubing. Row spacing is 5' for a total length of tubing of 174240 ft. This system typically includes a filter system, PE tubing laterals, PVC manifolds, and submains, valves, fittings, emitters, etc. Does not include Mainline, Pump, Power source, Water source (well or reservoir).

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $75,166.98 **Scenario Cost/Unit:** $3,758.35

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	$1,419.30	1	$1,419.30
Materials						
Pipe, PVC, dia. < 18", weight priced	1323	Polyvinyl Chloride (PVC) pressure rated pipe priced by the weight of the pipe materials for pipes with diameters less than 18". Materials only.	Pound	$1.69	1958	$3,309.02
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07
Micro Irrigation, media filter	1482	Sand or media filter for Micro irrigation system. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	$4,939.89	2	$9,879.78
Micro Irrigation, control valves and timers	1485	Automatic controller and timer, to turn on and off the sets for micro irrigation, installation and valves. Based on control unit, not number of valves controlled.	Each	$1,277.01	1	$1,277.01
Micro Irrigation, surface drip tubing	1488	Tubing is installed above ground for surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tubing has emitters built in.	Foot	$0.32	174240	$55,756.80

Practice: 441 - Irrigation System, Microirrigation

Scenario: #7 - Row Crop, Above Ground PE Manifold

Scenario Description:

A micro-irrigation system, provide irrigation for row crop fields utilizing above ground PE or "layflat" manifold line. Drip tape, tubing or microsprayers may be used. System is not automated.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, Degraded Plant Condition - Undesirable plant productivity and health, Water Quality Degradation - Excessive sediment in surface waters, and Inefficient Energy Use - Equipment and facilities.

Associated Practices: 533-Pumping Plant, 449-Irrigation Water Management, 430-Irrigation Pipeline, 610-Salinity & Sodic Soil Management, 328-Conservation Crop Rotation, and 590-Nutrient Management.

Before Situation:

A small cropland site is irrigated with an inefficent system resulting in excessive water use and decreased plant health and vigor.

After Situation:

A microirrigation system is utilized to provide highly efficient irrigation to the site. Water applications are reduced and runoff eliminated. Offsite water quality is improved, and on site water use is reduced. The typical system is a permanent system, installed on a 20 acre row crop site. System includes above ground PE manifold with above ground drip tubing.Row spacing is 5' for a total length of tubing of 174240 ft. This system typically includes a filter system, PE tubing laterals, PE or "layflat" manifolds, and submains, valves, fittings, emitters, etc. Does not include Mainline, Pump, Power source, Water source (well or reservoir).

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $67,381.73 **Scenario Cost/Unit:** $3,369.09

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	$1,419.30	1	$1,419.30
Materials						
Micro Irrigation, surface drip tubing	1488	Tubing is installed above ground for surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tubing has emitters built in.	Foot	$0.32	174240	$55,756.80
Micro Irrigation, disk filter	1483	Disk filter for Micro irrigation system. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	$3,340.28	2	$6,680.56
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07

Practice: 441 - Irrigation System, Microirrigation

Scenario: #8 - Retrofit, Irrigation Automation

Scenario Description:

The typical scenario consists of retrofitting an existing, functional pump and micro irrigation system. The existing system may be pressurized by a pump, or by gravity elevation drop. The retrofit includes the addition of electronic/computer based automatic control systems. Typical components may include any of the following: Soil moisture sensors, air and soil temperature sensors, weather station data collector, wireless communication base station, pump automation electronic controller, valve automation electronic controller, web or cellular phone based software interlink.

Before Situation:

The before practice situation is characterized by manual operation of an existing, functional, irrigation system based on non scientific estimates of soil moisture levels and air temperature. Irrigation, frost control, and cooling operations are based on conservative estimates by the land owner, resulting in overwatering of the crop and running pumping systems longer than necessary. The operator typically drives a vehicle a considerable distance to turn the pump station on and off. The current operation of the system results in significant energy and water waste.

After Situation:

The after practice situation is characterized by operation of the retrofitted irrigation system on 10 acres for irrigation, frost control, and cooling only when necessary based on soil moisture and air temperature measurements. Off-site operation of the pumping system reduces vehicle energy use. Significant energy and water conservation is achieved through scientific based irrigation system/pumping plant management/automation.

Associated practices/activities may include: Irrigation Water Management (449), Pump Station (533) and 374-Farmstead Energy Improvement. The resource concern is inefficient use of water and energy during farm operations, which increases water use and dependence on non-renewable energy sources. These concerns are addressed through irrigation system automation.

Scenario Feature Measure: Field Size in Acres

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $9,111.97 **Scenario Cost/Unit:** $911.20

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Switches and Controls, Wi-Fi system and software	1194	Software with built-in cellular or Wi-Fi communication commonly used to control pumps and irrigation systems	Each	$415.23	1	$415.23
Switches and Controls, temp sensors	1192	Temperature and soil moisture sensors installed as part of an electronic monitoring (with or without wireless telecommunications) commonly used to control pumps and irrigation systems	Each	$605.73	8	$4,845.84
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07
Switches and Controls, programmable controller	1193	Programmable logic controller (with or without wireless telecommunications) commonly used to control pumps and irrigation systems	Each	$153.22	1	$153.22
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: 441 - Irrigation System, Microirrigation

Scenario: #9 - Filter replace

Scenario Description:

Replacement of filter system that has exceeded 15 years of service OR that do not meet current 441 practice standard criteria.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, Degraded Plant Condition - Undesirable plant productivity and health, Water Quality Degradation - Excessive sediment in surface waters, and Inefficient Energy Use - Equipment and facilities.

Associated Practices: 533-Pumping Plant, 449-Irrigation Water Management, 430-Irrigation Pipeline, 610-Salinity & Sodic Soil Management, 328-Conservation Crop Rotation, and 590-Nutrient Management.

Before Situation:

An existing micro-irrigation system includes deteriorated or outdated components resulting in substandard unforminty and/or inadequate irrigation control..

After Situation:

The repaired/upgraded microirrigation system provides more control of water applications. Typical replacement of missing or poorly functioning filters. Offsite water quality is improved, and on site water use may be reduced.

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $14,819.67 **Scenario Cost/Unit:** $370.49

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Micro Irrigation, media filter	1482	Sand or media filter for Micro irrigation system. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	$4,939.89	3	$14,819.67

Practice: 442 - Sprinkler System

Scenario: #1 - Center Pivot, < 600 Ft

Scenario Description:

Installation of a low pressure center pivot system less than 600' in length. System installation includes a flowmeter.

Resource concerns include: Soil Erosion (Concentrated flow erosion e.g. irrigation induced), Insufficient Water (Inefficient use of irrigation water), Water Quality Degradation (Excess nutrients in surface and ground waters, Excessive salts in surface and ground waters, Excess pathogens and chemicals from manure, bio-solids or compost applications).

Associated Practices: Irrigation Pipeline (430), Pumping Plant (533), Irrigation Water Management (449)

Before Situation:

A 160 acre field is flood irrigated. Application of irrigation water is inefficient and non-uniform. Irrigation water is typically over applied in some parts of the field, and under applied in others. Deep percolation from the excess irrigation delivers excess nutrients salts, and chemicals to the ground water. Runoff from the field contains excess nutrients and degrades the receiving waters. Irrigated induced erosion is excessive.

After Situation:

The existing surface irrigation system is converted to a low pressure center pivot. Corners are converted to non-irrigated cropland. The pivot is 500 feet in length with pressure regulators and low pressure sprinklers on drops.

The new irrigation system has a coefficient of uniformity above 85%. Irrigation water is efficiently and uniformly applied to maintain adequate soil water for the desired level of plant growth. Deep percolation and field runoff is eliminated and there are no excess nutrients, salts or pathogens delivered to the receiving waters. Irrigation induced runoff is eliminated.

This center pivot scenario includes all hardware from the pivot point, including the concrete pad the pivot is placed on.

Scenario Feature Measure: Length of Center Pivot Lateral

Scenario Unit: Linear Foot

Scenario Typical Size: 500

Scenario Cost: $45,560.30 **Scenario Cost/Unit:** $91.12

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Irrigation, Center pivot system with appurtenances, variable cost portion	318	Variable cost portion of the center pivot system with appurtenances. This portion includes the following items: pivot point, pipe, towers, pad, controls, sprinklers, installation.	Foot	$69.98	500	$34,990.00
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07
Irrigation, Center pivot system with appurtenances, fixed cost portion	317	Fixed cost portion of the center pivot system with appurtenances. This portion includes the following items: pivot point, pipe, towers, pad, controls, sprinklers, installation.	Each	$6,390.21	1	$6,390.21
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	2	$141.74
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 442 - Sprinkler System

Scenario: #2 - Center Pivot, > 600 Ft

Scenario Description:

Installation of a low pressure center pivot system greater than 600' in length. System installation includes a flowmeter.

Resource concerns include: Soil Erosion (Concentrated flow erosion e.g. irrigation induced), Insufficient Water (Inefficient use of irrigation water), Water Quality Degradation (Excess nutrients in surface and ground waters, Excessive salts in surface and ground waters, Excess pathogens and chemicals from manure, bio-solids or compost applications).

Associated Practices: Irrigation Pipeline (430), Pumping Plant (533), Irrigation Water Management (449)

Before Situation:

A 160 acre field is flood irrigated. Application of irrigation water is inefficient and non-uniform. Irrigation water is typically over applied in some parts of the field, and under applied in others. Deep percolation from the excess irrigation delivers excess nutrients salts, and chemicals to the ground water. Runoff from the field contains excess nutrients and degrades the receiving waters. Irrigated induced erosion is excessive.

After Situation:

The existing surface irrigation system is converted to a low pressure center pivot. Corners are converted to non-irrigated cropland. The pivot is 1300 feet in length with pressure regulators and low pressure sprinklers on drops.

The new irrigation system has a coefficient of uniformity above 85%. Irrigation water is efficiently and uniformly applied to maintain adequate soil water for the desired level of plant growth. Deep percolation and field runoff is eliminated and there are no excess nutrients, salts or pathogens delivered to the receiving waters. Irrigation induced runoff is eliminated.

This center pivot scenario includes all hardware from the pivot point, including the concrete pad the pivot is placed on.

Scenario Feature Measure: Length of Center Pivot Lateral

Scenario Unit: Linear Foot

Scenario Typical Size: 1,300

Scenario Cost: $101,544.30 **Scenario Cost/Unit:** $78.11

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Irrigation, Center pivot system with appurtenances, fixed cost portion	317	Fixed cost portion of the center pivot system with appurtenances. This portion includes the following items: pivot point, pipe, towers, pad, controls, sprinklers, installation.	Each	$6,390.21	1	$6,390.21
Irrigation, Center pivot system with appurtenances, variable cost portion	318	Variable cost portion of the center pivot system with appurtenances. This portion includes the following items: pivot point, pipe, towers, pad, controls, sprinklers, installation.	Foot	$69.98	1300	$90,974.00
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	2	$141.74
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 442 - Sprinkler System

Scenario: #3 - Linear Move System

Scenario Description:

Installation of a linear or lateral move sprinkler system with sprinklers on drops with or without drag hoses to improve irrigation efficiency and reduce soil erosion. System installation includes a flowmeter.

Resource concerns include: Soil Erosion (Concentrated flow erosion e.g. irrigation induced), Insufficient Water (Inefficient use of irrigation water), Water Quality Degradation (Excess nutrients in surface and ground waters, Excessive salts in surface and ground waters, Excess pathogens and chemicals from manure, bio-solids or compost applications), Inefficient Energy Use (Equipment and facilities e.g. pumping)

Associated Practices: Irrigation Pipeline (430), Pumping Plant (533), Irrigation Water Management (449)

Payment rate is figured per foot of installed hardware length.

Before Situation:

A 76 acre field is flood irrigated. Application of irrigation water is inefficient and non-uniform. Irrigation water is typically over applied in some parts of the field, and under applied in others. Deep percolation from the excess irrigation delivers excess nutrients salts, and chemicals to the ground water. Runoff from the field contains excess nutrients and degrades the receiving waters. Irrigated induced erosion is excessive.

After Situation:

A typical unit is approximately 76 acres in size with the sprinkler system up to 1280 feet in length with drop tubes that have a minimum of 30" spacing.

The new irrigation system has a coefficient of uniformity above 85%. Irrigation water is efficiently and uniformly applied to maintain adequate soil water for the desired level of plant growth. Deep percolation and field runoff is eliminated and there are no excess nutrients, salts or pathogens delivered to the receiving waters. Irrigation induced runoff is eliminated.

Scenario Feature Measure: Length of Linear Move Lateral

Scenario Unit: Linear Foot

Scenario Typical Size: 1,280

Scenario Cost: $126,004.29 **Scenario Cost/Unit:** $98.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07
Linear Move System with appurtenances	322	Linear/lateral move system including: central tower, lateral towers, pipes, sprinklers, controllers, installation.	Acre	$1,602.95	76	$121,824.20
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	2	$141.74
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 442 - Sprinkler System

Scenario: #4 - Wheel Line System

Scenario Description:

A 1,280 foot wheel line (also called side roll, wheelmove, or lateral-roll) with 7 foot diameter wheels and five inch diameter supply pipeline. A wheel line consists of the mover, lateral pipe, wheels, sprinklers, couplers, and connectors to the mainline supply. System installation includes a flowmeter.

Resource concerns include: Soil Erosion (Concentrated flow erosion e.g. irrigation induced), Insufficient Water (Inefficient use of irrigation water), Water Quality Degradation (Excess nutrients in surface and ground waters, Excessive salts in surface and ground waters, Excess pathogens and chemicals from manure, bio-solids or compost applications), Inefficient Energy Use (Equipment and facilities e.g. pumping)

Associated Practices: Irrigation Pipeline (430), Pumping Plant (533), Irrigation Water Management (449)

Before Situation:

Cropland that is flood irrigated and has poor irrigation efficiency and distribution uniformity. The slope and irregular shape of the field limit the potential for improved management to improve the irrigation efficiency or the distribution uniformity.
Irrigation water moves both within the field and off it, resulting in wet areas, runoff and deep percolation. Parts of the field are over-irrigated, and other sections are under-irrigated. Runoff from the field flows into streams, water courses, and other water bodies. Excess applied irrigation water infiltrates into ground water causing degradation to the receiving waters.

After Situation:

A 1,280 foot wheel line with 7 foot diameter wheels and five inch diameter supply pipeline. Sprinklers are spaced along the wheel line at 40-foot intervals and risers are spaced at 60-foot increments along the mainline. The wheel line irrigates 40 acres of cropland.

The wheel line improves distribution uniformity. Irrigation application efficiency improves to 75%. Water application rates meet the consumptive use of the crop and matches soil intake rates in order to prevent irrigation induced erosion, runoff, and deep percolation.

Scenario Feature Measure: Length of Wheel Line Lateral

Scenario Unit: Linear Foot

Scenario Typical Size: 1,280

Scenario Cost: $24,672.98 **Scenario Cost/Unit:** $19.28

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07
Irrigation, Wheel line with appurtenances, variable price portion.	326	Variable cost portion of the wheel line system with appurtenances. This portion includes the following items: pipe, sprinklers, wheels, installation. Does not include a mover.	Foot	$12.96	1280	$16,588.80
Irrigation, Wheel line with appurtenances, fixed price portion.	325	Fixed cost portion of the wheel line system with appurtenances. This portion includes the following items: mover, pipe, sprinklers, wheels, installation.	Each	$4,213.89	1	$4,213.89
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 442 - Sprinkler System

Scenario: #5 - Solid Set System

Scenario Description:

A solid set irrigation system. System installation includes a flowmeter.

Resource concerns include: Soil Erosion (Concentrated flow erosion e.g. irrigation induced), Insufficient Water (Inefficient use of irrigation water), Water Quality Degradation (Excess nutrients in surface and ground waters, Excessive salts in surface and ground waters, Excess pathogens and chemicals from manure, bio-solids or compost applications)

Associated Practices: Irrigation Pipeline (430), Pumping Plant (533), Irrigation Water Management (449)

Before Situation:

The typical installation will be on cropland with some existing inefficient irrigation. The farm is typically producing specialty crops, such as fresh vegetables.

After Situation:

The system is installed on 10 acres. The installed solid set system has 3-4 inch pipe sizes and sprinklers set 30 – 50 ft apart. Improved distribution uniformity and irrigation efficiency will result.

Scenario Feature Measure: Area of Irrigation System

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $49,916.81 **Scenario Cost/Unit:** $4,991.68

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Irrigation, Solid Set, w/Appurtenances	324	Solid Set irrigation system that includes pipe, sprinklers, connections, installation and appurtenances.	Acre	$4,625.00	10	$46,250.00
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	2	$141.74

Practice: 442 - Sprinkler System

Scenario: #6 - Solid Set System Renovation

Scenario Description:

Replacement of solid set system components that help improve system efficiency of an existing system to meet current 442 practice standard criteria. Items typcally replaced or added include prssure regulators, heads, filters, injection equipment and control valves and a flowmeter.

Resource concerns include: Soil Erosion (Concentrated flow erosion e.g. irrigation induced), Insufficient Water (Inefficient use of irrigation water), Water Quality Degradation (Excess nutrients in surface and ground waters, Excessive salts in surface and ground waters, Excess pathogens and chemicals from manure, bio-solids or compost applications)

Associated Practices: Irrigation Pipeline (430), Pumping Plant (533), Irrigation Water Management (449)

Before Situation:

The typical installation will be on cropland with some existing inefficient irrigation. The farm is typically producing specialty crops, such as fresh vegetables. Existing system is more than 15 yrs old and not functioning as planned due to worn nozzles and other leaks that contribute to irrigation inefficiency.

After Situation:

The repaired/upgraded sprinkler system provides more control of water applications. Offsite water quality is improved, and on site water use may be reduced. The typical retrofit is performed on a 5 acre field.

Scenario Feature Measure: Area of Irrigation System

Scenario Unit: Acre

Scenario Typical Size: 5

Scenario Cost: $3,802.03 **Scenario Cost/Unit:** $760.41

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	12	$276.96
Materials						
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07

Practice: 442 - Sprinkler System

Scenario: #7 - Handline system

Scenario Description:

A handline irrigation system. System installation includes a flowmeter.

Resource concerns include: Soil Erosion (Concentrated flow erosion e.g. irrigation induced), Insufficient Water (Inefficient use of irrigation water), Water Quality Degradation (Excess nutrients in surface and ground waters, Excessive salts in surface and ground waters, Excess pathogens and chemicals from manure, bio-solids or compost applications)

Associated Practices: Irrigation Pipeline (430), Pumping Plant (533), Irrigation Water Management (449)

Before Situation:

The typical installation will be on cropland with some existing inefficient irrigation. The farm is typically producing specialty crops, such as fresh vegetables.

After Situation:

Typical installation of 1,280 foot handline. This will be moved to along a pipeline with risers spaced 30-60 feet apart according to a design. Mainline and risers have previously been installed or are being installed with associated Practice 430-Irrigation Pipeline. The handline is typically used to irrigate up to 20 acres.

The handline improves distribution uniformity. Irrigation application efficiency improves to 75% with proper management. Water application rates meet the consumptive use of the crop and matches soil intake rates in order to prevent irrigation induced erosion, runoff, and deep percolation.

Scenario Feature Measure: Feet of Handline installed

Scenario Unit: Linear Foot

Scenario Typical Size: 1,280

Scenario Cost: $8,735.61 **Scenario Cost/Unit:** $6.82

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Irrigation, Handline, w/Appurtenances	321	Handline irrigation system that includes pipe, sprinklers, connections and appurtenances. Includes materials only.	Foot	$3.96	1280	$5,068.80
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	2	$141.74

Practice: 442 - Sprinkler System

Scenario: #8 - Traveling Gun System, 2" or less diameter Hose

Scenario Description:

A portable small gun system with <=2" hose and mover; used to apply irrigation or waste water on small fields. System installation includes a flowmeter.
A small traveling gun irrigation system is installed to apply water uniformly and at an acceptable application rate operated under pressure to effectively irrigate less than 3 acres. The irrigation system is installed with all necessary appurtenances.

Resource concerns: Soil Erosion (Concentrated flow erosion, e.g. overflowing waste storage) and Water Quality Degradation (Excess nutrients in surface and ground waters, Excessive salts in surface and ground waters, Excess pathogens and chemicals from liquid manure)

Associated Practices: Irrigation Pipeline (430), Pumping Plant (533), Irrigation Water Management (449), Conservation Crop Rotation (328), Cover Crop (340), Nutrient Management (590), Waste Transfer (634)

Before Situation:

An existing traveling gun on a 2.5 acre field is inefficient and is not applying water uniformly or not at an acceptable application rate. Excess applied water causes irrigation induced erosion, runoff and deep percolation. The runoff and deep percolation degrade the receiving waters.

After Situation:

A small traveling gun irrigation system is installed to irrigate 2.5 acres based on the determined spacing needs.

Irrigation is applied efficiently and uniformly to maintain adequate soil water for plant growth without causing excessive water loss, erosion, or water quality degradation

The irrigation system is installed with all necessary appurtenances.

Scenario Feature Measure: Number of Traveling Gun Systems

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $20,149.37 **Scenario Cost/Unit:** $20,149.37

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07
Irrigation, Traveling Gun System with ≤ 2" Nominal size hose, and appurtenances light duty	1478	Irrigation, Traveling Gun System with ≤ 2" Nominal size hose with appurtenances. This includes the sprinkler gun, traveler cart, hard hose, reel, connections, controls, and installation. Normal hose length 500'	Inch Diameter	$8,312.15	2	$16,624.30

Practice: 442 - Sprinkler System

Scenario: #9 - Traveling Gun System, >2" to 3" Hose

Scenario Description:

A portable big gun system with >2 to 3" hose and mover; used to apply waste water from animal feeding operations. System installation includes a flowmeter.

This traveling big gun unit includes a sprinkler, towable cart, 1000' or more of PE hard hose, a self propelled reel that moves the sprinkler toward the reel during operation. The reel attaches to a mainline with appropriately designed towpath width. The scenario describes an irrigation system that is typical to confined animal feeding operations.

Resource concerns: Soil Erosion (Concentrated flow erosion, e.g. overflowing waste storage) and Water Quality Degradation (Excess nutrients in surface and ground waters, Excessive salts in surface and ground waters, Excess pathogens and chemicals from liquid manure)

Associated Practices: Irrigation Pipeline (430), Pumping Plant (533), Irrigation Water Management (449), Conservation Crop Rotation (328), Cover Crop (340), Nutrient Management (590), Waste Transfer (634)

Before Situation:

A confined, animal operation has a waste management system that exceeds its capacity, or a operation that does not have a waste management system in place. The inefficiency of the existing system or the lack of a waste management system has an impact on the soil and water quality. Animal waste runs off and degrades the receiving waters.

After Situation:

The big gun applies animal manure in an appropriate quantity and location that eliminates both runoff of the manure and deep percolation of excess nutrients, salts, and pathogens.

The big gun system is typically located on 50 acres or less of hay/pasture land, or 100 acres or less of cropland. The system includes a large irrigation gun with 1" to 1½" orifice mounted onto a movable cart. 1000' or more flexible 3" PE pipe is attached to the cart on one end and a large reel on the other end. The reel serves as storage are for the pipe as the cart moves back to the reel. The reel is turned by a small engine which gradually pulls the flexible pipe and cart back to the reel/base.

Scenario Feature Measure: Number of Traveling Gun Systems

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $26,136.16 **Scenario Cost/Unit:** $26,136.16

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Irrigation, Traveling Gun System, > 2" to 3 " Nominal size hose	1479	Irrigation, Traveling Gun System with 2.3 to 3 " Nominal size hose with appurtenances. This includes the sprinkler gun, traveler cart, hard hose, reel, connections, controls, and installation. Normal hose length 1000'.	Inch Diameter	$7,537.03	3	$22,611.09
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07

Practice: 442 - Sprinkler System

Scenario: #10 - Traveling Gun System, > 3" Hose

Scenario Description:

A portable big gun system with > 3" hose and mover; used to apply waste water from animal feeding operations. System installation includes a flowmeter.

This traveling big gun unit includes a sprinkler, towable cart, 1200' or more of >3" diameter PE hard hose, a self propelled reel that moves the sprinkler toward the reel during operation. The reel attaches to a mainline with appropriately designed tow-path width. The scenario describes an irrigation system that is typical to confined animal feeding operations.

Resource concerns: Soil Erosion (Concentrated flow erosion, e.g. overflowing waste storage) and Water Quality Degradation (Excess nutrients in surface and ground waters, Excessive salts in surface and ground waters, Excess pathogens and chemicals from liquid manure)

Associated Practices: Irrigation Pipeline (430), Pumping Plant (533), Irrigation Water Management (449), Conservation Crop Rotation (328), Cover Crop (340), Nutrient Management (590), Waste Transfer (634)

Before Situation:

A confined, animal operation has a waste management system that exceeds its capacity, or a operation that does not have a waste management system in place. The inefficiency of the existing system or the lack of a waste management system has an impact on the soil and water quality. Animal waste runs off and degrades the receiving waters.

After Situation:

The big gun applies animal manure in an appropriate quantity and location that eliminates both runoff of the manure and deep percolation of excess nutrients, salts, and pathogens.

The big gun system is typically located on 50 acres or less of hay/pasture land, or 100 acres or less of cropland. The system includes a large irrigation gun with 1" to 1½" orifice mounted onto a movable cart. 1200' or more flexible 4" PE pipe is attached to the cart on one end and a large reel on the other end. The reel serves as storage are for the pipe as the cart moves back to the reel. The reel is turned by a small engine which gradually pulls the flexible pipe and cart back to the reel/base.

Scenario Feature Measure: Number of Traveling Gun Systems

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $48,262.69 **Scenario Cost/Unit:** $48,262.69

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Irrigation, Traveling Gun System, > 3" Nominal size hose	1762	Irrigation, Traveling Gun System with > 3" Nominal size hose with appurtenances. This includes the sprinkler gun, traveler cart, hard hose, reel, connections, controls, and installation. Normal hose length 1300'	Each	$44,737.62	1	$44,737.62
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07

Practice: 442 - Sprinkler System

Scenario: #11 - Big Gun, Stationary

Scenario Description:

A portable big gun without a mover or reel; used to apply used to apply irrigation or waste water on small fields or pastures.

A small traveling gun irrigation system is installed to apply water uniformly and at an acceptable application rate operated under pressure to effectively irrigate small acreages of pasture or cropland. The irrigation system is installed with all necessary appurtenances.

Resource concerns: Soil Erosion (Concentrated flow erosion, e.g. overflowing waste storage) and Water Quality Degradation (Excess nutrients in surface and ground waters, Excessive salts in surface and ground waters, Excess pathogens and chemicals from liquid manure)

Associated Practices: Irrigation Pipeline (430), Pumping Plant (533), Irrigation Water Management (449), Conservation Crop Rotation (328), Cover Crop (340), Nutrient Management (590), Waste Transfer (634)

Before Situation:

A confined, animal operation has a waste management system that exceeds its capacity, or a operation that does not have a waste management system in place. The inefficiency of the existing system or the lack of a waste management system has an impact on the soil and water quality. Animal waste runs off and degrades the receiving waters.

After Situation:

The big gun applies animal manure in an appropriate quantity and location that eliminates both runoff of the manure and deep percolation of excess nutrients, salts, and pathogens.

The big gun is typically located on 3 acres of pasture or cropland. This includes a large irrigation gun with 1” to 1½” orifice mounted onto a movable cart which is attached to risers with a short section of hose. The Big Gun cart is moved by hand from one riser to another as needed throughout the field.

Scenario Feature Measure: Number of Big Guns

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $5,175.25 **Scenario Cost/Unit:** $5,175.25

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Irrigation, Traveling Gun System with ≤ 2" Nominal size hose, and appurtenances light duty	1478	Irrigation, Traveling Gun System with ≤ 2" Nominal size hose with appurtenances. This includes the sprinkler gun, traveler cart, hard hose, reel, connections, controls, and installation. Normal hose length 500'	Inch Diameter	$8,312.15	0.19	$1,579.31
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	1	$70.87

Practice: 442 - Sprinkler System

Scenario: #12 - Pod System

Scenario Description:

A portable irrigation system consisting of Polyethylene (PE) pipe and pods that have attached sprinklers. This scenario addresses installation of all pod style irrigation sprinkler systems. System installation includes a flowmeter.

Resource concerns include: Soil Erosion (Concentrated flow erosion e.g. irrigation induced), Insufficient Water (Inefficient use of irrigation water), Water Quality Degradation (Excess nutrients in surface and ground waters, Excessive salts in surface and ground waters, Excess pathogens and chemicals from manure, bio-solids or compost applications)

Associated Practices: Irrigation Pipeline (430), Pumping Plant (533), Irrigation Water Management (449)

Before Situation:

Pastureland is flood irrigated and has poor irrigation efficiency and distribution uniformity. The slope and irregular shape of the field limit the potential for improved management to improve the irrigation efficiency or the distribution uniformity. Irrigation water moves both within the field and off it, resulting in wet areas, runoff and deep percolation. Runoff from the field flows into streams, water courses, and other water bodies. Excess applied irrigation water infiltrates into ground water causing degradation to the receiving waters.

After Situation:

A 10 acre irrigated pasture with a medium pressure irrigation system consisting of sprinkler pods along a PE line is installed. The pods and PE line are placed in different sections of the pasture by dragging both with a four wheeler. The PE line is 660 feet in length and has 14 pods evenly spaced along its length.

The improved distribution uniformity and irrigation efficiency reduces the inefficient use of water on irrigated land, reducing irrigation water applied and energy use. Water application rates meet the pasture vegetation consumptive use requirements. Runoff and deep percolation as a result of irrigation are eliminated, and the receiving waters are no longer degraded.

Scenario Feature Measure: Number of Sprinkler Pods

Scenario Unit: Each

Scenario Typical Size: 12

Scenario Cost: $6,605.20 **Scenario Cost/Unit:** $550.43

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Irrigation, Pod System, w/Appurtenances	323	Pod irrigation system that includes pod, pipe, sprinklers, connections, and appurtenances. Includes materials only.	Each	$238.96	12	$2,867.52
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	3	$212.61

Practice: 442 - Sprinkler System

Scenario: #13 - Renovation of Existing Overhead or Wheel line Sprinkler System

Scenario Description:

Center Pivot and Linear Move sprinkler systems are used in large crop fields with fairly regular field borders and flat topography. The scenario involves changing nozzles on center pivot or lateral move irrigation systems to low-pressure systems to improve efficiency of water use and reduce energy use. This scenario is intended for cropland areas where the objective is water conservation. A typical scenario assumes a 1300 LF span, including end booms renozzled with low-pressure nozzles. Renovation system installation includes a flowmeter.

Resource concerns include: Soil Erosion (Concentrated flow erosion e.g. irrigation induced), Insufficient Water (Inefficient use of irrigation water), Water Quality Degradation (Excess nutrients in surface and ground waters, Excessive salts in surface and ground waters, Excess pathogens and chemicals from manure, bio-solids or compost applications), Inefficient Energy Use (Equipment and facilities e.g. pumping)

Associated Practices: Irrigation Pipeline (430), Pumping Plant (533), Irrigation Water Management (449)

Before Situation:

A center pivot or lateral move system has high pressure sprinklers. The nozzles are worn and water is applied non-uniformly. Water runs off the field and degrades the receiving waters. Deep percolation in some parts of the field degrades the ground water quality. The runoff from the field causes soil erosion. The high pressure requirement for the system requires excess energy use.

After Situation:

A Center Pivot or Linear Move sprinkler system with a span of 1300 linear feet is re-nozzled with low-pressure nozzles. The irrigation water is applied efficiently and uniformly to maintain adequate soil moisture for optimum plant growth. Runoff and deep percolation are eliminated, and the surface and ground water is no longer degraded. The irrigation induced soil erosion caused by runoff is also eliminated.
The lower pressure requirements of the sprinklers reduces the energy used by the pump.

Scenario Feature Measure: Length of Lateral Retrofitted

Scenario Unit: Linear Foot

Scenario Typical Size: 1,300

Scenario Cost: $10,975.45 **Scenario Cost/Unit:** $8.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Irrigation, Sprinkler Package, Renozzle or Retrofit, with drops and pressure regulators	1480	Sprinkler Package - Rennovation including sprinkler nozzle addition, and/or replacement, including new pressure regulators and drops.	Foot	$5.48	1300	$7,124.00
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	2	$141.74

Practice: 442 - Sprinkler System

Scenario: #14 - Retrofit, Irrigation Automation

Scenario Description:

The typical scenario consists of retrofitting an existing, functional, pump and sprinkler or micro irrigation system. The existing system may be pressurized by a pump, or by gravity elevation drop. The retrofit includes the addition of electronic/computer based automatic control systems. Typical components may include any of the following: Soil moisture sensors, air and soil temperature sensors, weather station data collector, wireless communication base station, pump automation electronic controller, valve automation electronic controller, web or cellular phone based software interlink.

Before Situation:

The before practice situation is characterized by manual operation of an existing, functional, irrigation system based on non scientific estimates of soil moisture levels and air temperature. Irrigation, frost control, and cooling operations are based on conservative estimates by the land owner, resulting in overwatering of the crop and running pumping systems longer than necessary. The operator typically drives a vehicle a considerable distance to turn the pump station on and off. The current operation of the system results in significant energy and water waste.

After Situation:

The after practice situation is characterized by operation of the retrofitted irrigation system for irrigation, frost control, and cooling only when necessary based on soil moisture and air temperature measurements. Off-site operation of the pumping system reduces vehicle energy use. Significant energy and water conservation is achieved through scientific based irrigation system/pumping plant management/automation.

Associated practices/activities may include: Irrigation Water Management (449), Pump Station (533) and 374-Farmstead Energy Improvement. The resource concern is inefficient use of water and energy during farm operations, which increases water use and dependence on non-renewable energy sources. These concerns are addressed through irrigation system automation.

Scenario Feature Measure: Field Size in Acres

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $9,290.45 **Scenario Cost/Unit:** $929.05

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	6	$138.48
Materials						
Switches and Controls, temp sensors	1192	Temperature and soil moisture sensors installed as part of an electronic monitoring (with or without wireless telecommunications) commonly used to control pumps and irrigation systems	Each	$605.73	8	$4,845.84
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07
Switches and Controls, Wi-Fi system and software	1194	Software with built-in cellular or Wi-Fi communication commonly used to control pumps and irrigation systems	Each	$415.23	1	$415.23
Switches and Controls, programmable controller	1193	Programmable logic controller (with or without wireless telecommunications) commonly used to control pumps and irrigation systems	Each	$153.22	1	$153.22
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	3	$212.61

Practice: 443 - Irrigation System, Surface and Subsurface

Scenario: #1 - Surge Valve & Controller

Scenario Description:

This scenario would typically include installation and utilization of a 10-inch surge valve with automated controller (including all appurtenances) and installation labor needed to convert from a conventional surface irrigated system to a surge irrigation system. Typical field size is 80 acres. The surge valve will be used with PVC Gated Pipe or PE Gated Tubing to convey and distribute irrigation water to alternating irrigation sets in a timed surge cycle that results in reduced a surging irrigation application. The surging action increases rate of advance along set length, reduces deep percolation at upper end of field, increases uniformity of application along row length, and on lower intake soils can significantly reduce runoff losses. The result is improved irrigation efficiency, reduced leaching and erosion losses, and conserved energy. This scenario does not include gated pipe or associated practices.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, and Degraded Plant Condition - Undesirable plant productivity and health, Water Quality Degradation- Excess nutrients in surface and ground waters, Water Quality Degradation - Excessive sediment in surface waters, and Inefficient Energy Use - Equipment and facilities

Associated Practices: 464-Irrigation Land leveling, 533-Pumping Plant, 449- Irrigation Water Management, 430 - Irrigation Pipeline, 328-Conservation Crop Rotation, and 590 Nutrient Management.

Before Situation:

Unacceptable irrigation application uniformity along existing surface irrigation system furrow or border length caused by excessive run length or soil infiltration rate when operated with continuous inflow on existing system. System is over irrigated in attempt to adequately irrigate low end of field.

After Situation:

A surge surface irrigation system is in place. After implementation, distribution uniformity and irrigation efficiency is improved, by reducing irrigation application volume and deep percolation losses. Runoff reductions, reduced energy use, and air quality improvements can also result.

Scenario Feature Measure: Number of Surge Valves

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $2,235.33 **Scenario Cost/Unit:** $2,235.33

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	2	$46.16
Materials						
Surge Valve And Controller	1477	Surge Valve and Controller, with appurtenances. Material cost includes valve, controller, all appurtenances, and mobilization.	Each	$2,189.17	1	$2,189.17

Practice: 443 - Irrigation System, Surface and Subsurface

Scenario: #2 - Aluminum Gated Pipe

Scenario Description:

Installation of surface Aluminum gated pipe to efficiently convey and distribute irrigation water in irrigation furrows, borders, or contour levees. A typical scenario would include 1,320 feet of 10-inch Aluminum gated pipe, with 40 inch gate spacing used to irrigate 60 acres. Appurtenances include: gates, couplings, fittings, in-line valves, pressure relief valves, and air vent valves. Does not include flow meters, or a permanent inlet structure with or without filtration.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, and Degraded Plant Condition - Undesirable Plant productivity and health.
Associated Practices: 464-Irrigation Land Leveling, 533-Pumping Plant, 449- Irrigation Water Management, 430 - Irrigation Pipeline, 328-Conservation Crop Rotation, and 590 Nutrient Management.,

Before Situation:

Typical before situation would include conveyance of water to surface irrigation distribution points with earthen ditches and distribution to individual furrows, borders, or contour levies by siphon tubes. The existing system would experience significant seepage ditch losses, and poor distribution uniformity.

After Situation:

The installation will improve distribution uniformity, irrigation efficiency, and eliminate or reduce ditch seepage.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 2,442

Scenario Cost: $12,908.72 **Scenario Cost/Unit:** $5.29

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80
Materials						
Pipe, aluminum, smooth wall, weight priced	1382	Aluminum manufactured into smooth wall pipe	Pound	$4.72	2686	$12,677.92

Practice: 443 - Irrigation System, Surface and Subsurface

Scenario: #3 - Polyvinyl Chloride (PVC) Gated Pipe

Scenario Description:

Installation of surface PVC gated pipe to efficiently convey and distribute irrigation water in irrigation furrows, borders, or contour levees. A typical scenario would include 1,320 feet of 10-inch PVC gated pipe, with 40 inch gate spacing used to irrigate 60 acres. Appurtenances include: gates, couplings, fittings, in-line valves, pressure relief valves, and air vent valves. Does not include flow meters, or a permanent inlet structure with or without filtration.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, and Degraded Plant Condition - Undesirable Plantproductivity and health.

Associated Practices: 464-Irrigation Land Leveling, 533-Pumping Plant, 449- Irrigation Water Management, 430 - Irrigation Pipeline, 328-Conservation Crop Rotation, and 590 Nutrient Management.

Before Situation:

Typical before situation would include conveyance of water to surface irrigation distribution points with earthen ditches and distribution to individual furrows, borders, or contour levies by siphon tubes. The existing system would experience significant seepage ditch losses, and poor distribution uniformity.

After Situation:

The installation will improve distribution uniformity, irrigation efficiency, and eliminate or reduce ditch seepage.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 3,320

Scenario Cost: $6,402.68 **Scenario Cost/Unit:** $1.93

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80
Materials						
Pipe, PVC, dia. < 18", weight priced	1323	Polyvinyl Chloride (PVC) pressure rated pipe priced by the weight of the pipe materials for pipes with diameters less than 18". Materials only.	Pound	$1.69	3652	$6,171.88

Practice: 443 - Irrigation System, Surface and Subsurface

Scenario: #4 - Poly Irrigation Tubing

Scenario Description:

This practice includes installation of thin wall Polyethylene (PE) irrigation tubing with 2½-inch gates, or gated pipe installed in shallow above ground trenches to replace above ground canals used to deliver water to individual basins within a contour levee or basin surface irrigation system. The typical scenario will use 1,320 feet of 15-inch, 10 mil, PE irrigation tubing (a 1,320-foot roll weighs 250 pounds) with 100 2½-inch gates spaced approximately 13 feet apart, installed in shallow above ground trenches to replace above ground canals used to deliver water to individual basins within a 40-acre irrigated field.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, and Degraded Plant Condition - Undesirable plant productivity and health, Water Quality Degradation- Excess nutrients in surface and ground waters, Water Quality Degradation - Excessive sediment in surface waters, and Inefficient Energy Use - Equipment and facilities

Associated Practices: 464-Irrigation Land Leveling, 533-Pumping Plant, 449-Irrigation Water Management, 430-Irrigation Pipeline, 328-Conservation Crop Rotation, and 590-Nutrient Management.

Before Situation:

Typical before situation would include a contour levee or basin surface irrigation system. Irrigation water is delivered to individual basins in a 40-acre rice field split into paddies using irrigation canals and field ditches.

After Situation:

After implementation irrigation efficiency is improved, while reducing irrigation application volume, runoff, evaporation losses, and cold water damage to crops. Reduced energy use and air quality improvements can also result.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pounds

Scenario Typical Size: 250

Scenario Cost: $772.30 **Scenario Cost/Unit:** $3.09

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80
Materials						
Flap gate, plastic, 2½"	1424	2 1/2" plastic flap gate for poly irrigation tubing. Materials only.	Each	$1.74	100	$174.00
Pipe, PE, collapsible, weight priced	1385	Polyethylene (PE) compound manufactured into collapsible tubing	Pound	$1.47	250	$367.50

Practice: 449 - Irrigation Water Management

Scenario: #1 - Basic IWM <30 acres

Scenario Description:

A low Intensity irrigation water management method for producers using an irrigation schedule based on historical crop water use averages or frost forcasts. This basic level of IWM is ideal for irrigators growing lower value crops or are constrained from implementing higher level activities. Introductory levels of basic Irrigation concepts of crop water use, irrigation intervals, set times, and soil moisture levels are stressed . For a typical scenario, soil moisture is determined by the feel method, and an irrigation schedule for a typical year is followed. May require only 1 soil monitoring site. Calendar schedules of irrigation dates and set times are kept on forms provided by NRCS. The Basic level allows novice irrigators to gain irrigation experience and possiblly advance to more intense levels of IWM. The owner/operator is the one carrying out these activities. Payment by "Each", referring to Each Field or Set of Fields that are managed the same.
Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Water Quality; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities.
Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface.

Before Situation:

The irrigator decides when to irrigate based on non scientific methods such as irrigation district delivery schedules, traditional intervals and run times, and historic frost data. The typical irrigated field is a 8 acre field with a surface/sprinkler irrigation system.

After Situation:

Irrigations are scheduled based on historical average crop water averages, and the feel method using soil samples. The irrigator keeps records of irrigation dates, set times, and soil moisture sample notes. At the end of the irrigation season all the data will be reviewed and evaluated. IWM Improvements, or higher levels of IWM may be planned for the following irrigation season.

Scenario Feature Measure: Each Field or set of fields that are managed the same

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $742.14 **Scenario Cost/Unit:** $742.14

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	18	$742.14

Practice: 449 - Irrigation Water Management

Scenario: #2 - Basic IWM >= 30 acres

Scenario Description:

A low Intensity irrigation water management method for producers using an irrigation schedule based on historical crop water use averages or frost forcasts. This basic level of IWM is ideal for novice irrigators growing lower value crops or are constrained from implementing higher level activities. Introduction to the basic Irrigation concepts of crop water use, irrigation intervals, set times, and soil moisture levels are stressed . For a typical scenario, soil moisture is determined by the feel method, and an irrigation schedule for a typical year is followed. Will likely require 2 or more soil monitoring sites to meet field size needs. Calendar schedules of irrigation dates and set times are kept on forms provided by NRCS. The Basic level allows novice irrigators to gain irrigation experience and possiblly advance to more intense levels of IWM. The owner/operator will include field staff to carry out activities.
Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Water Quality; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities.
Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface

Before Situation:

The irrigator decides when to irrigate based on non scientific methods such as irrigation district delivery schedules, or traditional intervals and run times and historic frost data. The typical irrigated field is a 60 acre field with a surface/sprinkler irrigation system.

After Situation:

Irrigations are scheduled based on historical average crop water averages, and the feel method using soil samples. The irrigator keeps records of irrigation dates, set times, and soil moisture sample notes. At the end of the irrigation season all the data will be reviewed and evaluated. IWM Improvements, or higher levels of IWM may be planned for the following irrigation season.

Scenario Feature Measure: Irrigated Area Managed

Scenario Unit: Acre

Scenario Typical Size: 60

Scenario Cost: $1,812.33 **Scenario Cost/Unit:** $30.21

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	16	$369.28
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	35	$1,443.05

Practice: 449 - Irrigation Water Management

Scenario: #3 - Intermediate IWM <30 acres

Scenario Description:

A medium intensity irrigation water management system for producers using a checkbook method or regional weather data to schedule irrigations or to manage crops for frost protection. Data recorded includes crops grown, evapotranspiration rates, soil moisture conditions, irrigation dates, set times, depths of irrigation applied, and amount of rainfall. All data is recorded on a daily basis. For a typical scenario, soil moisture is determined from soil samples and the feel method. May require only 1 soil monitoring site. Evapotranspitation, rainfall, and applied irrigation are dociumented to determine the soil moisture level and when to apply irrigation. Irrigation amounts are recorded from a flow meter near the pump, or from calculations of set times and application rates. Records are input manually into irrigation scheduling forms or computer programs. Payment by "Each", referring to Each Field or Set of Fields that are managed the same.
Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Water Quality; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities.
Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface

Before Situation:

The farmer decides when to irrigate based on traditional intervals and run times, general crop or soil appearance or limited soil moisture monitoring. System run times are based on past apparent success. The typical irrigated field is a 8 acre field with an irrigation system.

After Situation:

Irrigations are scheduled based on soil moisture levels calculated using the water balance or check book method or current regional weather conditions. Records are used to evaluate results of past irrigation events and influence future irrigations. The irrigator keeps records of soil moisture, crop water use, rainfall amounts and irrigation timing and amounts. At the end of the irrigation season all the data has been reviewed and evaluated. Improvements planned for the next season have been determined.

Scenario Feature Measure: Each Field or set of fields that are managed the same

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $1,113.21 **Scenario Cost/Unit:** $1,113.21

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	27	$1,113.21

Practice: 449 - Irrigation Water Management

Scenario: #4 - Intermediate IWM >= 30 acres

Scenario Description:

A medium intensity irrigation water management system for producers using a checkbook method or regional weather data to schedule irrigations or to manage crops for frost protection.. Data recorded includes crops grown, evapotranspiration rates, soil moisture conditions, irrigation dates, set times, depths of irrigation applied, and amount of rainfall. All data is recorded on a daily basis. For a typical scenario, soil moisture is determined from soil samples and the feel method. Evapotranspitation, rainfall, and applied irrigation are dociumented to determine the soil moisture level and when to apply irrigation. Irrigation amounts are recorded from a flow meter near the pump, or from calculations of set times and application rates. Will likely require 2 or more soil monitoring sites. Records are input manually into irrigation scheduling forms or computer programs. The owner/operator will include field staff to carry out activities.
Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Water Quality; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities.
Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface

Before Situation:

The farmer decides when to irrigate based on traditional intervals and run times, general crop or soil appearance or limited soil moisture monitoring. System run times are based on past apparent success. The typical irrigated field is a 60 acre field with an irrigation system.

After Situation:

Irrigations are scheduled based on soil moisture levels calculated using the water balance or check book method or current regional weather conditions. Records are used to evaluate results of past irrigation events and influence future irrigations. The irrigator keeps records of soil moisture, crop water use, rainfall amounts and irrigation timing and amounts. At the end of the irrigation season all the data has been reviewed and evaluated. Improvements planned for the next season have been determined.

Scenario Feature Measure: Irrigated Area Managed

Scenario Unit: Acre

Scenario Typical Size: 60

Scenario Cost: $2,717.60 **Scenario Cost/Unit:** $45.29

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	32	$738.56
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	48	$1,979.04

Practice: 449 - Irrigation Water Management

Scenario: #5 - Advanced IWM <30 acres

Scenario Description:

A high intensity irrigation water management system for producers using localized weather stations and/or soil moisture sensors to determine crop water requirements, and schedule irrigations accordingly or to manage crops for frost protection. Other methods such as the checkbook or touch methods may be used as a check on soil moisture sensor data. For this scenario, weather data or soil moisture, is determined by automated or manual moisture monitoring stations that may be equiped with telemetry data. Will likely require 1 or more soil monitoring sites. Irrigation amounts are recorded from a flow meter near the pump. For automated systems telemetry data is automatically sent to a computer with irrigation software. Irrigators can also receives real time data via mobile phone applications
Payment by "Each", referring to Each Field or Set of Fields that are managed the same.
Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Water Quality; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities.
Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface

Before Situation:

The farmer decides when to irrigate based on traditional intervals and run times, general crop or soil appearance or limited soil moisture monitoring. System run times are based on past apparent success. The typical irrigated field is a 8 acre field with a surface irrigation system.

After Situation:

Irrigations are scheduled based on measured soil moisture levels or current weather conditions. Records are used to evaluate results of past irrigation events and influence future irrigations. The irrigator keeps records of soil moisture, crop water use, rainfall amounts and irrigation timing and amounts. At the end of the irrigation season all the data has been reviewed and evaluated. Improvements planned for the next season have been determined.

Scenario Feature Measure: Each Field or set of fields that are managed the same

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $1,607.97 **Scenario Cost/Unit:** $1,607.97

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	39	$1,607.97

Practice: 449 - Irrigation Water Management

Scenario: #6 - Advanced IWM >= 30 acres

Scenario Description:

A high intensity irrigation water management system for producers using localized weather stations and/or soil moisture sensors to determine crop water requirements, and schedule irrigations accordingly or to manage crops for frost protection. Other methods such as the checkbook or touch methods may be used as a check on soil moisture sensor data. For this scenario, weather data or soil moisture, is determined by automated or manual moisture monitoring stations that may be equiped with telemetry data. Will likely require 2 or more soil monitoring sites. Irrigation amounts are recorded from a flow meter near the pump. For automated systems telemetry data is automatically sent to a computer with irrigation software. Irrigators can also receives real time data via mobile phone applications. The owner/operator will include field staff in carrying out activities.
Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Water Quality; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities.
Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface

Before Situation:

The farmer decides when to irrigate based on traditional intervals and run times, general crop or soil appearance or limited soil moisture monitoring. System run times are based on past apparent success. The typical irrigated field is a 60 acre field with a surface irrigation system.

After Situation:

Irrigations are scheduled based on measured soil moisture levels or current weather conditions. Records are used to evaluate results of past irrigation events and influence future irrigations. The irrigator keeps records of soil moisture, crop water use, rainfall amounts and irrigation timing and amounts. At the end of the irrigation season all the data has been reviewed and evaluated. Improvements planned for the next season have been determined.

Scenario Feature Measure: Irrigated Area Managed

Scenario Unit: Acre

Scenario Typical Size: 60

Scenario Cost: $3,746.56 **Scenario Cost/Unit:** $62.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	48	$1,107.84
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	64	$2,638.72

Practice: 449 - Irrigation Water Management

Scenario: #7 - IWM with Soil Moisture Sensors

Scenario Description:

This practice includes the installation of soil moisture sensors such as tensiometers, gyp blocks, capacitance sensors etc, that are installed and read to determine point in time soil moisture by depth. The installation includes the purchase of soil moisture meters and sensors, installation equipment, and labor to install and read sensors or meter. Typical Scenario involves installation of resistance sensor blocks in a 80 acre field of irrigated cropland. Producer periodically monitors the station during the growing season to determine timing and amounts of water to apply. Producer keeps records of collected data and resulting irrigation decisions. Meters used to read sensors may be portable. This scenario only applies to one year of IWM. The appropriate labor-only IWM scenario applies in subsequent contract years.
Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Water Quality; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities.
Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface

Before Situation:

Producer uses feel method to estimate soil moisture for scheduling irrigation.

After Situation:

Producer has installed four sensors at each monitoring site to a depth of four feet with one sensor representing each foot of depth. Producer uses periodic soil moisture measurements to schedule irrigation resulting in improved irrigation water managment and reduced energy use.

Scenario Feature Measure: Number of Measuring Sites

Scenario Unit: Each

Scenario Typical Size: 2

Scenario Cost: $2,627.15 **Scenario Cost/Unit:** $1,313.58

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	12	$276.96
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	40	$1,649.20
Materials						
Soil Moisture Sensor	1456	Soil moisture resistance sensor W/10' cables. Equipment only.	Each	$35.46	8	$283.68
Soil Moisture Meter	1455	Soil Moisture Sensor Reader. Equipment only.	Each	$275.57	1	$275.57
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	2	$141.74

Practice: 449 - Irrigation Water Management

Scenario: #8 - IWM with Soil Moisture Sensors with Data Recorder

Scenario Description:

This practice includes the installation of electrical soil moisture sensors such as capacitance or resistance sensors that are monitored to determine soil moisture. The installation includes the purchase of soil moisture sensors, installation equipment (probe or auger), and a data logger to log continuous soil moisture data that can be downloaded to a personal computer and associated graphing software. Typical Scenario involves installation of resistance sensor blocks in a 120 acre field of sprinkler irrigated cropland. Producer periodically monitors the station during the growing season to determine timing and amounts of water to apply. Producer keeps records of collected data and resulting irrigation decisions. This scenario only applies to one year of IWM. The appropriate labor-only IWM scenario applies in subsequent contract years.

Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Water Quality; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities.

Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface

Before Situation:

Producer uses feel method to estimate soil moisture for scheduling irrigation in the field.

After Situation:

Producer has installed four sensors at each monitoring site to a depth of four feet with one sensor representing each foot of depth. Producer periodically downloads continuously recorded soil moisture measurements that are used to schedule irrigation more effectively resulting in improved irrigation water managment and reduced energy use.

Scenario Feature Measure: Number of Measuring Sites

Scenario Unit: Each

Scenario Typical Size: 2

Scenario Cost: $3,492.42 **Scenario Cost/Unit:** $1,746.21

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	40	$1,649.20
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	12	$276.96
Materials						
Soil Moisture Sensor	1456	Soil moisture resistance sensor W/10' cables. Equipment only.	Each	$35.46	8	$283.68
Data Logger	1453	Data Logger W/Graphic Output for water management. Materials only.	Each	$570.42	2	$1,140.84
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	2	$141.74

Practice: 449 - Irrigation Water Management

Scenario: #9 - IWM with Irrigation Evaluation

Scenario Description:

Perform a systematic irrigation evaluation to gather information the producer can use to conserve and stretch limited water supplies by evaluating the performance of the irrigation system and its management. In an evaluation, measurements are made during an irrigation event to track and quantify the destination of applied water to calculate uniformity and water losses. In addition, the producer is given the opportunity to discuss his/her methods for determining when to irrigation and how much to apply (scheduling) to see if there might be opportunities for improvement. A report is developed for the producer describing system performance including how uniformly the water is being applied, how much is being applied during the irrigation event, the effect of the current irrigation scheduling strategy and what improvements would be beneficial. Producer bases irrigation decisions on soil, plant or climate based crop water use information and tracks and records irrigation applications. Producer keeps records of collected data and resulting irrigation decisions.
Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Water Quality; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities.
Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface

Before Situation:

Producer can not quantify irrigation performance and does not know with certainty where improvement can be made.

After Situation:

One evaluation is performed for the field or land unit of interest. Water destinations are identified and quantified. The producer knows the uniformity of the irrigation system and efficiency of the system and its management for that irrigation event. The producer knows where to focus improvements in the system or its management. Water applications are based on crop needs.

Scenario Feature Measure: Per Evaluation

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $3,673.04 **Scenario Cost/Unit:** $3,673.04

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	14	$1,539.16
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	40	$1,649.20
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	21	$484.68

Practice: 449 - Irrigation Water Management

Scenario: #10 - IWM with Weather Station

Scenario Description:

This practice includes the installation of weather stations that is monitored to determine crop water use and/or status of frost conditions to permit the producer to make informed irrigation decisions. The installation includes the purchase and installation of equipment, and a data logger to log continuous weather data including rainfall, temp, solar radiation, humidity, wind speed, etc. that can be downloaded to a personal computer and associated graphing software. Typical Scenario involves installation n a 120 acre field of sprinkler irrigated cropland. Producer periodically monitors the station during the growing season to determine timing and amounts of water to apply.
Producer keeps records of collected data and resulting irrigation decisions. This scenario only applies to one year of IWM. The appropriate labor-only IWM scenario applies in subsequent contract years.
Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Water Quality; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities.
Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface

Before Situation:

To meet crop water requirements, the producer schedules irrigations based on the calendar and what has apperently worked in the past. For frost protection, irrigation start and run times are based on broad regional weather forcasts.

After Situation:

Producer has installed a weather station and periodically downloads continuously recorded data that is used to schedule irrigation more effectively resulting in improved irrigation water managment and reduced energy use.

Scenario Feature Measure: Number of Weather Stations

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $3,955.76 **Scenario Cost/Unit:** $3,955.76

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	40	$1,649.20
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	12	$276.96
Materials						
Data Logger with Telemetry System	1454	Data Logger W/Graphic Output for water management and telemetry - data communication device with power supply in a weather proof enclosure. Equipment only.	Each	$1,621.02	1	$1,621.02
Weather Station	314	Basic Weather Station which collects and records recording rainfall, humidity, barometric pressure, wind speed, and temperature to a home weather console. Includes materials only.	Each	$266.84	1	$266.84
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	2	$141.74

Practice: 450 - Anionic Polyacrylamide (PAM) Application

Scenario: #1 - PAM Application

Scenario Description:

Control of irrigation induced erosion (typically in furrow irrigated fields) through the direct application of water-soluble Polyacrylamide (PAM) into the irrigation water supply with existing metering equipment. PAM comes in granular, liquid oil emulsion, tablet, and block forms. This typical application is for an 80-acre furrow irrigated row crop field, with one PAM application (1-1.5 lb/ac, creating a 10 ppm concentration of the granular PAM in the head ditch metered via large fish feeder) at first irrigation followed by two additional applications (reduced rates of 0.5-1 lb/ac, or about 1-5 ppm in the inflow water) after cultivations.
Resource Concern: Soil erosion.
Associated Practices: 443-Irrigation System, Surface and Subsurface, 449-Irrigation Water Management.

Before Situation:

Irrigated lands susceptible to irrigation-induced erosion, excluding peat soils, and where the sodium adsorption ratio (SAR) of irrigation water is less than 15.

After Situation:

Erosion is minimized in furrow irrigated field.

Scenario Feature Measure: Weight of PAM Applied

Scenario Unit: Pound

Scenario Typical Size: 240

Scenario Cost: $478.56 **Scenario Cost/Unit:** $1.99

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	12	$276.96
Materials						
Anionic Polyacrylamide (PAM)	1279	Water Soluble PAM, granular bulk, for mixing with irrigation water. Includes materials and shipping only.	Pounds	$0.84	240	$201.60

Practice: 450 - Anionic Polyacrylamide (PAM) Application

Scenario: #2 - PAM Application, with Metering Equipment

Scenario Description:

Control of irrigation induced erosion (typically in furrow irrigated fields) through the direct application of water-soluble Polyacrylamide (PAM) into the irrigation water supply. Includes PAM material, application/metering equipment, and labor. PAM comes in granular, liquid oil emulsion, tablet, and block forms. This typical application is for a 40-acre furrow irrigated row crop field, with one PAM application (1-1.5 lb/ac, creating a 10 ppm concentration of the granular PAM in the head ditch metered via large fish feeder) at first irrigation followed by two additional applications (reduced rates of 0.5-1 lb/ac, or about 1-5 ppm in the inflow water) after cultivations.
Resource Concern: Soil erosion.
Associated Practices: 443-Irrigation System, Surface and Subsurface, 449-Irrigation Water Management.

Before Situation:

Irrigated lands susceptible to irrigation-induced erosion, excluding peat soils, and where the sodium adsorption ratio (SAR) of irrigation water is less than 15.

After Situation:

Erosion is minimized in furrow irrigated field.

Scenario Feature Measure: Weight of PAM Applied

Scenario Unit: Pound

Scenario Typical Size: 120

Scenario Cost: $391.72 **Scenario Cost/Unit:** $3.26

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
PAM Application, metering equipment	2058	Metering equipment to dispense PAM into irrigation water at a controlled rate. Equipment only.	Each	$152.44	1	$152.44
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	6	$138.48
Materials						
Anionic Polyacrylamide (PAM)	1279	Water Soluble PAM, granular bulk, for mixing with irrigation water. Includes materials and shipping only.	Pounds	$0.84	120	$100.80

Practice: 457 - Mine Shaft and Adit Closing

Scenario: #1 - Horizontal Shaft, Bat Grating

Scenario Description:

This scenario addresses closure of horizontal shaft underground mine openings by installing barriers, grating or fencing in order to reduce safety hazards for humans and large animals; maintain or improve access and/or habitat for wildlife, specifically bats and other small wildlife; protect cultural resources which are known to be present in the shaft. For this scenario, problems with subsidence, emission of hazardous gases, and/or contamination of surface and ground water resources are not present. Critical Area Planting (342) & Fence (382) may be associated practices.

Before Situation:

A horizontal shaft that presents a threat to safety for humans and large animals. The shaft is being utilized by bats and other wildlife, or there are known cultural resources present in the shaft that need to be protected.

After Situation:

Bat grating is used to close the shaft to prevent access by humans and other large animals, but not impede wildlife usage. Typical horizontal shaft treated is 15' wide x 5' high.

Scenario Feature Measure: SqFt of opening

Scenario Unit: Square Foot

Scenario Typical Size: 75

Scenario Cost: $42,567.52 **Scenario Cost/Unit:** $567.57

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	6	$3,050.22
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	60	$346.80
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	24	$2,747.52
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	24	$900.48
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	24	$989.52
Materials						
Epoxy anchor	1599	Galvanized bolts anchored into concrete or stone using epoxy adhesive. Includes materials and labor to drill and install.	Each	$18.73	50	$936.50
Bat Gate	1129	Bat Gate Assembly, Includes materials, equipment and labor.	Square Foot	$71.92	460	$33,083.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 457 - Mine Shaft and Adit Closing

Scenario: #2 - Horizontal Shaft, Dry

Scenario Description:

This scenario addresses closure of horizontal shaft underground mine openings by backfilling to a stable slope with suitable materials to reduce hazards for humans and large animals. For this scenario, problems with subsidence, emission of hazardous gases, and/or contamination of surface and ground water resources are not present. Critical Area Planting (342) & Fence (382) may be associated practices.

Before Situation:

A horizontal shaft mine opening that presents a threat to safety for humans and large animals. The shaft is not being utilized by bats and other wildlife, and there are no known cultural resources present in the shaft.

After Situation:

After closure of the mine opening the hazard to humans and wildlife will be removed. Typical horizontal shaft treated is 15' wide x 5' high with approximately 85 CY of Backfill required

Scenario Feature Measure: Cubic Yard of Backfill

Scenario Unit: Cubic Yard

Scenario Typical Size: 85

Scenario Cost: $7,400.38 **Scenario Cost/Unit:** $87.06

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	32	$3,663.36
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	85	$491.30
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	32	$1,200.64
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	24	$989.52
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	4	$155.88
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$25.76	15	$386.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 457 - Mine Shaft and Adit Closing

Scenario: #4 - Vertical Shaft

Scenario Description:

This scenario addresses vertical shaft underground mine openings which are fall hazards to humans and animals. Depths of vertical shafts are typically greater than 100 feet. For this scenario, problems with subsidence, acid mine drainage, and emission of hazardous gases are not present. Critical Area Planting (342) & Fence (382) may be associated practices.

Before Situation:

An open shaft or hidden shaft poses a severe safety hazard to humans and wildlife.

After Situation:

The plugged shaft will remove the fall hazard to humans and wildlife. Typical vertical shaft treated is 15' Dia (Depth varies).

Scenario Feature Measure: CY of Concrete Plug

Scenario Unit: Cubic Yard

Scenario Typical Size: 18

Scenario Cost: $15,378.92 **Scenario Cost/Unit:** $854.38

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	18	$9,150.66
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	60	$346.80
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	16	$1,831.68
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	16	$600.32
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	16	$659.68
Materials						
Corrugated Steel, 12 Gauge, galvanized	1376	Corrugated Steel, 12 gauge, 3" by 1" corrugations, galvanized, meets ASTM A 929. Materials only.	Square Foot	$7.25	314	$2,276.50
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 460 - Land Clearing

Scenario: #1 - Non-Heavy Equipment

Scenario Description:

Site preparation of a field with a labor crew, chainsaws, chippers or similar equipment removing trees and shrubs to achieve a conservation objective. Typical scenario is approximately 1 acre of trees and shrubs to be cleared. The resource concern is determined by the conservation objective met with the final practice applied to the field.

Before Situation:

Forested land of approximately 1 acre, with moderate density evenly spaced tree canopy. Could be along a proposed access road corridor or other small acreages where structural practices are being installed in a planned conservation system. Removal of trees, brush, and other vegetation is necessary in order to implement another conservation objective, not including land clearing primarily for crop production purposes.

After Situation:

Labor crew uses chainsaws, chippers, or similar equipment to clear trees and prepare the field for a conservation objective, includes on-site disposal as necessary. Associated practices, like plantings, other structures, or irrigation/drainage water management practices, would be contracted separately as needed.

Scenario Feature Measure: Area Cleared

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $814.08 **Scenario Cost/Unit:** $814.08

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.09	24	$146.16
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	24	$599.04
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$68.88	1	$68.88

Practice: **460 - Land Clearing**

Scenario: **#2 - Heavy Equipment**

Scenario Description:

Site preparation of a field with dozer or equivalent heavy equipment to acheive a conservation objective. Typical scenario is approximately 10 acres of trees and shrubs to be cleared. The resource concern is determined by the conservation objective met with the final practice applied to the field.

Before Situation:

Forested land of approximately 10 acres, with moderate density evenly spaced tree canopy. Removal of trees and stumps is needed in order to implement another conservation objective. Does not include land clearing for crop production purposes.

After Situation:

Crew uses 200 HP dozer to clear trees and prepare field for conservation objective, includes on-site debris disposal as necessary. Associated practices, like plantings, other structures, or irrigation/drainage water management practices, would be contracted separately as needed.

Scenario Feature Measure: Area Cleared

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $10,229.46 **Scenario Cost/Unit:** $1,022.95

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$180.39	40	$7,215.60
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	40	$998.40
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.48	40	$1,539.20
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$476.26	1	$476.26

Practice: 460 - Land Clearing

Scenario: #3 - Shrub and Brush Clearing

Scenario Description:

Site preparation of a field with a labor crew and chainsaws removing mostly shrubs to achieve a conservation objective such as providing access to water or forage opportunities or clearing an area for installation of a structural practice. Typical scenario is approximately 1 acre of shrubs to be cleared. The resource concern is determined by the conservation objective met with the final practice applied to the field.

Before Situation:

Various situations including 1) Heavy brush exists where a new structure will be installed 2) Land with dense woody vegetation is blocking access to water and other forage opportunities for livestock and wildlife, 3) Other site preparation for installation of other structural conservation practices. Does not include site preparation for vegetative practices. Does not include site preparation for crop production related activities.

After Situation:

Labor crew uses chainsaws to clear heavy brush and very small trees the field for a conservation objective, includes on-site disposal as necessary.

Scenario Feature Measure: Area Cleared

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $434.70 **Scenario Cost/Unit:** $434.70

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.09	14	$85.26
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	14	$349.44

Practice: **462 - Precision Land Forming**

Scenario: **#1 - Minor Shaping**

Scenario Description:

The land surface is shaped or leveled to a specific elevation and grade for various land uses. Cuts and fills are small. The resource concerns are Excess/Insufficient Water (Ponding, Flooding) and Soil Erosion (Sheet, Rill).

Before Situation:

The field has minor topographic issues or problems with surface drainage or erosion which can be corrected without land leveling or land smoothing. Site conditions require attention to elevation and grade. Typical situation is a 5 acre field. Material to be moved and or placed typically around 100 cubic yards per acre.

After Situation:

Land has been shaped to the required elevations and grades. Resource concerns have been treated. Associated practices, like plantings or drainage water management practices, would be contracted seperately as needed.

Scenario Feature Measure: Acres of land treated

Scenario Unit: Acre

Scenario Typical Size: 5

Scenario Cost: $2,394.26 **Scenario Cost/Unit:** $478.85

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	6	$259.92
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	6	$748.68
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	6	$225.12
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	6	$133.98
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	4	$1,026.56

Practice: **462 - Precision Land Forming**

Scenario: **#2 - Site Stabilization**

Scenario Description:

The site contains a gully or other site specific topographic problem. Site conditions require attention to elevation and grade. Resource concerns areExcess/Insufficient Water (Ponding, Flooding) and Soil Erosion (Sheet, Rill).

Before Situation:

The site, commonly a crop field or CAFO, has localized gully or topographic issues causing drainage or erosion problems. Typical situation is a gully 10 feet wide, 5 feet deep and 300 feet long.

After Situation:

Land has been shaped to the required elevations and grades. Resource concerns have been treated. Associated practices, like plantings or drainage water management practices, would be contracted seperately as needed.

Scenario Feature Measure: Cubic yards of material moved

Scenario Unit: Cubic Yard

Scenario Typical Size: 140

Scenario Cost: $1,051.28 **Scenario Cost/Unit:** $7.51

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	2	$134.90
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$56.21	3.5	$196.74
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	5.5	$206.36
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: **464 - Irrigation Land Leveling**

Scenario: **#1 - Irrigation Land Leveling**

Scenario Description:

Land levelling is performed on a typical field, 80 acres of irrigated crop land surface, to enhance uniform flow of surface water to improve irrigation efficiency using GPS-enabled scraper equipment. The typical volume of earth moved is 100 to 500 cubic yards per acre.
Resource Concern: Excess/Insufficient - Inefficient Use of Irrigation Water
Associated Conservation Practices: 433 - Irrigation System, Surface and Subsurface; 607 - Surface Drain, Field Ditch; 388 - Irrigation Field Ditch; 449 - Irrigation Water Management; or 587 - Structure for Water Control.

Before Situation:

Irregular field surface reduces uniformity of surface application and thus irrigation efficiency by localized ponding and/or excess runoff/runon.

After Situation:

Land-Leveling greatly enhances uniform distribution of irrigation water in order to promote irrigation efficiencies.

Scenario Feature Measure: Volume of Earth Moved

Scenario Unit: Cubic Yard

Scenario Typical Size: 16,000

Scenario Cost: $22,075.98 **Scenario Cost/Unit:** $1.38

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tractor, agricultural, 260 HP	1204	Agricultural tractor with horsepower range of 240 to 290. Equipment and power unit costs. Labor not included.	Hour	$116.10	120	$13,932.00
Scraper, pull, 15 CY	1207	Pull type earthmoving scraper with 15 CY capacity. Does not include pulling equipment or labor. Add Tractor or Dozer, 260 HP typically required for single scraper.	Hour	$22.18	120	$2,661.60
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	120	$4,502.40
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: **466 - Land Smoothing**

Scenario: **#1 - Minor Shaping**

Scenario Description:

Removing irregularities on the land surface of cropland by use of heavy equipment.

Before Situation:

Field damaged by flooding, past agricultural practices, or other topographich issues causing drainage or field workablity issues. Typically less than 100 cy/acre material moved.

After Situation:

Land level, backhoe, bulldozer or other heavy equipment used to correct irregulaties and address drainage or workablity issues.

Scenario Feature Measure: Acres of land treated

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $4,218.44 **Scenario Cost/Unit:** $105.46

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$120.28	25	$3,007.00
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.48	25	$962.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$249.44	1	$249.44

Practice: 468 - Lined Waterway or Outlet

Scenario: #1 - Turf Reinforced Matting

Scenario Description:

Install 300' long by 15' wide by 1.5' deep trapezoidal or parabolic shaped waterway lined with Turf Reinforced Matting (TRM). Half of the channel is excavated. Excess excavation is spoiled in the immediate area. TRM is installed over 100% of the width of the waterway to prevent scour and aid in waterway establishment. Cost include excavation, spoiling of excess material, and furnishing and installing TRM. Lined waterway width is measured from top of bank to top of bank.
Resource Concerns: Concentrated Flow Erosion (Classic Gully & Ephemeral Erosion) and Excessive Sediment in surface waters.

Before Situation:

Excessive sedimentation and soil erosion as a result of ephemeral or classic gully erosion. Velocities are generally too high or saturated soil conditions make it difficult to establish a grassed waterway.

After Situation:

TRM lined waterway is 300' long by 15' wide by 1.5' deep. The practice is installed using a hydraulic excavator. TRM is installed by laborers. Associated practices are Subsurface Drain (606), Underground Outlet (620), Structure for Water Control (587), and Critical Area Seeding (342).

Scenario Feature Measure: Square Foot of Waterway

Scenario Unit: Square Feet

Scenario Typical Size: 4,500

Scenario Cost: $3,759.86 **Scenario Cost/Unit:** $0.84

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	90	$213.30
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Turf reinforcement mat	1212	Synthetic turf reinforcement mat with staple anchoring. Includes materials, equipment and labor.	Square Yard	$6.25	500	$3,125.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 468 - Lined Waterway or Outlet

Scenario: #2 - Rock Lined - 12"

Scenario Description:

Install 300' long by 15' wide by 12" deep trapezoidal or parabolic shaped waterway lined with riprap (D100 = 9", Velocity ~ 8 ft/sec). Half of the channel is excavated, before excavation for riprap. Excess excavation is spoiled in the immediate area. Riprap is installed over 100% of the width of the waterway to prevent scour. Cost include excavation, spoiling of excess material, geotextile underlayment and installing 9" Rock Riprap. Lined waterway width is measured from top of bank to top of bank.
Resource Concerns: Concentrated Flow Erosion (Classic Gully & Ephemeral Erosion) and Excessive Sediment in surface waters.

Before Situation:

Excessive sedimentation and soil erosion as a result of ephemeral or classic gully erosion. Velocities are generally too high or saturated soil conditions make it difficult to establish a grassed waterway.

After Situation:

Rock lined waterway is 300' long by 15' wide by 12" deep. Waterway is excavated and rock is placed using a hydraulic excavator. Geotextile underlayment is installed by laborers. Associated practices are Subsurface Drain (606), Underground Outlet (620), Structure for Water Control (587), and Critical Area Seeding (342).

Scenario Feature Measure: Square Foot of Waterway

Scenario Unit: Square Feet

Scenario Typical Size: 4,500

Scenario Cost: $14,481.16 **Scenario Cost/Unit:** $3.22

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	295	$699.15
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	2	$46.16
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	205	$13,396.75
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 468 - Lined Waterway or Outlet

Scenario: #3 - Rock Lined - 24"

Scenario Description:

Install 300' long by 15' wide by 24-inch deep trapezoidal or parabolic shaped waterway lined with riprap (D100 = 18", Velocity ~ 11 ft/sec). Half of the channel is excavated, before excavation for riprap. Excess excavation is spoiled in the immediate area. Riprap is installed over 100% of the width of the waterway to prevent scour. Cost include excavation, spoiling of excess material, geotextile underlayment and installing 18" Rock Riprap. Lined waterway width is measured from top of bank to top of bank.
Resource Concerns: Concentrated Flow Erosion (Classic Gully & Ephemeral Erosion) and Excessive Sediment in surface waters.

Before Situation:

Excessive sedimentation and soil erosion as a result of ephemeral or classic gully erosion. Velocities are generally too high or saturated soil conditions make it difficult to establish a grassed waterway.

After Situation:

Rock lined waterway is 300' long by 15' wide by 24-inch deep. Waterway is excavated and rock is placed using a hydraulic excavator. Geotextile underlayment is installed by laborers. Associated practices are Subsurface Drain (606), Underground Outlet (620), Structure for Water Control (587), and Critical Area Seeding (342).

Scenario Feature Measure: Square Foot of Waterway

Scenario Unit: Square Feet

Scenario Typical Size: 4,500

Scenario Cost: $32,088.36 **Scenario Cost/Unit:** $7.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	555	$1,315.35
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	2	$46.16
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	465	$30,387.75
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 468 - Lined Waterway or Outlet

Scenario: #4 - Concrete

Scenario Description:

Install 300' long by 15' wide by 1.5' deep trapezoidal or parabolic shaped waterway lined with concrete. Half of the channel is excavated, before excavation for concrete and subgrade material. Excess excavation is spoiled in the immediate area. Concrete is installed over 100% of the width of the waterway to prevent scour. Cost include excavation, spoiling of excess material, 6" of clean sand or gravel subgrade, and 5" reinforced concrete slab. Lined waterway width is measured from top of bank to top of bank.
Resource Concerns: Concentrated Flow Erosion (Classic Gully & Ephemeral Erosion) and Excessive Sediment in surface waters.

Before Situation:

Excessive sedimentation and soil erosion as a result of ephemeral or classic gully erosion. Velocities are generally too high or saturated soil conditions make it difficult to establish a grassed waterway. Usually installed in locations where rock or other lining materials are not readily available.

After Situation:

Concrete lined waterway is 300' long by 15' wide by 1.5' deep. Waterway is excavated using a hydraulic excavator. Concrete slab is placed on 6" of clean sand or #57 stone. Concrete is placed, graded and screeded by laborers. Associated practices are Subsurface Drain (606), Underground Outlet (620), Structure for Water Control (587), and Critical Area Seeding (342).

Scenario Feature Measure: Square Foot of Waterway

Scenario Unit: Square Feet

Scenario Typical Size: 4,500

Scenario Cost: $18,207.56 **Scenario Cost/Unit:** $4.05

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	280	$663.60
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	80	$12,872.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	2	$46.16
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	110	$4,286.70
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 468 - Lined Waterway or Outlet

Scenario: #6 - Concrete Block

Scenario Description:

Install 36' long (including inlet and outlet aprons) by 15' wide by 1.5' deep trapezoidal shaped waterway or chute lined with concrete blocks. 1/2 the channel is excavated. Excess excavation is spoiled in the immediate area. 8"x8"x16" standard concrete blocks are installed over 100% of the width of the waterway/chute to prevent scour. Cost include excavation, spoiling of excess material, 3" stone subgrade, geotextile and furnishing and installing standard concrete blocks. Lined waterway width is measured from top of bank to top of bank. Resource Concerns: Concentrated Flow Erosion (Classic Gully & Ephemeral Erosion) and Excessive Sediment in surface waters.

Before Situation:

Excessive sedimentation and soil erosion as a result of ephemeral or classic gully erosion. Velocities are generally too high or saturated soil conditions make it difficult to establish a grassed waterway. Usually installed in locations where rock or other lining materials are not readily available.

After Situation:

Conccrete block lined waterway or chute is 36 ' long by 15' wide by 1.5' deep. Chute is installed on a 3 to 1 slope. The practice is installed using a hydraulic excavator. Geotextile and concrete blocks are installed by laborers. Associated practices are Subsurface Drain (606), Underground Outlet (620), Structure for Water Control (587), and Critical Area Seeding (342).

Scenario Feature Measure: Square Foot of Waterway

Scenario Unit: Square Feet

Scenario Typical Size: 540

Scenario Cost: $2,609.93 **Scenario Cost/Unit:** $4.83

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	65	$159.25
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	32	$75.84
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	24	$553.92
Materials						
Block, concrete	253	Concrete block, hollow, normal weight, 3500 psi. Includes both full and partial sizes. Material only	Each	$1.95	640	$1,248.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	6	$233.82
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 472 - Access Control

Scenario: #1 - Seasonal exclusion, High production

Scenario Description:

Seasonally restricting access to forage fields by livestock during critical growth periods, nesting periods, or other times when livestock use of the field will damage the identified threatened resource. Resource concerns may include Undesirable plant productivity and health, Concentrated flow erosion, Soil compaction, Excessive sediment or nutrients in surface waters, or Wildlife habitat degradation. These fields are typically pastures or riparian areas where forage production is higher.

Before Situation:

Fields are used at times of the year when use causes damage to identified resource concerns such as plant productivity and health, erosion, soil compaction, excessive sediment or nutrients in surface waters, or wildife habitat degredation.

After Situation:

Resources are protected during identified critical periods.

Scenario Feature Measure: Number

Scenario Unit: Acre

Scenario Typical Size: 5

Scenario Cost: $438.28 **Scenario Cost/Unit:** $87.66

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$35.97	2	$71.94
Foregone Income						
FI, Hay, General Grass	2122	General Grass Hay is Primary Land Use	Ton	$41.00	6.5	$266.50
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	4	$99.84

Practice: 472 - Access Control

Scenario: #2 - Seasonal exclusion, Low production

Scenario Description:

Seasonally restricting access to forage fields by livestock during critical growth periods, nesting periods, or other times when livestock use of the field will damage the identified threatened resource. Resource concerns may include Undesirable plant productivity and health, Concentrated flow erosion, Soil compaction, Excessive sediment or nutrients in surface waters, or Wildlife habitat degradation. These fields are typically in areas where climatic or soil conditions limit forage production.

Before Situation:

Fields are used at times of the year when use causes damage to identified resource concerns such as plant productivity and health, erosion, soil compaction, excessive sediment or nutrients in surface waters, or wildife habitat degredation.

After Situation:

Resources are protected during identified critical periods.

Scenario Feature Measure: Number

Scenario Unit: Acre

Scenario Typical Size: 50

Scenario Cost: $1,196.78 **Scenario Cost/Unit:** $23.94

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$35.97	2	$71.94
Foregone Income						
FI, Hay, General Grass	2122	General Grass Hay is Primary Land Use	Ton	$41.00	25	$1,025.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	4	$99.84

Practice: 472 - Access Control

Scenario: #3 - Cattle Guard

Scenario Description:

Restricting access to the use of forest/farm roads and trails by the use of a cattle gaurd. Resource concerns include Undesirable plant productivity and health, Concentrated flow erosion, Soil compaction, Excessive sediment in surface waters, and Wildlife habitat degradation. Assoicated Practices include 382 Fencing.

Before Situation:

Roads and fields are damaged or misusedby unrestricted animal access. Extensive amount of fencing (other than that needed to restrict access at the site of ingress) is not included in this scenario, but instead will be planned and installed with the Fence practice (382).

After Situation:

Roads and field access by livestock and wildlife is restricted. Fields and grazing systems can be managed for more production.

Scenario Feature Measure: Number

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $5,090.54 **Scenario Cost/Unit:** $5,090.54

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.30	18	$41.40
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$54.18	4	$216.72
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$120.28	8	$962.24
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$494.12	2.5	$1,235.30
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.48	14	$538.72
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	9	$224.64
Materials						
Cattle guard	2144	Standard 16' x 6' cattle guard. Materials and shipping only.	Each	$1,814.47	1	$1,814.47
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.03	1.5	$57.05

Practice: 472 - Access Control

Scenario: #4 - Swing Arm Gate

Scenario Description:

Restricting access to the use of forest/farm roads and trails by the use of a large manufactured steel 'forest road type' swing arm gate with a lock post. Resource concerns include Undesirable plant productivity and health, Concentrated flow erosion, Soil compaction, Excessive sediment in surface waters, and Wildlife habitat degradation. Assoicated Practices include 382 Fencing.

Before Situation:

Roads and fields are damaged or misusedby unrestricted animal access. Extensive amount of fencing (other than that needed to restrict access at the site of ingress) is not included in this scenario, but instead will be planned and installed with the Fence practice (382).

After Situation:

Roads and field access by livestock and wildlife is restricted. Fields and grazing systems can be managed for more production.

Scenario Feature Measure: Number

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $3,891.99 **Scenario Cost/Unit:** $3,891.99

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$110.36	10	$1,103.60
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.30	7	$16.10
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	9	$224.64
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.48	11	$423.28
Materials						
Gate, swing arm	2150	Steel swing arm type gate with steel post anchor. Materials and shipping only.	Each	$1,480.34	1	$1,480.34
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$167.77	1	$167.77
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$476.26	1	$476.26

Practice: 472 - Access Control

Scenario: #5 - Extended Road Closure

Scenario Description:

Restricting access to the use of forest/farm roads and trails for an extended period of time, typically assoicated with decomissioning of a road. This would include installation of boulders, ecology blocks or tank traps to ensure that a road is no longer accessable. Resource concerns include Undesirable plant productivity and health, Concentrated flow erosion, Soil compaction, Excessive sediment in surface waters, and Wildlife habitat degradation.

Before Situation:

Roads are damaged or misused, illegal activities occur and/or forest resources are at risk. Extensive amount of fencing (other than that needed to restrict access at the site of ingress) is not included in this scenario, but instead will be planned and installed with the Fence practice (382).

After Situation:

Roads are protected, illegal activities are stopped and/or forest resources are secure.

Scenario Feature Measure: Number

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $3,819.00 **Scenario Cost/Unit:** $3,819.00

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$184.47	10	$1,844.70
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	10	$249.60
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.48	10	$384.80
Materials						
Block, pre-cast concrete, modular	1496	Pre-cast concrete blocks, typically 2ft x 2ft x 6ft , includes installation and delivery.	Cubic Yard	$110.68	3.5	$387.38
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$476.26	2	$952.52

Practice: 472 - Access Control

Scenario: #6 - Monitoring

Scenario Description:

Labor and increased time needed to control and re-route animals and traffic from sensitive areas, monitor and maintain barriers. Resource concerns include Excessive sediment in surface waters, Habitat degradation for fish and wildlife, and Undesirable plant productivity and health.

Before Situation:

The application of access control has resulted in increased labor and time to re-route traffic and animals from a riparian area that splits a field in half. This has also lead to more time and labor in monitoring the animals, inspecting and repairing the barrier.

After Situation:

Water quality is maintained, habitat is improved, and plant health is maintained by controlling access to the riparian area.

Scenario Feature Measure: Area of riparian area

Scenario Unit: Acres

Scenario Typical Size: 5

Scenario Cost: $182.79 **Scenario Cost/Unit:** $36.56

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$35.97	3	$107.91
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	3	$74.88

Practice: 484 - Mulching

Scenario: #1 - Natural Materials

Scenario Description:

Typical use is a medium application of straw mulch or other state approved natural material that provides 60-70% soil coverage (approximately 2 T/ac or 1-3 inch depth when using straw). Purpose is to conserve soil moisture, reduce energy use associated with irrigations, protect soil from erosion, and/or to reduce airborne particulate matter from wind erosion. Mulch may be used with critical area planting, between or in rows on orchards/vineyards or between rows of crops. Payment is based on actual acres mulched.

Before Situation:

Typical scenario ranges from a 0.1 to 1.0 acre site where vegetated cover is needed and/or there is a high potential for soil erosion such as around a newly constructed practice. The potential for soil erosion is high and mulch is needed to stabilize the soil and facilitate the establishment of vegetative cover. There may also be a need to reduce airborne particulates, conserve moisture, moderate soil temperature or improve soil quality.

After Situation:

Straw mulch has been applied to areas needing mulch. Vegetative cover is established, and erosion and sedimentation is reduced. In addition there may be improvements through reductions in airborne particulates and soil temperature, increased soil moisture and improved soil quality.

Scenario Feature Measure: Area Covered by Mulch

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $412.08 **Scenario Cost/Unit:** $412.08

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	1	$37.31
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	1	$23.53
Mulcher, straw blower	1305	Straw bale mulcher/blower to mechanically spread small or large straw bales. Labor not included.	Hour	$45.67	1	$45.67
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	1	$22.33
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	2	$46.16
Materials						
Straw	1237	Small grain straw (non organic and certified organic). Includes materials only.	Ton	$118.54	2	$237.08

Practice: 484 - Mulching

Scenario: #2 - Natural Materials, Heavy Application

Scenario Description:

Typical use is a heavy application of straw mulch or other state approved natural material (such as compost or hay) that provides 100% soil coverage (approximately 3-4 T/ac or 3-4 inch depth when using straw). The purpose is to moderate soil temperature and/or improve soil quality if Soil Condition Index specifies this rate. Area of mulch may be concentrated in strips in orchard/vineyards or portions of fields used for row crops. Payment based on actual acres mulched.

Before Situation:

Site conditions vary. Typical scenario ranges from a 0.1 to 1.0 acre site with application around new tree and shrub plantings, on irrigated orchards or vineyards, or annual and perennial specialty crops. Moderation of soil temperature Weed control, water quantity and soil moisture is a concern.

After Situation:

Straw or other natural mulch is applied in rows. Soil temperature is reduced, soil moisture is conserved, energy use associated with irrigation is decreased and erosion is reduced

Scenario Feature Measure: Total Acres Mulched

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $832.24 **Scenario Cost/Unit:** $832.24

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	5	$186.55
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80
Materials						
Straw	1237	Small grain straw (non organic and certified organic). Includes materials only.	Ton	$118.54	3.5	$414.89

Practice: 484 - Mulching

Scenario: #3 - Wood Chips

Scenario Description:

Typical applications include 2-3 inches of wood chips, or similar materials that are hardy enough to last for several years, applied primarily to reduce soil erosion and water runoff. Area mulched may be on all or portions of fields, for example, between rows of permanent crops. Payment is based on actual acres mulched and is typically only applied one time; not repeated for several years. Resource concerns addressed include soil erosion, soil quality and water quality.

Before Situation:

One typical scenario is on sloping avacado trees operations where very little light penetrates such that cover crops or conservation cover cannot be established. Water runoff and/or erosion are a problem.

After Situation:

Mulch has been applied to areas needing mulch. Erosion and sedimentation is reduced and water quality is protected.

Scenario Feature Measure: Area Covered by Mulch

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $1,348.15 **Scenario Cost/Unit:** $1,348.15

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Aggregate, Wood Chips	1098	Includes materials, equipment and labor	Cubic yard	$23.27	40	$930.80
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	5	$186.55
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80

Practice: 484 - Mulching

Scenario: #4 - Hydromulch

Scenario Description:

Hydromulch is applied to at a minimum of 70% coverage to a small (0.1-0.5 ac) critical, steep sloped areas to hold soil in place until vegetation can be established. Seed source is available as part of the natural setting. If seed is needed, then do not use this practice, use 342-Critial Area Planting - hydroseeding instead. One-time payment only.

Before Situation:

Typical scenario ranges from a 0.1 to 1.0 acre site such as a post-fire situation. Lack of vegetation on steep slopes near water sources or other drainages has caused very unstable conditions. Erosion potential is very high. Seed source is naturally available as part of the fire ecology.

After Situation:

Hydromulch is applied, perhaps along with other practices in an erosion control system. Soil erosion is reduced significantly and water ways are protected. Typical size is 1/2 acre or less. 43560 / 2 = 21780 sqft.

Scenario Feature Measure: Square Foot

Scenario Unit: Square Foot

Scenario Typical Size: 21,780

Scenario Cost: $663.11 **Scenario Cost/Unit:** $0.03

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, hydroseeder	1291	Hydroseeding with typical 1500 to 3600 gallon seeder. Includes all costs for equipment, power unit, and labor.	Acre	$852.06	0.5	$426.03
Materials						
Straw	1237	Small grain straw (non organic and certified organic). Includes materials only.	Ton	$118.54	2	$237.08

Practice: 484 - Mulching

Scenario: #5 - Erosion Control Blanket, Steep Slopes

Scenario Description:

Installation of erosion control blanket on critical areas typically 0.1 acre in size or less, with steep slopes such as streambanks, graded gullies or road cuts. Blanket is typically made of coconut coir, wood fiber, and/or straw and is typically covered on both sides with polypropylene netting. Used to help control erosion and establish vegetative cover. One-time payment only.

Before Situation:

There are areas of concentrated flow on very steep, unstable slopes, often adjacent to water courses. Soil erosion is a concern and there is little to no vegetation.

After Situation:

The erosion control blanket is placed on concentrated flow areas and secured with ground stables. Soil erosion is minimized and vegetative cover is established.

Scenario Feature Measure: Area Covered by Mulch

Scenario Unit: Square Foot

Scenario Typical Size: 5,000

Scenario Cost: $851.84 **Scenario Cost/Unit:** $0.17

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Erosion Control Blanket, biodegradable	1213	Biodegradable erosion control blanket, typically a composite of natural fibers with reinforcing polymer netting. Materials and shipping only.	Square Yard	$1.20	556	$667.20

Practice: 484 - Mulching

Scenario: #6 - Plastic

Scenario Description:

Installation of biodegradable or polyethylene plastic or other equivalent synthetic material to conserve soil moisture, moderate soil temperature, and/or provide erosion control. Payment based on actual area covered by mulching material.

Before Situation:

Site conditions vary. Typically scenarios include sites of bare soils on irrigated orchards or vineyards, or perennial specialty crops .Water quantity and soil moisture is a concern.

After Situation:

Plastic mulch is applied in rows with a mulch layer or by other mechanized means. Soil moisture is conserved and energy use associated with irrigation is decreased.

Scenario Feature Measure: Area Covered by Mulch

Scenario Unit: Square Foot

Scenario Typical Size: 17,424

Scenario Cost: $842.88 **Scenario Cost/Unit:** $0.05

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Mulch, polyethylene plastic, 1.0 mil	1303	1.0 mil polyethylene plastic mulch, with anchoring. Includes materials and shipping only.	Square Yard	$0.34	1936	$658.24

Practice: 484 - Mulching

Scenario: #7 - Geotextile

Scenario Description:

Installation of geotextile or other fabric mulch to conserve soil moisture, moderate soil temperature, and/or provide erosion control hwhere longer-term protection is needed. Typically used around along vineyard rows or around new tree and shrub plantings (9 sqft/seedling). Payment based on actual area covered by mulching material. One-time Payment only.

Before Situation:

Site conditions vary. Typically scenarios include site of bare soils on irrigated orchards or vineyards, perennial specialty crops, or new tree/shrub plantings. Water quantity and soil moisture is a concern.

After Situation:

Synthetic mulch is applied in rows with a mulch layer or by other mechanized means. Soil moisture is conserved, energy use associated with irrigation is decreased.

Scenario Feature Measure: Area Covered by Mulch

Scenario Unit: Square Foot

Scenario Typical Size: 17,424

Scenario Cost: $4,743.20 **Scenario Cost/Unit:** $0.27

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	1936	$4,743.20

Practice: 484 - Mulching

Scenario: #8 - Tree and Shrub

Scenario Description:

Weed barrier fabric or other suitable natural or synthetic mulch is installed with a new tree and shrub planting. Typically used to conserve soil moisture and moderate soil temperature and also prevent weed competition during establishment. Rate is per tree/shrub and assumes 1 square yard of weed barrier fabric and 5 staples/tree.

Before Situation:

Site conditions vary. Typical scenario is an installation of 100 native trees and shrubs to enhance wildlife habitat. Sites are often remote and trees may not be planted in rows, requiring each tree to be mulched individually

After Situation:

Fabric squares are installed with 5 sod staples each, around individual trees and shrubs. Micro-environment is moderated and weeds are controlled to ensure and tree/shrub establishment.

Scenario Feature Measure: Number of Trees Mulched

Scenario Unit: Each

Scenario Typical Size: 100

Scenario Cost: $245.00 **Scenario Cost/Unit:** $2.45

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	100	$245.00

Practice: 490 - Tree & Shrub Site Preparation

Scenario: #1 - Mechanical, Shredding, Light vegetation

Scenario Description:

This practice involves the use of medium to heavy machinery to clear above ground vegetation typically consisting of shrub dominated plant communities and small diameter trees to improve site conditions for establishing trees and/or shrubs. Typical sites include burned over or cut over forestlands where natural seed sources have been lost and the site captured by undesirable plant communities. This following resource concerns: soil quality degredation - compaction, soil erosion - sheet and rill, and degraded plant condition - undesirable plant productivity and health and inadequate structure and composition.

Before Situation:

Undesirable vegetation is present on the site including shrub dominated plant communities and small diameter trees. Noxious and invasive species may also be present on the site. If left uncontrolled, undesirable vegetation will inhibit successful establishment of target species of trees and/or shrubs. Soils are compacted as a result of harvesting heavy equipment activities or other land uses.

After Situation:

Undesirable vegetation has been removed using a shredding powerhead on a high flow skidsteer or articulating loader. Undesirable vegetation is reduced to levels which favor establishment of desirable tree or shrub species. Woody residues mitigate soil erosion, delay establishment of herbaceous species, and conserve soil moisture in the unit. The typical size of the practice is 40 acres.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $34,487.56 **Scenario Cost/Unit:** $862.19

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$124.26	200	$24,852.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	12	$506.76
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.48	210	$8,080.80
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	22	$549.12
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$249.44	2	$498.88

Practice: 490 - Tree & Shrub Site Preparation

Scenario: #2 - Mechanical, Shredding, Heavy vegetation

Scenario Description:

This practice involves the use of heavy machinery to treat an area dominated by significant amounts of woody vegetation (trees and brush) and woody debris onsite. Treatment will improve site conditions for establishing trees and/or shrubs. Typical sites include trees and brush cover that is not appropriate to the site or providing the desired condition for the landowner. This practice is typically used to address the following resource concerns: degraded plant condition - undesirable plant productivity and health and inadequate structure and composition and soil quality degredation - soil erosion - sheet and rill.

Before Situation:

The site is dominated by undesirable vegetation including herbaceous plants and significant amounts of woody vegetation (trees and brush) occupying the site. There is also a significant component of woody debris onsite. Noxious and invasive species may also be present on the site. Vegetation densities and lack of natural seed sources prevent regeneration of desirable species. Soil erosion is above acceptable levels following fire occurrence.

After Situation:

Undesirable vegetation has been removed using a shredding powerhead on a high flow hydraulic excavator/ feller buncher, reducing competition for target trees and/or shrubs. Woody debris has been removed or modified to facilitate tree/shrub planting operations. Woody residues mitigate soil erosion, delay establishment of herbaceous species, and conserve soil moisture in the unit. Site conditions are favorable for successful establishment of trees and/or shrubs. The typical size is 40 acres.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $46,434.08 **Scenario Cost/Unit:** $1,160.85

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$184.47	200	$36,894.00
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.48	210	$8,080.80
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	12	$506.76
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$476.26	2	$952.52

Practice: 490 - Tree & Shrub Site Preparation

Scenario: #3 - Mechanical, Brush Rake

Scenario Description:

This practice involves the use of a brush rake to treat an area in order to improve site conditions for establishing trees and/or shrubs. Slope, soil, and precipitation attributes allow for lower residual organic matter cover. Typical sites include trees and brush cover that are not appropriate to the site or providing the desired condition for the landowner. This practice is typically used to address the following resource concerns: degraded plant condition - undesirable plant productivity and health, inadequate structure and composition, wildfire hazard, and soil quality degredation - soil erosion - sheet and rill.

Before Situation:

Plant community management attributes or current fuel loading concerns would be best addressed by higher rates of residue as opposed to residue modification. Vegetation densities and lack of natural seed sources prevent regeneration of desirable species.

After Situation:

Undesirable vegetation has been removed using a brush rake. Woody debris has been removed or modified to facilitate tree/shrub planting operations. Conditions favor the establisment of desirable species. Soil erosion is mitigated through woody debris retention during raking operations. The typical size is 40 acres.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $17,720.08 **Scenario Cost/Unit:** $443.00

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$120.28	100	$12,028.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	12	$506.76
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.48	110	$4,232.80
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$476.26	2	$952.52

Practice: 490 - Tree & Shrub Site Preparation

Scenario: #4 - Chemical, Ground Application

Scenario Description:

This practice involves the use of various herbicides applied using ground-based machinery (and some hack-n-squirt treatment of select trees) in order to remove undesirable vegetation and improve site conditions for establishing trees and/or shrubs. Typical sites include abandoned fields, pastures, rangelands, agricultural fields or forestland that was recently harvested. This practice is typically used to address the following resource concerns: degraded plant condition - undesirable plant productivity and health and inadequate structure and composition.

Before Situation:

Undesirable vegetation is present on the site including herbaceous plants and woody vegetation. Noxious and invasive species may also be present on the site. If left uncontrolled, undesirable vegetation will inhibit successful establishment of target species of trees and/or shrubs.

After Situation:

Undesirable vegetation has been treated using appropriate herbicides, reducing competition for target trees and/or shrubs. Site conditions are favorable for successful establishment of trees and/or shrubs. The typical size of the practice is 40 acres.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $7,879.74 **Scenario Cost/Unit:** $196.99

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$54.76	26	$1,423.76
Chemical, ground application, wildland	1313	Chemical application performed by ground equipment. Includes forestry application methods that include heavy equipment such as skidders. Includes material, equipment, power unit and labor costs.	Acre	$106.26	40	$4,250.40
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	26	$1,097.98
Materials						
Herbicide, Triclopyor	338	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$42.84	4	$171.36
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.83	40	$633.20
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.34	40	$53.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$249.44	1	$249.44

Practice: 490 - Tree & Shrub Site Preparation

Scenario: #5 - Chemical, Aerial Application

Scenario Description:

This practice involves the use of herbicides applied by helicoptor in order to remove undesirable vegetation and improve site conditions for establishing trees and/or shrubs. This typical scenario includes open land such as abandoned fields, pastures or forestlands that were recently harvested. This practice is typically used to address the following resource concerns: degraded plant condition - undesirable plant productivity and health and inadequate structure and composition.

Before Situation:

Undesirable vegetation is present on the site including herbaceous plants and woody competition. Noxious and invasive species may also be present on the site. If left uncontrolled, undesirable vegetation will inhibit successful establishment of target species of trees and/or shrubs.

After Situation:

Undesirable vegetation has been treated using appropriate herbicides, reducing competition for target trees and/or shrubs. Site conditions are favorable for successful establishment of trees and/or shrubs. The typical size of the practice is 40 acres.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $2,549.50 **Scenario Cost/Unit:** $63.74

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, aerial application, helicopter	1991	Chemical application performed by helicopter on forest only. Includes equipment, mobilization, and labor.	Acre	$29.77	40	$1,190.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	10	$249.60
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	10	$422.30
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.83	40	$633.20
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.34	40	$53.60

Practice: 490 - Tree & Shrub Site Preparation

Scenario: #6 - Chemical, Hand Application

Scenario Description:

This practice involves the use of various herbicides applied using backpack sprayer or similar equipment, and hack-n-squirt for tree control, in order to remove undesirable vegetation and improve site conditions for establishing trees and/or shrubs. Typical sites include lands such as old fields, pastures, rangelands, agricultural fields, previous forestlands that have been abandoned and are now covered with a mixture of grasses, forbs, shrubs and some remnant trees. Resource concerns are: degraded plant condition - undesirable plant productivity and health and inadequate structure and composition.

Before Situation:

Undesirable vegetation, including woody and herbaceous plants, occupy 100% of the site. Noxious and invasive species may also be present on the site. If left uncontrolled, undesirable vegetation will inhibit successful establishment of target species of trees and/or shrubs.

After Situation:

Undesirable vegetation has been treated using appropriate herbicides, reducing competition for target trees and/or shrubs. Site conditions are favorable for successful establishment of trees and/or shrubs. The typical size of the practice is 40 acres.

Scenario Feature Measure: area of treatment

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $5,348.54 **Scenario Cost/Unit:** $133.71

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$54.76	44	$2,409.44
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$29.71	4	$118.84
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$35.97	2	$71.94
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	24	$1,013.52
Materials						
Herbicide, Imazapyr	336	Pre and post-emergent, non-selective herbicide for control of undesirable vegetation in non-crop areas. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$42.03	40	$1,681.20
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.34	40	$53.60

Practice: 490 - Tree & Shrub Site Preparation

Scenario: #7 - Hand Site Prep, Individual Spots, Light Vegetation

Scenario Description:

This practice typically involves hand grubbing all vegetation from individual spots (roughly 4-8 sqft) leaving bare soil where trees and/or shrubs will be planted with approximate density of 300 trees per acre. Typical sites are in upland settings with light to medium herbaceous vegetation. This practice is typically used to address the following resource concerns: degraded plant condition - undesirable plant productivity and health and inadequate structure.

Before Situation:

The site contains undesirable vegetation including herbaceous and woody plants. Noxious and invasive species may also be present on the site. If left uncontrolled, undesirable vegetation will inhibit successful establishment of target species of trees and/or shrubs. Soils are compacted as a result of recent timber harvesting activities or other land uses. If left untreated poor survival or reduced growth of trees/shrubs will occur and wildlife habitat conditions will not improve.

After Situation:

All undesirable vegetation has been grubbed out of a 3' x 3' area, leaving bare soil, at each planting spot. Tree seedlings and/or shrubs will be planted at each spot. Adequate moisture, space and light is available allowing plants to grow properly. Site conditions are favorable for successful establishment of trees and/or shrubs. The typical size is 10 acres; 300 spots per acre.

Scenario Feature Measure: Area of field where spots are created

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $2,451.75 **Scenario Cost/Unit:** $245.18

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	83	$2,071.68
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	9	$380.07

Practice: 490 - Tree & Shrub Site Preparation

Scenario: #8 - Hand Site Prep, Individual Spots, Thick Vegetation

Scenario Description:

This practice typically involves cutting and grubbing all vegetation from individual spots (roughly 4-8 sqft) leaving bare soil where trees and/or shrubs will be planted (300-600 trees per acre). Typical sites include riparian areas, wetlands, or other areas that include thick herbaceous mixed with woody vegetation and where use of chemicals is not desireable. Resource concerns addressed: degraded plant condition - undesirable plant productivity and health and inadequate structure.

Before Situation:

The site contains undesirable vegetation including herbaceous and woody plants. Noxious and invasive species may also be present on the site. If left uncontrolled, undesirable vegetation will inhibit successful establishment of target species of trees and/or shrubs.

After Situation:

All undesirable vegetation has been grubbed out of a 3' x 3' area, leaving bare soil, at each planting spot. Tree seedlings and/or shrubs will be planted at each spot. Adequate moisture, space and light is available allowing plants to grow properly. Site conditions are favorable for successful establishment of trees and/or shrubs. The typical size is 1 acre; approximately 300-600 trees per acre.

Scenario Feature Measure: Area of field where spots are created

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $869.69 **Scenario Cost/Unit:** $869.69

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	23	$574.08
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	7	$295.61

Practice: 490 - Tree & Shrub Site Preparation

Scenario: #9 - Hand Site Prep, Individual Spots, Woody, Wet

Scenario Description:

This practice typically involves hand-cutting woody vegetation and grubbing all vegetation from individual spots (roughly 4-8 sqft) leaving bare soil where trees and/or shrubs will be planted (300-600 trees per acre). Typical sites include riparian areas, wetlands, or other sensitive areas dominated by thick woody vegetation and where use of chemicals is not desireable. Resource concerns addressed: degraded plant condition - undesirable plant productivity and health and inadequate structure.

Before Situation:

The site is in wet or sensitive areas where mechanical equipment would cause harm to site. It contains undesirable vegetation including mostly woody plants. Noxious and invasive species may also be present on the site. If left uncontrolled, undesirable vegetation will inhibit successful establishment of target species of trees and/or shrubs.

After Situation:

All undesirable vegetation has been cut and grubbed out of a 3' x 3' area, leaving bare soil, at each planting spot. Tree seedlings and/or shrubs will be planted at each spot. Adequate moisture, space and light is available allowing plants to grow properly. Site conditions are favorable for successful establishment of trees and/or shrubs. The typical size is 1 acre; approximately 300-600 trees per acre.

Scenario Feature Measure: Area of field where spots are created

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $1,572.21 **Scenario Cost/Unit:** $1,572.21

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$35.97	2	$71.94
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.09	20	$121.80
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	9	$380.07
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	40	$998.40

Practice: 490 - Tree & Shrub Site Preparation

Scenario: #10 - Hand Site Prep, Individual Spots, Disaster Rehabilitation

Scenario Description:

This practice typically involves cutting and grubbing all vegetation from individual spots (roughly 4-8 sqft) leaving bare soil where trees and/or shrubs will be planted (300-600 trees per acre). Typical sites include emergent brush areas growing back after fire or other destructive event. SItes often have burnt or downed wood that requires clearing. A combination of mechanical and chemical methods may be used. Resource concerns addressed: degraded plant condition - undesirable plant productivity and health and inadequate structure.

Before Situation:

The site contains undesirable vegetation including herbaceous and woody plants. Noxious and invasive species are actively invading the site. If left uncontrolled, undesirable vegetation will inhibit successful establishment of target species of trees and/or shrubs.

After Situation:

All undesirable vegetation has been grubbed out of a 3' x 3' area, leaving bare soil, at each planting spot. Tree seedlings and/or shrubs will be planted at each spot. Adequate moisture, space and light is available allowing plants to grow properly. Site conditions are favorable for successful establishment of trees and/or shrubs. The typical size is 10 acre; approximately 300-600 trees per acre.

Scenario Feature Measure: Area of field where spots are created

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $5,188.41 **Scenario Cost/Unit:** $518.84

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$299.98	8	$2,399.84
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$18.81	2	$37.62
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$54.76	40	$2,190.40
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	10	$422.30
Materials						
Herbicide, Imazapyr	336	Pre and post-emergent, non-selective herbicide for control of undesirable vegetation in non-crop areas. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$42.03	2	$84.06
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.34	5	$6.70
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.83	3	$47.49

Practice: 490 - Tree & Shrub Site Preparation

Scenario: #11 - Windbreak/Hedgerow

Scenario Description:

This practice involves the use of various chemical and/or tillage methods to allow for the planting of a windbreak or hedgerow. Site preparation includes chemically killing vegetation prior to mechanical site preparation that includes appropriate methods to allow for planting of the site which may include one or all of the following, ripping, disking, and harrowing. This practice may be applied on all lands needing treatment to facilitate establishment of trees and/or shrubs to facilitate establishment of a windbreak or hedgerow. Typical sites include open land such as old fields, pastures, rangelands and agricultural fields.
Associated practices: Windbreak/Shelterbelt Establishment (380); Hedgerows (422). Resource concerns addressed: Soil erosion-wind; inadequate wildlife habitat; air quality-odors, chemical drift.

Before Situation:

Undesirable vegetation, including woody and herbaceous plants, is present on the site. Noxious and invasive species may also be present on the site. If left uncontrolled, undesirable vegetation will inhibit successful establishment of target species of trees and/or shrubs. Soil is compacted as a result of prior land management activities.

After Situation:

Undesirable vegetation has been treated using appropriate herbicides, reducing competition for target trees and/or shrubs. Site conditions are favorable for successful establishment of trees and/or shrubs. The typical size is 1.5 acres.

Scenario Feature Measure: Area of treatment

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $366.89 **Scenario Cost/Unit:** $366.89

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	1	$10.20
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.62	1	$5.62
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	2	$84.46
Materials						
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.34	1	$1.34
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.83	1	$15.83
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$249.44	1	$249.44

Practice: 490 - Tree & Shrub Site Preparation

Scenario: #12 - Windbreak/Hedgerow, Small Project, <=0.7 ac

Scenario Description:

This practice involves the use of various tillage methods, and/or chemicals, to allow for planting very small areas (0.7 ac or less) of shrubs and trees for hedgerows or windbreaks. Site preparation may include such implements as ripping, disking, harrowing, etc. This practice may be applied on all lands needing treatment to facilitate establishment of trees and/or shrubs. Typical sites include open land such as old fields, pastures, rangelands and agricultural fields. Could be used for organic operations.
Associated practices: Windbreak/Shelterbelt Establishment (380); Hedgerows (422). Resource concerns addressed: Soil erosion-wind; inadequate wildlife habitat; air quality-odors, chemical drift.Resource concerns: Soil erosion (wind) and improvement of wildlife habitat.

Before Situation:

Undesirable vegetation, including woody and herbaceous plants, is present on the site. Noxious and invasive species may also be present on the site. If left uncontrolled, undesirable vegetation will inhibit successful establishment of target species of trees and/or shrubs. Soil may be compacted as a result of prior land management activities.

After Situation:

Undesirable vegetation has been treated reducing competition for target trees and/or shrubs. Site conditions are favorable for successful establishment of trees and/or shrubs. Size is typically is less than 0.7 acre or less.

Scenario Feature Measure: Area of treatment

Scenario Unit: Acre

Scenario Typical Size: 0

Scenario Cost: $350.40 **Scenario Cost/Unit:** #Div/0!

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	0.5	$5.10
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.62	0.5	$2.81
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	2	$84.46
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.83	0.5	$7.92
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.34	0.5	$0.67
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$249.44	1	$249.44

Practice: 500 - Obstruction Removal

Scenario: #1 - Removal and Disposal of Brush and Trees < 6 inch Diameter

Scenario Description:

Remove and disposal of brush and trees < 6 inches in diameter by demolition, excavation or other means required for removal. Dispose of all brush and trees so that it does not impede subsequent work or cause onsite or offsite damage. Dispose of all brush and trees by removal to an approved landfill, wood chipping and or land distribution, or recycling center, burial at an approved location or burning. If burning is used, implement appropriate smoke management to protect public health and safety. Remove and dispose of brush and trees in order to apply conservation practices or facilitate the planned land use. Brush and tree removal will address the resource concerns of the prevention or hindrance to the installation of conservation practices or present a hazard to their use and enjoyment.

Before Situation:

On any land where existing obstructions interfere with planned land use development, public safety or infrastructure. The site may be abandoned mine lands, construction sites, recreation areas, farms, ranches, and areas affected by natural disasters. This is not intended for the removal of obstructions from aquatic environments.

After Situation:

The typical area will be a 2.0 acre impaired area. The removal of brush and trees < 6 inch diameter will be performed with the use of equipment and hand labor. Dispose of all brush and trees from the obstruction removal so that it does not impede subsequent work or cause onsite or offsite damage. Revegetate or otherwise protect from erosion disturbed areas as soon as possible. Refer to NRCS Conservation Practice Standard 342, Critical Area Planting for seedbed preparation, seeding, fertilizing, and mulching requirements. The practice is to improve site conditions in order to apply conservation practices or facilitate better use of the landscape.

Scenario Feature Measure: Land Area

Scenario Unit: Acre

Scenario Typical Size: 2

Scenario Cost: $2,358.32 **Scenario Cost/Unit:** $1,179.16

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$35.97	8	$287.76
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$120.28	8	$962.24
Brush Chipper, 6" capacity	938	Brush Chipper, 6" capacity, typically 35 HP. Includes chipper and power unit. Labor not included.	Hour	$21.38	8	$171.04
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	8	$178.64
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	8	$199.68
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.69	8	$309.52
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$249.44	1	$249.44

Practice: 500 - Obstruction Removal

Scenario: #2 - Removal and Disposal of Brush and Trees > 6 inch Diameter

Scenario Description:

Remove and disposal of brush and trees > 6 inches in diameter by demolition, excavation or other means required for removal. Dispose of all brush and trees so that it does not impede subsequent work or cause onsite or offsite damage. Dispose of all brush and trees by removal to an approved landfill, wood chipping and or land distribution, or recycling center, burial at an approved location or burning. If burning is used, implement appropriate smoke management to protect public health and safety. Remove and dispose of brush and trees in order to apply conservation practices or facilitate the planned land use. Brush and tree removal will address the resource concerns of the prevention or hindrance to the installation of conservation practices or present a hazard to their use and enjoyment.

Before Situation:

On any land where existing obstructions interfere with planned land use development, public safety or infrastructure. The site may be abandoned mine lands, construction sites, recreation areas, farms, ranches, and areas affected by natural disasters. This is not intended for the removal of obstructions from aquatic environments.

After Situation:

The typical area will be a 2.0 acre impaired area. The removal of brush and trees > 6 inch diameter will be performed with the use of equipment and hand labor. Dispose of all brush and trees from the obstruction removal so that it does not impede subsequent work or cause onsite or offsite damage. Revegetate or otherwise protect from erosion disturbed areas as soon as possible. Refer to NRCS Conservation Practice Standard 342, Critical Area Planting for seedbed preparation, seeding, fertilizing, and mulching requirements. The practice is to improve site conditions in order to apply conservation practices or facilitate better use of the landscape.

Scenario Feature Measure: Land Area

Scenario Unit: Acre

Scenario Typical Size: 2

Scenario Cost: $4,581.72 **Scenario Cost/Unit:** $2,290.86

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$180.39	12	$2,164.68
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$35.97	12	$431.64
Brush Chipper, 15" capacity	1868	Brush Chipper, 15" capacity, typically 165 HP. Includes chipper and power unit. Does not include labor.	Hour	$63.32	12	$759.84
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	12	$299.52
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.48	12	$461.76
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.69	12	$464.28

Practice: 500 - Obstruction Removal

Scenario: #3 - Removal and Disposal of Fence

Scenario Description:

Remove and disposal of all existing fences by demolition, excavation or other means required for removal. Dispose of all fence materials from the site so that it does not impede subsequent work or cause onsite or offsite damage. Dispose of all materials by removal to an approved landfill, wood chipping and land distribution, or recycling center, burial at an approved location or burning. If burning is used, implement appropriate smoke management to protect public health and safety. Remove and dispose of the unwanted fence obstruction in order to apply conservation practices such as Upland Wildlife Habitat Management (645) or facilitate the planned land use. Fence removal will address the resource concerns of the prevention or hindrance to the installation of conservation practices or present a hazard to their use and enjoyment and reduce hazards to wildlife.

Before Situation:

On any land where existing fence interferes with planned land use development, public safety, wildlife movement and habitat, or infrastructure. The site may be abandoned mine lands, construction sites, recreation areas, farms, ranches, and areas affected by natural disasters. This is not intended for the removal of obstructions from aquatic environments.

After Situation:

The typical fence will be 2640 in linear feet. The removal of the fence will be performed with the use of equipment and hand labor. Dispose of all debris from the fence removal so that it does not impede subsequent work or cause onsite or offsite damage. Revegetate or otherwise protect from erosion disturbed areas as soon as possible. Refer to NRCS Conservation Practice Standard 342, Critical Area Planting for seedbed preparation, seeding, fertilizing, and mulching requirements. The practice is to improve site conditions in order to apply conservation practices or facilitate better use of the landscape such as Upland Wildlife Habitat Management (645).

Scenario Feature Measure: Length of Fence

Scenario Unit: Linear Feet

Scenario Typical Size: 2,640

Scenario Cost: $2,749.64 **Scenario Cost/Unit:** $1.04

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$41.75	20	$835.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$35.97	20	$719.40
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	20	$499.20
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	20	$446.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$249.44	1	$249.44

Practice: 500 - Obstruction Removal

Scenario: #4 - Removal and Disposal of Rock and or Boulders

Scenario Description:

Remove and disposal of rock and or boulders by drilling, blasting, demolition, excavation or other means required for removal. Dispose of all rocks and or boulders so that it does not impede subsequent work or cause onsite or offsite damage. Dispose of all rock and or boulders by removal to an approved location, or reuse location. Remove and dispose all rock and or boulders in order to apply conservation practices or facilitate the planned land use. Rocks and or boulders will address the resource concerns of the prevention or hindrance to the installation of conservation practices or present a hazard to their use and enjoyment.

Before Situation:

On any land where existing obstructions interfere with planned land use development, public safety or infrastructure. The site may be abandoned mine lands, construction sites, recreation areas, farms, ranches, and areas affected by natural disasters. This is not intended for the removal of obstructions from aquatic environments.

After Situation:

The typical area will be a 5.0 acre impaired area. The removal of rock and or boulders will be performed by drilling, blasting, demolition, excavation or other means required for removal with the use of heavy equipment and hand labor. Dispose of all rocks and boulders from the obstruction removal so that it does not impede subsequent work or cause onsite or offsite damage. Revegetate or otherwise protect from erosion disturbed areas as soon as possible. Refer to NRCS Conservation Practice Standard 342, Critical Area Planting for seedbed preparation, seeding, fertilizing, and mulching requirements. The practice is to improve site conditions in order to apply conservation practices or facilitate better use of the landscape.

Scenario Feature Measure: Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 500

Scenario Cost: $68,402.50 **Scenario Cost/Unit:** $136.81

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$117.30	250	$29,325.00
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$54.18	250	$13,545.00
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.69	250	$9,672.50
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.48	250	$9,620.00
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	250	$6,240.00

Practice: 500 - Obstruction Removal

Scenario: #5 - Removal and Disposal of Steel and or Concrete Structures

Scenario Description:

Remove and disposal of steel and or concrete structures by demolition, excavation or other means required for removal. Dispose of all steel and or concrete structures so that it does not impede subsequent work or cause onsite or offsite damage. Dispose of all steel and or concrete structures by removal to an approved location, or reuse location. Remove and dispose all steel and or concrete structures in order to apply conservation practices or facilitate the planned land use. Steel and or concrete structure removal will address the resource concerns of the prevention or hindrance to the installation of conservation practices or present a hazard to their use and enjoyment.

Before Situation:

On any land where existing obstructions interfere with planned land use development, public safety or infrastructure. The site may be abandoned mine lands, construction sites, recreation areas, farms, ranches, and areas affected by natural disasters. This is not intended for the removal of obstructions from aquatic environments.

After Situation:

The typical area will be a 2000 square feet of impaired land. The removal of steel and or concrete structures will be performed by demolition, excavation or other means required for removal with the use of heavy equipment and hand labor. Dispose of all steel and or concrete structures from the obstruction removal so that it does not impede subsequent work or cause onsite or offsite damage. Revegetate or otherwise protect from erosion disturbed areas as soon as possible. Refer to NRCS Conservation Practice Standard 342, Critical Area Planting for seedbed preparation, seeding, fertilizing, and mulching requirements. The practice is to improve site conditions in order to apply conservation practices or facilitate better use of the landscape.

Scenario Feature Measure: Land Area

Scenario Unit: Square Foot

Scenario Typical Size: 2,000

Scenario Cost: $30,418.00 **Scenario Cost/Unit:** $15.21

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$180.39	67	$12,086.13
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$54.18	67	$3,630.06
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$117.30	67	$7,859.10
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.69	67	$2,592.23
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.48	67	$2,578.16
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	67	$1,672.32

Practice: 500 - Obstruction Removal

Scenario: #6 - Removal and Disposal of Wood Structures

Scenario Description:

Remove and disposal of wood structures by demolition, excavation or other means required for removal. Dispose of all wood structures so that it does not impede subsequent work or cause onsite or offsite damage. Dispose of all wood structures by removal to an approved location, landfill, or reuse location. Remove and dispose all wood structures in order to apply conservation practices or facilitate the planned land use. Wood structure removal will address the resource concerns of the prevention or hindrance to the installation of conservation practices or present a hazard to their use and enjoyment.

Before Situation:

On any land where existing obstructions interfere with planned land use development, public safety or infrastructure. The site may be abandoned mine lands, construction sites, recreation areas, farms, ranches, and areas affected by natural disasters. This is not intended for the removal of obstructions from aquatic environments.

After Situation:

The typical area will be a 2000 square feet of impaired land. The removal of wood structures will be performed by demolition, excavation or other means required for removal with the use of heavy equipment and hand labor. Dispose of all wood structures from the obstruction removal so that it does not impede subsequent work or cause onsite or offsite damage. Revegetate or otherwise protect from erosion disturbed areas as soon as possible. Refer to NRCS Conservation Practice Standard 342, Critical Area Planting for seedbed preparation, seeding, fertilizing, and mulching requirements. The practice is to improve site conditions in order to apply conservation practices or facilitate better use of the landscape.

Scenario Feature Measure: Land Area

Scenario Unit: Square Foot

Scenario Typical Size: 2,000

Scenario Cost: $14,528.00 **Scenario Cost/Unit:** $7.26

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$54.18	32	$1,733.76
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$180.39	32	$5,772.48
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$117.30	32	$3,753.60
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.48	32	$1,231.36
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.69	32	$1,238.08
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	32	$798.72

Practice: 511 - Forage Harvest Management

Scenario: #1 - Improved Forage Quality

Scenario Description:

Improved cultural practices and recordkeeping result in better forage quality and better livestock performance.

Before Situation:

Forage cutting heights are as close to the ground as equipment will allow resulting in very low stubble height. Plant regrowth is very slow. Forage quality tests are not regularly done. Records of forage quality components, cutting heights, moisture content, and harvest schedule are not regularly kept.

After Situation:

Forage cutting heights are raised to leave at least 3-4" stubble height for cool season grasses and 6-8" for warm season grasses. Increased residual forage results in much faster plant regrowth. Forage quality tests are submitted to an accredited lab for analysis. Records of forage quality components, cutting heights, moisture content, and harvest schedule are regularly kept to track increased forage quality and improved livestock performance.

Scenario Feature Measure: Improved Relative Feed Value

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $237.02 **Scenario Cost/Unit:** $5.93

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$44.18	1	$44.18
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	3	$114.42
Materials						
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	3	$78.42

Practice: 511 - Forage Harvest Management

Scenario: #2 - Weed and Pest Control

Scenario Description:

Harvesting forages to optimize forage quality. Examples include preemptive harvest of forage crops to prevent damage from insects (such as leafhopper on alfalfa) or other pests; altering harvest schedule or height to control invasive weeds; altering frequency of harvest to reduce weed competition or pest populations. Also may be applied in transition to organic operations or to adjust feeding rotations developed in a management plan.

Before Situation:

Forage pests and weeds are usually controlled with pesticides and herbicides. Harvest schedules promote invasive weeds and support pests.

After Situation:

Forage pests are controlled by executing a preemptive harvest before pests can damage forage quality. Forage yields are reduced because of immature stage of forage growth. Forage tests are submitted to an accredited lab for analysis. Records of forage quality components are used to adjust feeding rations.

Scenario Feature Measure: Relative Feed Value Maintained

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $389.58 **Scenario Cost/Unit:** $9.74

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$44.18	1	$44.18
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	7	$266.98
Materials						
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	3	$78.42

Practice: 511 - Forage Harvest Management

Scenario: #3 - Delayed Harvest, Single Crop

Scenario Description:

In perennial forage crops, the delaying the harvest of forages to promote wildlife, such as the reproduction of ground nesting birds or skipping the last cutting to leave forage for wintering wildlife. Delaying the harvest of the first cutting will benefit species such as ground nesting birds The delayed harvest results in a decrease in overall forage quality and/or quantity. The selected fields should be large enough to promote ground nesting birds. After young have fledged the field will be harvested for forages. Use state guidance for target nesting dates.

Before Situation:

Forage crops, (typically perennial) are produced and harvested; ground nesting birds are disturbed and/or fledgling birds are killed in the process, or no excess forage is available for winter forage.

After Situation:

Forage crop harvest is delayed; forage quality is compromised, however, the survival of ground nesting birds or other wildlife is promoted.

Scenario Feature Measure: Increased grassland bird populations.

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $2,285.01 **Scenario Cost/Unit:** $57.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$44.18	1	$44.18
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$17.21	119	$2,047.99
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	3	$114.42
Materials						
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	3	$78.42

Practice: 511 - Forage Harvest Management

Scenario: #4 - Delayed Harvest, Double Crop

Scenario Description:

In doublecropped annual forages, delaying the harvest of the first crop will provide feed and shelter for ground nesting birds. Delaying the harvest results in a 50% decrease in quality and yields. The selected fields should be large enough to promote ground nesting birds. After the young have fledged, the second crop will be planted approximately one month later than normal. The harvest of the second crop is delayed sometimes until the following spring to provide a food source for overwintering birds and undulates.

Before Situation:

Forage crops are produced and harvested; ground nesting birds are disturbed and/or fledgling birds are killed in the process.

After Situation:

Double cropped annual crops are harvested with a delayed mowing and a subesquent later planting of the second crop; forage quality is compromised somewhat, however, the survival of ground nesting birds is promoted.

Scenario Feature Measure: Increased grassland bird populations.

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $3,334.82 **Scenario Cost/Unit:** $83.37

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$44.18	1	$44.18
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$17.21	180	$3,097.80
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	3	$114.42
Materials						
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	3	$78.42

Practice: 511 - Forage Harvest Management

Scenario: #5 - Delayed Harvest, Silage-Corn Rotation

Scenario Description:

Adjusting the harvesting of forages (wheat/oat silage) to provide wildlife benefits during a drought year when prices of feed are much higher than normal. This example is a 20 acre crop field planted to wheat for silage feed for dairy operations and later planted to grain corn. Tricolored Blackbirds are unhazed for 30 days during mid-spring to allow for fledging of young before silage is chopped. The selected area should be large enough to buffer adults and nestlings from silage chopping in adjacent areas or fields. Wheat silage harvest is postponed 2- 4 weeks, resulting in a decrease in crop weight and quality, or potentially the harvest as grain only if the crop becomes too mature. This is best planned cooperatively with the farmer and appropriate regulatory agencies far enough in advance to reduce disturbance to nesting tricolored blackbirds.

Before Situation:

Small grain grown for silage is normally harvested in early May. Offspring from the Tricolored blackbirds nesting in the small grain have not yet fledged, and both nests and birds are destroyed during harvest. Subsequent corn crop is planted shortly after silage harvest.

After Situation:

Wheat silage harvest is postponed 3-4 weeks, based on nesting dates of birds to ensure offspring have fledged prior to harvest. It is critical that silage be harvested at the proper moisture content for optimal forage benefit and price. Postponing harvest 3-4 weeks will reduce moisture content and therefore reduce both yield (ton/ac) and price ($/ton) by nearly 50% during a drought year. If harvest is postponed greater than 4 weeks, there is significant chance that the crop will fully mature and must be harvested and sold as a grain crop. Given that TCBB need 35 days from nest to fledging, this is a reasonable liklihood that later harvests may occur. The grain sells for around 75% of the silage rate. Delayed harvest also requires additional crop management/labor because of the delay to contracted harvesters, difference in harvest equipment, and planting of the following grain (usually corn) crop. The second grain crop will likely exceed the growing season and produce reduced yields as well. Compensation for reduced yield of the silage crop and the subsequent corn crop is necessary to protect the habitat.

Scenario Feature Measure: acres of delayed harvest

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $12,582.16 **Scenario Cost/Unit:** $629.11

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$17.21	680	$11,702.80
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	21	$800.94
Materials						
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	3	$78.42

Practice: 512 - Forage and Biomass Planting

Scenario: #1 - Non-Native Standard Seeding with Fertilizer

Scenario Description:

The field is seeded to herbaceous cover, consisting of a mixture of non-native species for pasture, hay or biomass production. The standard low seeding rate is typically used in areas of lower precipitation or other sites where moisture or other site conditions are limiting. Standard rate is typically in the vicinity of 9 lb/acre PLS (Pure Live Seed). Resource concerns addressed: improve or maintain livestock nutrition, provide or increase forage supply, reduce soil erosion, improve soil and water quality, or produce feedstock for biofuel or energy production. The practice applies to all lands suitable to the establishment of species for forage or biomass production, but not to the establishment of annually planted and harvested food, fiber or oilseed crops.

Before Situation:

Poor or nonexistent stand of desired herbaceous species. Resource concerns may include undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Suitable species are established to improve or maintain livestock nutrition, provide or increase forage supply, reduce soil erosion, improve soil and water quality, or produce feedstock for biofuel or energy production. The typical size of the practice is 30 acres.

Scenario Feature Measure: Acres of Forage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $5,575.67 **Scenario Cost/Unit:** $185.86

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	30	$174.90
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	30	$194.10
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	60	$634.80
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	30	$608.70
Materials						
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.51	1500	$765.00
Nitrogen (N), Ammonium Nitrate	69	Price per pound of N supplied by Ammonium Nitrate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.00	1200	$0.00
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.82	1500	$1,230.00
Four Species Mix, Cool Season, Introduced Perennial (2 grasses, 2 legumes)	2317	Cool season grass and legume mix. Includes material and shipping only.	Acre	$49.65	30	$1,489.50
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	30	$468.90
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	1	$9.77

Practice: 512 - Forage and Biomass Planting

Scenario: #2 - Non-Native Standard Seeding no Fertilizer

Scenario Description:

The field is seeded to herbaceous cover, consisting of a mixture of non-native species for pasture, hay or biomass production. The standard low seeding rate is typically used in areas of lower precipitation or other sites where moisture or other site conditions are limiting. Standard rate is typically in the vicinity of 9 lb/acre PLS (Pure Live Seed). Resource concerns addressed: improve or maintain livestock nutrition, provide or increase forage supply, reduce soil erosion, improve soil and water quality, or produce feedstock for biofuel or energy production. The practice applies to all lands suitable to the establishment of species for forage or biomass production, but not to the establishment of annually planted and harvested food, fiber or oilseed crops.

Before Situation:

Poor or nonexistent stand desired of herbaceous species. Resource concerns may include undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Suitable species are established to improve or maintain livestock nutrition, provide or increase forage supply, reduce soil erosion, improve soil and water quality, or produce feedstock for biofuel or energy production. The typical size of the practice is 30 acres.

Scenario Feature Measure: Acres of Forage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $3,386.57 **Scenario Cost/Unit:** $112.89

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	30	$174.90
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	60	$634.80
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	30	$608.70
Materials						
Four Species Mix, Cool Season, Introduced Perennial (2 grasses, 2 legumes)	2317	Cool season grass and legume mix. Includes material and shipping only.	Acre	$49.65	30	$1,489.50
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	1	$9.77
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	30	$468.90

Practice: 512 - Forage and Biomass Planting

Scenario: #3 - NonNative High Seeding Rate no Lime

Scenario Description:

The field is seeded to herbaceous cover, consisting of a mixture of non-native species for pasture, hay or biomass production. The high seeding rate is used in areas of higher precipitation or on irrigated fields where moisture or other site conditions are not limiting. The high rate is typically in the vicinity of 30 lb/acre PLS (Pure Live Seed). Higher seeding rates account for seed losses to causes such as increased density of predators or moisture conditions which may cause seed to rot before sprouting. Since moisture is not limiting, a higher density of desireable seedlings also offers greater competition to weed seedlings without significant adverse effects to the planted species. Resource concerns addressed: improve or maintain livestock nutrition, provide or increase forage supply, reduce soil erosion, improve soil and water quality, or produce feedstock for biofuel or energy production. The practice applies to all lands suitable to the establishment of species for forage or biomass production, but not to the establishment of annually planted and harvested food, fiber or oilseed crops. Results of a soil test DO NOT show the need for lime or similar soil amendments.

Before Situation:

Poor or nonexistent stand of desired herbaceous species. Resource concerns may include undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Suitable species are established to improve or maintain livestock nutrition, provide or increase forage supply, reduce soil erosion, improve soil and water quality, or produce feedstock for biofuel or energy production. The typical size of the practice is 30 acres.

Scenario Feature Measure: Acres of Forage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $7,708.97 **Scenario Cost/Unit:** $256.97

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	60	$634.80
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	30	$608.70
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	60	$349.80
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	30	$194.10
Materials						
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.82	1500	$1,230.00
Nitrogen (N), Ammonium Nitrate	69	Price per pound of N supplied by Ammonium Nitrate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.00	1200	$0.00
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	1	$9.77
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	60	$937.80
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.51	1500	$765.00
Four Species Mix, Cool Season, Introduced Perennial (2 grasses, 2 legumes)	2317	Cool season grass and legume mix. Includes material and shipping only.	Acre	$49.65	60	$2,979.00

Practice: 512 - Forage and Biomass Planting

Scenario: #4 - NonNative, High Seeding Rate with Lime or similar amendment

Scenario Description:

The field is seeded to herbaceous cover, consisting of a mixture of non-native species for pasture, hay or biomass production. Soil tests show the need for lime or similar soil amendments. The high seeding rate is used in areas of higher precipitation or on irrigated fields where moisture or other site conditions are not limiting. The high rate is typically in the vicinity of 30 lb/acre PLS (Pure Live Seed). Higher seeding rates account for seed losses to causes such as increased density of predators or moisture conditions which may cause seed to rot before sprouting. Since moisture is not limiting, a higher density of desireable seedlings also offers greater competition to weed seedlings without significant adverse effects to the planted species. Resource concerns addressed: improve or maintain livestock nutrition, provide or increase forage supply, reduce soil erosion, improve soil and water quality, or produce feedstock for biofuel or energy production. The practice applies to all lands suitable to the establishment of species for forage or biomass production, but not to the establishment of annually planted and harvested food, fiber or oilseed crops.

Before Situation:

Poor or nonexistent stand of desired herbaceous species. Resource concerns may include undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Suitable species are established to improve or maintain livestock nutrition, provide or increase forage supply, reduce soil erosion, improve soil and water quality, or produce feedstock for biofuel or energy production. The typical size of the practice is 30 acres.

Scenario Feature Measure: Acres of Forage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $11,493.47 **Scenario Cost/Unit:** $383.12

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Lime application	953	Lime application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$9.65	30	$289.50
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	60	$634.80
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	60	$349.80
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	30	$194.10
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	30	$608.70
Materials						
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	1	$9.77
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	60	$937.80
Four Species Mix, Cool Season, Introduced Perennial (2 grasses, 2 legumes)	2317	Cool season grass and legume mix. Includes material and shipping only.	Acre	$49.65	60	$2,979.00
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.51	1500	$765.00
Lime, ENM	75	Fertilizer: Limestone Spread on field.	Ton	$58.25	60	$3,495.00
Nitrogen (N), Ammonium Nitrate	69	Price per pound of N supplied by Ammonium Nitrate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.00	1200	$0.00
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.82	1500	$1,230.00

Practice: 512 - Forage and Biomass Planting

Scenario: #5 - Organic, Nonnative Species

Scenario Description:

The field is seeded to herbaceous cover, consisting of a mixture of non-native species for pasture, hay or biomass production using Organically Certified Seed. The high seeding rate is used in areas of higher precipitation or on irrigated fields where moisture or other site conditions are not limiting. The high rate is typically in the vicinity of 30 lb/acre PLS (Pure Live Seed). Higher seeding rates account for seed losses to causes such as increased density of predators or moisture conditions which may cause seed to rot before sprouting. Since moisture is not limiting, a higher density of desireable seedlings also offers greater competition to weed seedlings without significant adverse effects to the planted species. Resource concerns addressed: improve or maintain livestock nutrition, provide or increase forage supply, reduce soil erosion, improve soil and water quality, or produce feedstock for biofuel or energy production. The practice applies to all lands suitable to the establishment of species for forage or biomass production, but not to the establishment of annually planted and harvested food, fiber or oilseed crops.

Before Situation:

Poor or nonexistent stand of herbaceous species. Resource concerns may include undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Suitable species are established to improve or maintain livestock nutrition, provide or increase forage supply, reduce soil erosion, improve soil and water quality, or produce feedstock for biofuel or energy production. The typical size of the practice is 30 acres. Use of Organically certified seed is required.

Scenario Feature Measure: Acres of Forage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $11,273.87 **Scenario Cost/Unit:** $375.80

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	120	$1,269.60
Lime application	953	Lime application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$9.65	30	$289.50
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	30	$194.10
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	30	$608.70
Materials						
Lime, ENM	75	Fertilizer: Limestone Spread on field.	Ton	$58.25	60	$3,495.00
Certified Organic, Three Species Mix, Cool Season, Perennial Grasses and Legumes	2340	Certified organic cool season perennial grass and legume mix. Includes material and shipping only.	Acre	$69.62	60	$4,177.20
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	1	$9.77
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.82	1500	$1,230.00

Practice: 512 - Forage and Biomass Planting

Scenario: #6 - Small Acreage NonNative High Seeding Rate no Lime

Scenario Description:

The small acreage field (typically 1 to 10 acres) is seeded to herbaceous cover, consisting of a mixture of non-native species for pasture, hay or biomass production. The high seeding rate is used in areas of higher precipitation or on irrigated fields where moisture or other site conditions are not limiting. The high rate is typically in the vicinity of 30 lb/acre PLS (Pure Live Seed). Higher seeding rates account for seed losses to causes such as increased density of predators or moisture conditions which may cause seed to rot before sprouting. Since moisture is not limiting, a higher density of desireable seedlings also offers greater competition to weed seedlings without significant adverse effects to the planted species. The small acreage is broadcast seeded. Resource concerns addressed: improve or maintain livestock nutrition, provide or increase forage supply, reduce soil erosion, improve soil and water quality, or produce feedstock for biofuel or energy production. The practice applies to all lands suitable to the establishment of species for forage or biomass production, but not to the establishment of annually planted and harvested food, fiber or oilseed crops. Results of a soil test DO NOT show the need for lime or similar soil amendments.

Before Situation:

Poor or nonexistent stand of desired herbaceous species. Resource concerns may include undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Suitable species are established to improve or maintain livestock nutrition, provide or increase forage supply, reduce soil erosion, improve soil and water quality, or produce feedstock for biofuel or energy production. The typical size of the practice is 30 acres.

Scenario Feature Measure: Acres of Forage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 5

Scenario Cost: $2,110.41 **Scenario Cost/Unit:** $422.08

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	20	$211.60
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.99	5	$59.95
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	5	$32.35
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	10	$58.30
Materials						
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.51	250	$127.50
Nitrogen (N), Ammonium Nitrate	69	Price per pound of N supplied by Ammonium Nitrate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.00	200	$0.00
Four Species Mix, Cool Season, Introduced Perennial (2 grasses, 2 legumes)	2317	Cool season grass and legume mix. Includes material and shipping only.	Acre	$49.65	20	$993.00
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	10	$156.30
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	1	$9.77
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.82	250	$205.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 516 - Livestock Pipeline

Scenario: #1 - PVC (Iron Pipe Size)

Scenario Description:

Description: Below-ground installation of PVC (Iron Pipe Size) pipeline. PVC (IPS) is manufactured in sizes (nominal diameter) from ½-inch to 36-inch; typical practice sizes range from 1-inch to 4-inch Appurtenances include couplings, fittings, thrust blocks, gate valves (2), air release valves (2), drain valve (1), and pressure relief valve (1), and are included in the cost of pipe material (additional 10% of pipe material quantity). Revegetation is not included.
Resource Concerns: Inadequate Livestock Water, Inefficient Energy Use.
Associated Practices: Critical Area Planting (342), Pumping Plant (533), Watering Facility (614), and Water Harvesting Catchment (636).

Before Situation:

Water supplies need to be conveyed through pipelines for use by livestock or wildlife.

After Situation:

Pipeline(s) convey and/or distribute water to storage and/or watering facilities for use by livestock or wildlife. Typical scenario size is 1½-inch. Construct one mile (5,280 feet) of 1½-inch, Schedule 40, PVC Pipeline with appurtenances, installed below ground with a minimum 1.5 feet of ground cover. The scenario unit is length of pipe material in feet. 5,280 feet of 1½-inch, Schedule 40, PVC pipe weighs 0.501 lb/ft, or a total of 2,645 pounds.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Foot

Scenario Typical Size: 5,280

Scenario Cost: $13,878.22 **Scenario Cost/Unit:** $2.63

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.39	5280	$7,339.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	48	$1,107.84
Materials						
Pipe, PVC, dia. < 18", weight priced	1323	Polyvinyl Chloride (PVC) pressure rated pipe priced by the weight of the pipe materials for pipes with diameters less than 18". Materials only.	Pound	$1.69	2910	$4,917.90
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 516 - Livestock Pipeline

Scenario: #2 - PVC (Iron Pipe Size) Difficult install

Scenario Description:

Description: Below-ground installation of PVC (Iron Pipe Size) pipeline in difficult or rocky terrain. PVC (IPS) is manufactured in sizes (nominal diameter) from ½-inch to 36-inch; typical practice sizes range from 1-inch to 4-inch; and typical scenario size is 1½-inch. Construct one mile (5,280 feet) of 1½-inch, Schedule 40, PVC Pipeline with appurtenances, installed below ground with a minimum 1.5 feet of ground cover. The scenario unit is length of pipe material in feet. 5,280 feet of 1½-inch, Schedule 40, PVC pipe weighs 0.501 lb/ft, or a total of 2,645 pounds. Appurtenances include couplings, fittings, thrust blocks, gate valves (2), air release valves (2), drain valve (1), and pressure relief valve (1), and are included in the cost of pipe material (additional 10% of pipe material quantity). Revegetation is not included.
Resource Concerns: Inadequate Livestock Water, Inefficient Energy Use.
Associated Practices: Critical Area Planting (342), Pumping Plant (533), Watering Facility (614), and Water Harvesting Catchment (636).

Before Situation:

Water supplies need to be conveyed through pipelines for use by livestock or wildlife.

After Situation:

Pipeline(s) convey and/or distribute water to storage and/or watering facilities for use by livestock or wildlife.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Foot

Scenario Typical Size: 5,280

Scenario Cost: $28,836.96 **Scenario Cost/Unit:** $5.46

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	3130	$5,665.30
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	3130	$15,524.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	96	$2,215.68
Materials						
Pipe, PVC, dia. < 18", weight priced	1323	Polyvinyl Chloride (PVC) pressure rated pipe priced by the weight of the pipe materials for pipes with diameters less than 18". Materials only.	Pound	$1.69	2910	$4,917.90
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 516 - Livestock Pipeline

Scenario: #3 - HDPE (Iron Pipe Size & Tubing)

Scenario Description:

Description: Below-ground installation of HDPE (Iron Pipe Size & Tubing) pipeline. HDPE (IPS &Tubing) is manufactured in sizes (nominal diameter) from ½-inch to 24-inch; typical practice sizes range from 1-inch to 4-inch; and typical scenario size is 1½-inch. Construct one mile (5,280 feet) of 1½-inch, Class 200 (SDR-9.0, PE4708), HDPE Pipeline with appurtenances, installed below ground with a minimum 1.5 feet of ground cover. Typical size range of pipe installed: 1-inch to 4-inch. The scenario unit is length of pipe material in feet. 5,280 feet of 1½-inch, Class 200 (SDR-9.0, PE4708), HDPE pipe weighs 0.475 lb/ft, or a total of 2,508 pounds. Appurtenances include fittings, anchors, thrust blocks, gate valves (2), air release valves (2), drain valve (1), and pressure relief valve (1), and are included in the cost of pipe material (additional 10% of pipe material quantity). Revegetation is not included.
Resource Concerns: Inadequate Livestock Water, Inefficient Energy Use.
Associated Practices: Critical Area Planting (342), Pumping Plant (533), Watering Facility (614), and Water Harvesting Catchment (636).

Before Situation:

Water supplies need to be conveyed through pipelines for use by livestock or wildlife.

After Situation:

Pipeline(s) convey and/or distribute water to storage and/or watering facilities for use by livestock or wildlife.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Foot

Scenario Typical Size: 5,280

Scenario Cost: $14,528.24 **Scenario Cost/Unit:** $2.75

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Pipeline Plowing	1096	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	$1.10	5280	$5,808.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	40	$923.20
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.64	2759	$7,283.76
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 516 - Livestock Pipeline

Scenario: #4 - HDPE (Iron Pipe Size & Tubing) Difficult install

Scenario Description:

Description: Below-ground installation of HDPE (Iron Pipe Size & Tubing) pipeline in difficult or rocky terrain. HDPE (IPS &Tubing) is manufactured in sizes (nominal diameter) from ½-inch to 24-inch; typical practice sizes range from 1-inch to 4-inch; and typical scenario size is 1½-inch. Construct one mile (5,280 feet) of 1½-inch, Class 200 (SDR-9.0, PE4708), HDPE Pipeline with appurtenances, installed below ground with a minimum 1.5 feet of ground cover. Typical size range of pipe installed: 1-inch to 4-inch. The scenario unit is length of pipe material in feet. 5,280 feet of 1½-inch, Class 200 (SDR-9.0, PE4708), HDPE pipe weighs 0.475 lb/ft, or a total of 2,508 pounds. Appurtenances include fittings, anchors, thrust blocks, gate valves (2), air release valves (2), drain valve (1), and pressure relief valve (1), and are included in the cost of pipe material (additional 10% of pipe material quantity). Revegetation is not included.
Resource Concerns: Inadequate Livestock Water, Inefficient Energy Use.
Associated Practices: Critical Area Planting (342), Pumping Plant (533), Watering Facility (614), and Water Harvesting Catchment (636).

Before Situation:

Water supplies need to be conveyed through pipelines for use by livestock or wildlife.

After Situation:

Pipeline(s) convey and/or distribute water to storage and/or watering facilities for use by livestock or wildlife.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Foot

Scenario Typical Size: 5,280

Scenario Cost: $30,833.54 **Scenario Cost/Unit:** $5.84

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	3130	$15,524.80
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	3130	$5,665.30
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	80	$1,846.40
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.64	2759	$7,283.76
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 516 - Livestock Pipeline

Scenario: #5 - Surface HDPE (Iron Pipe Size & Tubing)

Scenario Description:

Description: on-ground surface installation of HDPE (Iron Pipe Size & Tubing) pipeline. HDPE (IPS & Tubing) is manufactured in sizes (nominal diameter) from ½-inch to 24-inch; typical practice sizes range from 1-inch to 4-inch; and typical scenario size is 1½-inch. Construct one mile (5,280 feet) of 1½-inch, Class 200 (SDR-9.0, PE4708), HDPE Pipeline with appurtenances, installed on the ground surface. Typical size range of pipe installed: 1-inch to 4-inch. The scenario unit is length of pipe material in feet. 5,280 feet of 1½-inch, Class 200 (SDR-9.0, PE4708), HDPE pipe weighs 0.475 lb/ft, or a total of 2,508 pounds. Appurtenances include couplings, fittings, anchors, thrust blocks, gate valves (2), air release valves (2), drain valve (1), and pressure relief valve (1), and are included in the cost of pipe material (additional 15% of pipe material quantity). Revegetation is not included.
Resource Concerns: Inadequate Livestock Water, Inefficient Energy Use.
Associated Practices: Critical Area Planting (342), Pumping Plant (533), Watering Facility (614), and Water Harvesting Catchment (636).

Before Situation:

Water supplies need to be conveyed through pipelines for use by livestock or wildlife.

After Situation:

Pipeline(s) convey and/or distribute water to storage and/or watering facilities for use by livestock or wildlife.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Foot

Scenario Typical Size: 5,280

Scenario Cost: $8,720.72 **Scenario Cost/Unit:** $1.65

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Fuser for HDPE Pipe	1383	Fusing machine for 1" to 12" diameter HDPE pipe joints. Equipment costs only. Does not include labor.	Hour	$22.97	8	$183.76
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	40	$923.20
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.64	2884	$7,613.76

Practice: 516 - Livestock Pipeline

Scenario: #6 - Steel (Iron Pipe Size)

Scenario Description:

Description: Below-ground installation of Steel (Iron Pipe Size) pipeline. Steel (IPS) is manufactured in sizes (nominal diameter) from ½-inch to 36-inch; typical practice sizes range from 1-inch to 4-inch; and typical scenario size is 1½-inch. Construct one mile (5,280 feet) of 1½-inch, Schedule 40, Galvanized Steel Pipeline with appurtenances, installed below ground with a minimum 1.5 feet of ground cover. Typical size range of pipe installed: 1-inch to 4-inch. The scenario unit is length of pipe material in feet. 5,280 feet of 1½-inch, Schedule 40, Galvanized Steel Pipe weighs 2.718 lb/ft, or a total of 14,351 pounds. Appurtenances include couplings, fittings, thrust blocks, gate valves (2), air release valves (2), drain valve (1), and pressure relief valve (1), and are included in the cost of pipe material (additional 10% of pipe material quantity). Revegetation is not included.
Resource Concerns: Inadequate Livestock Water, Inefficient Energy Use.
Associated Practices: Critical Area Planting (342), Pumping Plant (533), Watering Facility (614), and Water Harvesting Catchment (636).

Before Situation:

Water supplies need to be conveyed through pipelines for use by livestock or wildlife.

After Situation:

Pipeline(s) convey and/or distribute water to storage and/or watering facilities for use by livestock or wildlife.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Foot

Scenario Typical Size: 5,280

Scenario Cost: $37,065.04 **Scenario Cost/Unit:** $7.02

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.39	5280	$7,339.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	144	$3,323.52
Materials						
Pipe, steel, smooth wall, galvanized, weight priced	1381	Steel manufactured into galvanized smooth wall pipe	Pound	$1.64	15786	$25,889.04
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 516 - Livestock Pipeline

Scenario: #7 - Steel (Iron Pipe Size) Difficult Install

Scenario Description:

Description: Below-ground installation of Steel (Iron Pipe Size) pipeline in difficult or rocky terrain. Steel (IPS) is manufactured in sizes (nominal diameter) from ½-inch to 36-inch; typical practice sizes range from 1-inch to 4-inch; and typical scenario size is 1½-inch. Construct one mile (5,280 feet) of 1½-inch, Schedule 40, Galvanized Steel Pipeline with appurtenances, installed below ground with a minimum 1.5 feet of ground cover. Typical size range of pipe installed: 1-inch to 4-inch. The scenario unit is length of pipe material in feet. 5,280 feet of 1½-inch, Schedule 40, Galvanized Steel Pipe weighs 2.718 lb/ft, or a total of 14,351 pounds. Appurtenances include couplings, fittings, thrust blocks, gate valves (2), air release valves (2), drain valve (1), and pressure relief valve (1), and are included in the cost of pipe material (additional 10% of pipe material quantity). Revegetation is not included.
Resource Concerns: Inadequate Livestock Water, Inefficient Energy Use.
Associated Practices: Critical Area Planting (342), Pumping Plant (533), Watering Facility (614), and Water Harvesting Catchment (636).

Before Situation:

Water supplies need to be conveyed through pipelines for use by livestock or wildlife.

After Situation:

Pipeline(s) convey and/or distribute water to storage and/or watering facilities for use by livestock or wildlife.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Foot

Scenario Typical Size: 5,280

Scenario Cost: $54,239.46 **Scenario Cost/Unit:** $10.27

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	3130	$5,665.30
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	3130	$15,524.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	288	$6,647.04
Materials						
Pipe, steel, smooth wall, galvanized, weight priced	1381	Steel manufactured into galvanized smooth wall pipe	Pound	$1.64	15786	$25,889.04
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 516 - Livestock Pipeline

Scenario: #8 - Surface Steel (Iron Pipe Size)

Scenario Description:

Description: on-ground surface installation of Steel (Iron Pipe Size) pipeline. Steel (IPS) is manufactured in sizes (nominal diameter) from ½-inch to 36-inch; typical practice sizes range from 1-inch to 4-inch; and typical scenario size is 1½-inch. Construct one mile (5,280 feet) of 1½-inch, Schedule 40, Galvanized Steel Pipeline with appurtenances, installed on the ground surface. Typical size range of pipe installed: 1-inch to 4-inch. The scenario unit is length of pipe material in feet. 5,280 feet of 1½-inch, Schedule 40, Galvanized Steel Pipe weighs 2.718 lb/ft, or a total of 14,351 pounds. Appurtenances include couplings, fittings, expansion joints, anchors, thrust blocks, gate valves (2), air release valves (2), drain valve (1), and pressure relief valve (1), and are included in the cost of pipe material (additional 15% of pipe material quantity). Revegetation is not included.
Resource Concerns: Inadequate Livestock Water, Inefficient Energy Use.
Associated Practices: Critical Area Planting (342), Pumping Plant (533), Watering Facility (614), and Water Harvesting Catchment (636).

Before Situation:

Water supplies need to be conveyed through pipelines for use by livestock or wildlife.

After Situation:

Pipeline(s) convey and/or distribute water to storage and/or watering facilities, for use by livestock or wildlife.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Foot

Scenario Typical Size: 5,280

Scenario Cost: $30,390.08 **Scenario Cost/Unit:** $5.76

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	144	$3,323.52
Materials						
Pipe, steel, smooth wall, galvanized, weight priced	1381	Steel manufactured into galvanized smooth wall pipe	Pound	$1.64	16504	$27,066.56

Practice: 516 - Livestock Pipeline

Scenario: #9 - PVC deep trench

Scenario Description:

Description: Below ground installation of PVC (Iron Pipe Size) pipeline deeper than a typical installation to ensure the pipe is kept below the frost line (typically 5' deep). PVC (IPS) is manufactured in sizes (nominal diameter) from ½-inch to 36-inch; typical practice sizes range from 1-inch to 4-inch; and typical scenario size is 1½-inch. Construct one mile (5,280 feet) of 1½-inch, Schedule 40, PVC Pipeline with appurtenances, installed below ground. The scenario unit is length of pipe material in feet. 5,280 feet of 1½-inch, Schedule 40, PVC pipe weighs 0.501 lb/ft, or a total of 2,645 pounds. Appurtenances include couplings, fittings, thrust blocks, gate valves (2), air release valves (2), drain valve (1), and pressure relief valve (1), and are included in the cost of pipe material (additional 10% of pipe material quantity). Revegetation is not included.
Resource Concerns: Inadequate Livestock Water, Inefficient Energy Use.
Associated Practices: Critical Area Planting (342), Pumping Plant (533), Watering Facility (614), and Water Harvesting Catchment (636).

Before Situation:

Water supplies need to be conveyed through pipelines for use by livestock or wildlife.

After Situation:

Pipeline(s) convey and/or distribute water to storage and/or watering facilities for use by livestock or wildlife.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Foot

Scenario Typical Size: 5,280

Scenario Cost: $40,242.80 **Scenario Cost/Unit:** $7.62

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	7825	$19,171.25
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	7825	$14,163.25
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	64	$1,477.12
Materials						
Pipe, PVC, dia. < 18", weight priced	1323	Polyvinyl Chloride (PVC) pressure rated pipe priced by the weight of the pipe materials for pipes with diameters less than 18". Materials only.	Pound	$1.69	2910	$4,917.90
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 516 - Livestock Pipeline

Scenario: #10 - PVC, High Fitting Ratio

Scenario Description:

Description: Below-ground installation of PVC pipeline on a short section of pipeline with a high number of fittings. This scenario would be appropraite on sites where the number of elbows, risers, gate valves and other appurtanences would significantly increase the cost of the installation. PVC (IPS) is manufactured in sizes (nominal diameter) from ½-inch to 36-inch; typical practice sizes range from 1-inch to 4-inch. Appurtenances include couplings, fittings, thrust blocks, gate valves (2), air release valves (2), drain valve (1), and pressure relief valve (1), and are included in the cost of pipe material (additional 50% of pipe material quantity). Revegetation is not included.
Resource Concerns: Inadequate Livestock Water, Inefficient Energy Use.
Associated Practices: Critical Area Planting (342), Pumping Plant (533), Watering Facility (614), and Water Harvesting Catchment (636).

Before Situation:

Water supplies need to be conveyed through pipelines for use by livestock or wildlife.

After Situation:

Pipeline(s) convey and/or distribute water to storage and/or watering facilities for use by livestock or wildlife. Typical scenario size is 1½-inch. Construct 2000 ft of 1½-inch, Schedule 40, PVC Pipeline with appurtenances, installed below ground with a minimum 1.5 feet of ground cover. The site and use require a large number of gate valves to control water direction and a large number of risers. The scenario unit is length of pipe material in feet. 2,000 feet of 1½-inch, Schedule 40, PVC pipe weighs 0.501 lb/ft plus an additional 50% for fittings and valves, or a total of 1,503 pounds.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Foot

Scenario Typical Size: 2,000

Scenario Cost: $6,525.75 **Scenario Cost/Unit:** $3.26

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.39	2000	$2,780.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	30	$692.40
Materials						
Pipe, PVC, dia. < 18", weight priced	1323	Polyvinyl Chloride (PVC) pressure rated pipe priced by the weight of the pipe materials for pipes with diameters less than 18". Materials only.	Pound	$1.69	1503	$2,540.07
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 521A - Pond Sealing or Lining, Flexible Membrane

Scenario: #1 - Flexible Membrane, Uncovered, without liner drainage or venting

Scenario Description:

Installation of a flexible geosynthetic membrane liner, uncovered, to reduce seepage from ponds or waste storage impoundment structures. Practice implementation includes a geotextile or soil cushion to protect the liner from subgrade damage. Associated practices include PS378 Pond, PS313 Waste Storage Facility.

Before Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits.

After Situation:

Water conservation and enviromental protection provided by limiting seepage losses from ponds or waste storage impoundments.

Scenario Feature Measure: Surface area of Liner Material (including anchorage)

Scenario Unit: Square Yard

Scenario Typical Size: 2,420

Scenario Cost: $133,938.29 **Scenario Cost/Unit:** $55.35

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.36	2420	$5,711.20
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$108.60	33	$3,583.80
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.69	41	$1,586.29
Materials						
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Foot	$5.65	21780	$123,057.00

Practice: 521A - Pond Sealing or Lining, Flexible Membrane

Scenario: #2 - Flexible Membrane, Uncovered, with liner drainage or venting

Scenario Description:

Installation of a flexible geosynthetic membrane liner, uncovered, to reduce seepage from ponds or waste storage impoundment structures. Practice implementation includes a geotextile or soil cushion to protect the liner from subgrade damage, and liner drainage or venting. Associated practices include PS378 Pond, PS313 Waste Storage Facility.

Before Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits.

After Situation:

Water conservation and enviromental protection provided by limiting seepage losses from ponds or waste storage impoundments.

Scenario Feature Measure: Surface area of Liner Material (including anchorage)

Scenario Unit: Square Yard

Scenario Typical Size: 2,420

Scenario Cost: $140,883.69 **Scenario Cost/Unit:** $58.22

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.36	2420	$5,711.20
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$108.60	33	$3,583.80
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.69	41	$1,586.29
Materials						
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Foot	$5.65	21780	$123,057.00
Geonet	1778	Geosynthetic drainage liner, typically HDPE of 300 mil thickness. Includes materials and shipping only.	Square Yard	$2.87	2420	$6,945.40

Practice: 521A - Pond Sealing or Lining, Flexible Membrane

Scenario: #3 - Flexible Membrane, Covered, without liner drainage or venting

Scenario Description:

Installation of a flexible geosynthetic membrane liner to reduce seepage from ponds or waste storage impoundment structures. Practice implementation includes 1 foot of soil cover for liner protection, and a geotextile or soil cushion to protect liner from subgrade damage. Associated practices include PS378 Pond, PS313 Waste Storage Facility.

Before Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits.

After Situation:

Water conservation and enviromental protection provided by limiting seepage losses from ponds or waste storage impoundments.

Scenario Feature Measure: Surface area of Liner Material (including anchorage)

Scenario Unit: Square Yard

Scenario Typical Size: 2,420

Scenario Cost: $137,384.18 **Scenario Cost/Unit:** $56.77

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.36	2420	$5,711.20
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.27	807	$3,445.89
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.69	41	$1,586.29
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$108.60	33	$3,583.80
Materials						
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Foot	$5.65	21780	$123,057.00

Practice: 521A - Pond Sealing or Lining, Flexible Membrane

Scenario: #4 - Flexible Membrane, Covered, with liner drainage or venting

Scenario Description:

Installation of a flexible geosynthetic membrane liner to reduce seepage from ponds or waste storage impoundment structures. Practice implementation includes 1 foot of soil cover for liner protection, a geotextile or soil cushion to protect liner from subgrade damage, and liner drainage or venting. Associated practices include PS378 Pond, PS313 Waste Storage Facility.

Before Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits.

After Situation:

Water conservation and enviromental protection provided by limiting seepage losses from ponds or waste storage impoundments.

Scenario Feature Measure: Surface area of Liner Material (including anchorage)

Scenario Unit: Square Yard

Scenario Typical Size: 2,420

Scenario Cost: $144,329.58 **Scenario Cost/Unit:** $59.64

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.27	807	$3,445.89
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.36	2420	$5,711.20
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$108.60	33	$3,583.80
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.69	41	$1,586.29
Materials						
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Foot	$5.65	21780	$123,057.00
Geonet	1778	Geosynthetic drainage liner, typically HDPE of 300 mil thickness. Includes materials and shipping only.	Square Yard	$2.87	2420	$6,945.40

Practice: 521A - Pond Sealing or Lining, Flexible Membrane

Scenario: #5 - Double Flexible Membrane, with Geoweb and drain

Scenario Description:

Installation of a double flexible geosynthetic membrane liner, uncovered, to reduce seepage from ponds or waste storage impoundment structures. Practice implementation includes a geoweb/geonet structure encompassed by a membrane on top and bottom. A drain collects any seepage through the top layer and removes it through a drain system. Practice protects ground water from contamination. Practices meets Central Valley Regional Water Control Board water quality regulations for dairies. Associated practices include PS378 Pond, PS313 Waste Storage Facility.

Before Situation:

In-place soils at site exhibits seepage rates in excess of acceptable limits and site is in area likely to cause degradation to ground water resources.

After Situation:

Water conservation and enviromental protection provided by limiting seepage losses from ponds or waste storage impoundments.

Scenario Feature Measure: Surface area of Liner Material (including anchorage)

Scenario Unit: Square Yard

Scenario Typical Size: 2,420

Scenario Cost: $261,943.60 **Scenario Cost/Unit:** $108.24

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.36	2420	$5,711.20
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$54.18	30	$1,625.40
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.69	40	$1,547.60
Materials						
Geonet	1778	Geosynthetic drainage liner, typically HDPE of 300 mil thickness. Includes materials and shipping only.	Square Yard	$2.87	2420	$6,945.40
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Foot	$5.65	43560	$246,114.00

Practice: 521B - Pond Sealing or Lining, Soil Dispersant

Scenario: #1 - Soil Dispersant, Uncovered

Scenario Description:

Construction of a compacted soil liner, treated with a soil dispersant, to reduce seepage from ponds or waste storage impoundment structures. Practice implementation includes incorporation of the dispersant with the soil liner under proper moisture conditions and compaction to the designed liner thickness. Practice implementation may require filter compatibility with the subgrade (graded filter or geotextile). Associated practice PS378, PS313.

Before Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits. Soils are suitable for treatment with dispersants.

After Situation:

Water conservation and environmental protection provided by limiting seepage losses from ponds or waste storage impoundments.

Scenario Feature Measure: Volume of Liner Material

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,613

Scenario Cost: $11,484.79 **Scenario Cost/Unit:** $7.12

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$54.81	6	$328.86
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	1613	$7,097.20
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	3	$329.82
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	8	$329.84
Materials						
Soil Dispersant	1490	Soil Amendment (tetrasodium pyrophosphate (TSPP), sodium tripolyphosphate (STPP), or soda ash or approved equivalent)	Ton	$481.23	6.53	$3,142.43
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: **521B - Pond Sealing or Lining, Soil Dispersant**

Scenario: **#2 - Soil Dispersant, Covered**

Scenario Description:

Construction of a compacted soil liner, treated with a soil dispersant, to reduce seepage from ponds or waste storage impoundment structures. Practice implementation includes incorporation of the dispersant with the soil liner under proper moisture conditions, compaction to the designed liner thickness, and placement of soil cover over the treated liner. Payment is based on Volume of Liner Material only. Practice implementation may require filter compatibility with the subgrade (graded filter or geotextile). Associated practice PS378, PS313.

Before Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits. Soils are suitable for treatment with dispersants.

After Situation:

Water conservation and environmental protection provided by limiting seepage losses from ponds or waste storage impoundments. Typical pond liner: 1 foot thick with 1 foot soil cover x 1 acre in area

Scenario Feature Measure: Volume of Liner Material - not including Soil Cover over Liner

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,613

Scenario Cost: $18,691.61 **Scenario Cost/Unit:** $11.59

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$54.81	8	$438.48
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	3226	$14,194.40
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	3	$329.82
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	8	$329.84
Materials						
Soil Dispersant	1490	Soil Amendment (tetrasodium pyrophosphate (TSPP), sodium tripolyphosphate (STPP), or soda ash or approved equivalent)	Ton	$481.23	6.53	$3,142.43
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: **521C - Pond Sealing or Lining, Bentonite Sealant**

Scenario: **#1 - Bentonite Treatment, Uncovered**

Scenario Description:

Construction of a compacted soil liner, treated with bentonite, to reduce seepage from ponds or waste storage impoundment structures. Practice implementation includes incorporation of the bentonite with the soil under proper moisture conditions, compaction to the designed liner thickness. Practice implementation may require filter compatibility with the subgrade (graded filter or geotextile). Associated practice PS378, PS313.

Before Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits. Soils are suitable for treatment with dispersants.

After Situation:

Water conservation and environmental protection provided by limiting seepage losses from ponds or waste storage impoundments. Typical pond liner: 1 ft. thick x 1 acre in area

Scenario Feature Measure: Volume of Liner Material

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,613

Scenario Cost: $66,237.37 **Scenario Cost/Unit:** $41.06

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$52.83	6	$316.98
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.27	1613	$6,887.51
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$108.60	3	$325.80
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	2	$84.46
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	7	$156.31
Materials						
Bentonite	41	Bentonite, includes materials (50# bag)	Each	$11.09	5227	$57,967.43
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$249.44	2	$498.88

Practice: **521C - Pond Sealing or Lining, Bentonite Sealant**

Scenario: **#2 - Bentonite Treatment, Covered**

Scenario Description:

Construction of a compacted soil liner, treated with bentonite, to reduce seepage from ponds or waste storage impoundment structures. Practice implementation includes incorporation of the bentonite with the soil under proper moisture conditions, compaction to the designed liner thickness, and placement of soil cover over the treated liner. Payment is based on Volume of Liner Material only. Practice implementation may require filter compatibility with the subgrade (graded filter or geotextile). Associated practice PS378, PS313.

Before Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits. Soils are suitable for treatment with bentonite.

After Situation:

Water conservation and environmental protection provided by limiting seepage losses from ponds or waste storage impoundments. Typical pond liner: 1 ft. thick with 1 ft. soil cover x 1 acre in area

Scenario Feature Measure: Volume of Liner Material Only, not including volume of soil cover

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,613

Scenario Cost: $77,128.52 **Scenario Cost/Unit:** $47.82

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.27	4033	$17,220.91
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$52.83	12	$633.96
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$108.60	3	$325.80
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	4	$168.92
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	14	$312.62
Materials						
Bentonite	41	Bentonite, includes materials (50# bag)	Each	$11.09	5227	$57,967.43
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$249.44	2	$498.88

Practice: 521D - Pond Sealing or Lining, Compacted Clay Treatment

Scenario: #1 - Clay Liner, On site Material

Scenario Description:

Construction of a compacted soil liner, treated with compacted clay, to reduce seepage from ponds or waste storage impoundment structures. All material is located on site, no hauling required. Practice implementation includes compaction of the soil liner under proper moisture conditions to the designed liner thickness, and soil cover to protect the finished liner. Associated practices include PS378, PS313, & other waste water impoundments.

Before Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits. An adequate quantity of soil suitable for constructing a clay liner without amendments is available at an econical haul distance. Material haul < 1 mile.

After Situation:

Water conservation and environmental protection provided by limiting seepage losses from ponds or waste storage impoundments. Typical scenario is for a 12" thick liner with an area of one acre.

Scenario Feature Measure: Volume of Liner Material

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,613

Scenario Cost: $20,293.10 **Scenario Cost/Unit:** $12.58

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, clay, large equipment, 50 ft	1218	Bulk excavation of clay with dozer >100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.56	2016	$5,160.96
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$187.13	20	$3,742.60
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	2016	$8,870.40
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	14	$1,539.16
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 521D - Pond Sealing or Lining, Compacted Clay Treatment

Scenario: #2 - Clay Liner, Off Site Material

Scenario Description:

Construction of a compacted soil liner, treated with compacted clay, to reduce seepage from ponds or waste storage impoundment structures. Liner is constructed from off site matieral Practice implementation includes compaction of the soil liner under proper moisture conditions to the designed liner thickness, and protection of the finished liner. Material haul > 1 mile. Associated practices include PS378, PS313, & other waste water impoundments.

Before Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits. An adequate quantity of soil suitable for constructing a clay liner without amendments is available at an economical haul distance.

After Situation:

Water conservation and environmental protection provided by limiting seepage losses from ponds or waste storage impoundments.Typical scenario is for a 12" thick liner with an area of one acre constructed from material hauled in 10 miles.

Scenario Feature Measure: Volume of Compacted Liner Material

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,613

Scenario Cost: $37,469.42 **Scenario Cost/Unit:** $23.23

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.32	20160	$6,451.20
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	2016	$3,648.96
Excavation, clay, large equipment, 150 ft	1219	Bulk excavation of clay with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$6.07	2016	$12,237.12
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$187.13	20	$3,742.60
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	2016	$8,870.40
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	14	$1,539.16
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 528 - Prescribed Grazing

Scenario: #1 - Range Basic

Scenario Description:

Design and implementation of a grazing system that will enhance rangeland health and ecosystem function as well as optimize efficiency and economic return through monitoring (ex:photo points, stubble height after grazing, etc) & record keeping.

Before Situation:

Current grazing system exhibits undesirable and inefficient use of forage plants and such use may have a negative impact on rangeland health, as well as soil and water resources. Stocking rates are likely higher than the current level of production and efficiency of use can support without management changes. There is currently no monitoring plan in place to evaluate change on the landscape.

After Situation:

Prescribed grazing system is designed to protect the health and vigor of the plant communities that are in place. Livestock are managed in a way that enhances rangeland health and function through protection of sensitive areas, and efficient harvest of forage resources. Grazing system success will be evaluated through monitoring of key grazing areas.

Scenario Feature Measure: Acre

Scenario Unit: Acre

Scenario Typical Size: 500

Scenario Cost: $1,942.21 **Scenario Cost/Unit:** $3.88

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$41.42	1	$41.42
Equipment/Installation						
Rangeland/grassland field monitoring kit	967	Miscellaneous tools needed to complete rangeland/grassland monitoring. Materials may include camera, clippers, plot frame, scale, tape measure, etc. Includes materials and shipping only.	Each	$43.67	1	$43.67
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.69	48	$1,857.12

Practice: 528 - Prescribed Grazing

Scenario: #2 - Range, Intensive

Scenario Description:

Design and implementation of a grazing system that will enhance rangeland health and ecosystem function as well as optimize efficiency and economic return through monitoring (ex: trend, composition, utilization, production, etc), record keeping and establishment of transects for long-term monitoring.

Before Situation:

Current grazing system exhibits undesirable and inefficient use of forage plants and such use may have a negative impact on rangeland health, as well as soil and water resources. Stocking rates are likely higher than the current level of production and efficiency of use can support without management changes. There is currently no monitoring plan in place to evaluate change on the landscape.

After Situation:

Prescribed grazing system is designed to protect the health and vigor of the plant communities that are in place. Livestock are managed in a way that enhances rangeland health and function through proper rest and recovery periods, protection of sensitive areas, proper utilization, and efficient harvest of forage resources. Grazing system success will be evaluated through establishment of transects for long term monitoring and monitoring of utilization.

Scenario Feature Measure: Acre

Scenario Unit: Acre

Scenario Typical Size: 500

Scenario Cost: $2,621.89 **Scenario Cost/Unit:** $5.24

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$41.42	1	$41.42
Equipment/Installation						
Rangeland/grassland field monitoring kit	967	Miscellaneous tools needed to complete rangeland/grassland monitoring. Materials may include camera, clippers, plot frame, scale, tape measure, etc. Includes materials and shipping only.	Each	$43.67	1	$43.67
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.69	60	$2,321.40
Materials						
Nutritional Balance Analyzer, fecal sample analysis only	1127	NIRS fecal analysis, animal performance report. Includes materials and shipping only.	Each	$35.90	6	$215.40

Practice: 528 - Prescribed Grazing

Scenario: #3 - Habitat Management, Basic

Scenario Description:

Development and implementation of an adaptively managed grazing schedule that will enhance habitat components for the identified native species of concern. Grazing system success will be evaluated through monitoring of key grazing areas.

Before Situation:

Wildlife cover, shelter, food, water or movement are limited due to grazingland condition. Plant health and vigor are negatively impacted by one or more of the following: poor grazing distribution, timing of grazing or inadequate rest and recovery periods. Water quality may be impacted by increased runoff and erosion. In addition reduced vegetative cover increases the opportunity for encroachment of noxious and invasive weeds.

After Situation:

A grazing system is altered and/or enhanced to benefit habitat for targeted wildlife species. Additional benefits include improved rangeland and/or pasture health, protection of sensitive areas, improved water quality and reduced risk of invasive or noxious weed encroachment. Grazing system success will be evaluated through monitoring of key grazing areas.

Scenario Feature Measure: Acre

Scenario Unit: Acre

Scenario Typical Size: 1,000

Scenario Cost: $5,962.94 **Scenario Cost/Unit:** $5.96

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$41.42	1	$41.42
Equipment/Installation						
Rangeland/grassland field monitoring kit	967	Miscellaneous tools needed to complete rangeland/grassland monitoring. Materials may include camera, clippers, plot frame, scale, tape measure, etc. Includes materials and shipping only.	Each	$43.67	1	$43.67
Trucking, moving livestock to new paddock	961	Livestock transportation costs to implement a grazing rotation using a gooseneck trailer 6'8" x 24'. Includes equipment, power unit and labor costs.	Mile	$4.32	200	$864.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$35.97	40	$1,438.80
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$17.05	17	$289.85
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$108.60	16	$1,737.60
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.69	40	$1,547.60

Practice: 528 - Prescribed Grazing

Scenario: #4 - Habitat Management, Intensive

Scenario Description:

Development and implementation of an adaptively managed grazing schedule that will enhance habitat components for the identified native species of concern. In order to achieve this, implementation of a rest/rotation, deferred or Management-intensive grazing system will be required. A portion of the acres (i.e. 20% for Sage Grouse Initiative) will be deferred during periods of critical periods for the native species of concern. Typically, a utilization map will be developed that covers the entire grazing unit.

Before Situation:

Wildlife cover, shelter, food, water or movement are limited due to grazingland condition. Plant health and vigor are negatively impacted by one or more of the following: poor grazing distribution, timing of grazing or inadequate rest and recovery periods. Water quality may be impacted by increased runoff and erosion. In addition reduced vegetative cover increases the opportunity for encroachment of noxious and invasive weeds.

After Situation:

A grazing system is altered and/or enhanced to benefit habitat for targeted native species. Additional benefits may include improved rangeland and/or pasture health, adequate rest and recovery periods, protection of sensitive areas, improved water quality and reduced risk of invasive or noxious weed encroachment. A rest/rotation, deferred or Management-intensive grazing system has been implemented. A portion of the acres (i.e. 20% for Sage Grouse Initiative) is deferred during periods of critical periods for the native species of concern. Typically, a utilization map will be developed that covers the entire grazing unit.

Scenario Feature Measure: Acre

Scenario Unit: Acre

Scenario Typical Size: 1,000

Scenario Cost: $10,086.14 **Scenario Cost/Unit:** $10.09

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$41.42	1	$41.42
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$35.97	80	$2,877.60
Trucking, moving livestock to new paddock	961	Livestock transportation costs to implement a grazing rotation using a gooseneck trailer 6'8" x 24'. Includes equipment, power unit and labor costs.	Mile	$4.32	400	$1,728.00
Rangeland/grassland field monitoring kit	967	Miscellaneous tools needed to complete rangeland/grassland monitoring. Materials may include camera, clippers, plot frame, scale, tape measure, etc. Includes materials and shipping only.	Each	$43.67	1	$43.67
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$17.05	33	$562.65
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$108.60	16	$1,737.60
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.69	80	$3,095.20

Practice: 528 - Prescribed Grazing

Scenario: #5 - Pasture, Basic

Scenario Description:

Design and implement a grazing system that will enhance pasture condition and ecosystem function as well as optimize efficiency and economic return through monitoring (ex:photo points, stubble height after grazing, etc) & record keeping.

Before Situation:

Current grazing system exhibits undesirable and inefficient use of forage plants and such use may have a negative impact on pasture condition, as well as soil and water resources. Stocking rates are likely higher than the current level of production and efficiency of use can support without management changes. There is currently no monitoring plan in place to evaluate change on the landscape. Typical size of pastures is 30 acres.

After Situation:

Prescribed grazing system is designed to protect the health and vigor of the plant communities that are in place. Livestock are managed in a way that enhances pasture condition and function through protection of sensitive areas, and efficient harvest of forage resources. Grazing system success will be evaluated through short term monitoring (ex:photo points showing species composition, forage production and utilization) and recordkeeping of grazing dates and stubble height after grazing by paddock, etc.

Scenario Feature Measure: Acre

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $1,323.17 **Scenario Cost/Unit:** $44.11

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$41.42	1	$41.42
Equipment/Installation						
Rangeland/grassland field monitoring kit	967	Miscellaneous tools needed to complete rangeland/grassland monitoring. Materials may include camera, clippers, plot frame, scale, tape measure, etc. Includes materials and shipping only.	Each	$43.67	1	$43.67
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.69	32	$1,238.08

Practice: 528 - Prescribed Grazing

Scenario: #6 - Pasture, Intensive

Scenario Description:

Design and implementation of a grazing system that will enhance pasture condition and ecosystem function as well as optimize efficiency and economic return through monitoring (ex: trend, composition, utilization, production, etc), record keeping and establishment of long-term monitoring areas. This scenario may also be used on vineyards and orchards for management of interrow cover crops.

Before Situation:

Current grazing system exhibits undesirable and inefficient use of forage plants and such use may have a negative impact on pasture condition, as well as soil and water resources. Stocking rates are likely higher than the current level of production and efficiency of use can support without management changes. There is currently no monitoring plan in place to evaluate change on the landscape. Typical size of pastures is 30 acres.

After Situation:

Prescribed grazing system is designed to protect the health and vigor of the plant communities that are in place. Livestock are managed in a way that enhances pasture condition and function through proper rest and recovery periods, protection of sensitive areas, proper utilization, and efficient harvest of forage resources. Activities might include moving animals more frequently, subdivision of fields with temporary fencing, grazing fields at different times of year, developing watering areas to improve distribution, or seasonal deferment. Grazing system success will be evaluated through review of records (i.e. grazing dates and stubble heights by paddock, photo points and other measurements of trend, species composition, forage production and utilization) and establishment and monitoring of long term monitoring areas.

Scenario Feature Measure: Acre

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $2,157.61 **Scenario Cost/Unit:** $71.92

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$41.42	1	$41.42
Equipment/Installation						
Rangeland/grassland field monitoring kit	967	Miscellaneous tools needed to complete rangeland/grassland monitoring. Materials may include camera, clippers, plot frame, scale, tape measure, etc. Includes materials and shipping only.	Each	$43.67	1	$43.67
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.69	48	$1,857.12
Materials						
Nutritional Balance Analyzer, fecal sample analysis only	1127	NIRS fecal analysis, animal performance report. Includes materials and shipping only.	Each	$35.90	6	$215.40

Practice: 528 - Prescribed Grazing

Scenario: #7 - Pasture, Deferment

Scenario Description:

Defer the pasture for 90 days and up to a growing season to manage for invasive weeds when necessary, to improve the health of the plants and/or provide nesting habitat for wildlife species. Keep records of dates out and monitor to determine when desired objectives of deferment are met.

Before Situation:

Over-grazed pasture, a pasture with a low condition score, or a newly established pasture converted from cropland with a need for proper grazing management. Typical size of pastures is 30 acres.

After Situation:

Improve the health and vigor of the sward, through deferment of grazing and/or improve the nesting habitat for wildlife.

Scenario Feature Measure: Acre

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $2,324.87 **Scenario Cost/Unit:** $77.50

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$41.42	1	$41.42
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$35.97	8	$287.76
Trucking, moving livestock to new paddock	961	Livestock transportation costs to implement a grazing rotation using a gooseneck trailer 6'8" x 24'. Includes equipment, power unit and labor costs.	Mile	$4.32	25	$108.00
Rangeland/grassland field monitoring kit	967	Miscellaneous tools needed to complete rangeland/grassland monitoring. Materials may include camera, clippers, plot frame, scale, tape measure, etc. Includes materials and shipping only.	Each	$43.67	1	$43.67
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$17.05	90	$1,534.50
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.69	8	$309.52

Practice: 528 - Prescribed Grazing

Scenario: #8 - Range, Deferment

Scenario Description:

Defer Rangeland for up to one year to manage for invasive weeds/brush, prescribed burning, to improve the rangeland health and/or provide nesting habitat for wildlife species. Keep records of dates out and monitor to determine when desired objectives of deferment are met.

Before Situation:

Over-grazed rangeland, native rangeland with declining rangeland health, or a newly established range planting with a need for proper grazing management.

After Situation:

Improve the health and vigor native rangeland, through deferment of grazing and/or improve the nesting habitat for wildlife.

Scenario Feature Measure: Acre

Scenario Unit: Acre

Scenario Typical Size: 500

Scenario Cost: $4,325.95 **Scenario Cost/Unit:** $8.65

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$41.42	1	$41.42
Equipment/Installation						
Trucking, moving livestock to new paddock	961	Livestock transportation costs to implement a grazing rotation using a gooseneck trailer 6'8" x 24'. Includes equipment, power unit and labor costs.	Mile	$4.32	50	$216.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$35.97	16	$575.52
Rangeland/grassland field monitoring kit	967	Miscellaneous tools needed to complete rangeland/grassland monitoring. Materials may include camera, clippers, plot frame, scale, tape measure, etc. Includes materials and shipping only.	Each	$43.67	1	$43.67
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$17.05	166	$2,830.30
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.69	16	$619.04

Practice: 528 - Prescribed Grazing

Scenario: #9 - Targeted Grazing Brush Control

Scenario Description:

Management of woody plant species through the use of livestock that are closely herded to concentrate grazing on targeted shrubs. Typical areas have dense stands of woody non-herbaceous species that exceed the desirable ecological site condition.

Before Situation:

Area consist of dense stands of woody non-herbaceous species that exceed the desirable ecological site condition degrading forage quality, promoting noxious and invasive species, increasing risk of soil erosion and degrading wildlife habitat.

After Situation:

Woody species are grazed to limit the regrowth of targeted shrubs and achieve a desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, affected hydrology and plant health and vigor is returning to near normal levels.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $57,158.08 **Scenario Cost/Unit:** $5,715.81

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.69	32	$1,238.08
Materials						
Animals used for biological weed control	1130	Goats, Llamas, Sheep - Includes all support: fence, water, dog, mob, etc. Includes materials and shipping only.	Head per day	$11.65	4800	$55,920.00

Practice: 528 - Prescribed Grazing

Scenario: #10 - Targeted Grazing Herbaceous Weed Control

Scenario Description:

Management of herbaceous plant species through the use of livestock that are closely herded to concentrate grazinging on undesired herbaceous species. Typical area is moderate rolling to gentle sloping, moderately deep to deep soils that have stands of herbaceous weed species that exceed the desirable ecological site condition. This scenario is an alternative for organic producers.

Before Situation:

Area consist of tends of herbaceous weed species that exceed the desirable ecological site condition degrading forage quality, promoting noxious and invasive species, increasing risk of soil erosion and degrading wildlife habitat.

After Situation:

Herbaceous species are grazed to limit the regrowth of targeted weed species and achieve a desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, hydrology and plant health and vigor is returning to near normal levels.

Scenario Feature Measure: Acres teated

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $35,723.80 **Scenario Cost/Unit:** $3,572.38

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.69	20	$773.80
Materials						
Animals used for biological weed control	1130	Goats, Llamas, Sheep - Includes all support: fence, water, dog, mob, etc. Includes materials and shipping only.	Head per day	$11.65	3000	$34,950.00

Practice: 533 - Pumping Plant

Scenario: #1 - Electric-Powered Pump ≤ 3 Hp

Scenario Description:

A submersible electric-powered pump is installed in a well or structure; or a close-coupled electric-powered centrifugal pump is mounted on a platform that is 3 Hp or less. Typical scenario is for a 1 Hp pump .
Resource Concerns: Livestock Production Limitation - Inadequate livestock water; Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water.
Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management; 516 - Livestock Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; and 614 - Watering Facility.

Before Situation:

Livestock: The present gravity flow system is inadequate to provide the proper flow rate for a prescribed grazing system.
Irrigation: Available water is at an insufficient pressure to allow for even distribution of water.
Waste Transfer: Contaminated water needs to be moved to a containment facility.

After Situation:

Livestock: Water is transferred at a sufficient rate and pressure to meet the requirements of a prescribed grazing system.
Irrigation: A properly designed pump is installed to improve irrigation efficiency and reduce energy usage.
Waste Transfer: Liquid wastes that have been collected through a waste transfer system are now efficiently transferred to an appropriate treatment or storage facility.

Scenario Feature Measure: Pump Power Requirement

Scenario Unit: Horsepower

Scenario Typical Size: 1

Scenario Cost: $1,356.31 **Scenario Cost/Unit:** $1,356.31

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	0.25	$40.23
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	6	$138.48
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	6	$247.38
Materials						
Pump, ≤ 5 HP, pump and motor, variable cost portion	1010	Variable cost portion of a pump less than or equal to 5 HP pump and motor. This portion IS dependent on the total horsepower for the pump. The total cost of any pump will include this variable cost plus the fixed cost portion. The completed pump and moto	Horsepower	$399.47	1	$399.47
Pump, ≤ 5 HP, pump and motor, fixed cost portion	1009	Fixed cost portion of a pump less than or equal to 5 HP pump and motor. This portion is a base cost and is not dependant on horsepower. The total cost of any pump will include this fixed cost plus a variable cost portion. The completed pump and motor will	Each	$530.75	1	$530.75

Practice: 533 - Pumping Plant

Scenario: #2 - Electric-Powered Pump ≤ 3 HP with Pressure Tank

Scenario Description:

A 1 Hp submersible electric-powered pump is installed in a well or structure; or a close-coupled 1 Hp electric-powered centrifugal pump is mounted on a platform. It is used for watering livestock as part of a prescribed grazing system; or for pressurizing a small irrigation system. Resource Concerns: Livestock Production Limitation - Inadequate livestock water; Insufficient water - Inefficient use of irrigation water. Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management; 516 - Livestock Pipeline.

Before Situation:

Livestock: The present gravity flow system is inadequate to provide the proper flow rate for a prescribed grazing system.
Irrigation: Available water is at an insufficient pressure to allow for even distribution of water.

After Situation:

Livestock: Water is transferred at a sufficient rate and pressure to meet the requirements of a prescribed grazing system.
Irrigation: A properly designed pump is installed to improve irrigation efficiency and reduce energy usage.

Scenario Feature Measure: Pump Power Requirement

Scenario Unit: Horsepower

Scenario Typical Size: 1

Scenario Cost: $1,803.85 **Scenario Cost/Unit:** $1,803.85

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	0.25	$40.23
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	6	$138.48
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	6	$247.38
Materials						
Pressure Tank, 40 gallon	1038	Pressure Tank, 40 gallon. Includes materials and shipping only.	Each	$447.54	1	$447.54
Pump, ≤ 5 HP, pump and motor, variable cost portion	1010	Variable cost portion of a pump less than or equal to 5 HP pump and motor. This portion IS dependent on the total horsepower for the pump. The total cost of any pump will include this variable cost plus the fixed cost portion. The completed pump and moto	Horsepower	$399.47	1	$399.47
Pump, ≤ 5 HP, pump and motor, fixed cost portion	1009	Fixed cost portion of a pump less than or equal to 5 HP pump and motor. This portion is a base cost and is not dependant on horsepower. The total cost of any pump will include this fixed cost plus a variable cost portion. The completed pump and motor will	Each	$530.75	1	$530.75

Practice: 533 - Pumping Plant

Scenario: #3 - Electric-Powered Pump >3 to 10 HP

Scenario Description:

A submersible electric-powered pump is installed in a well or structure; or a close-coupled electric-powered centrifugal pump is mounted on a platform that is >3 to 10 Hp. Typical scenario is for a 7.5 Hp pump
Resource Concerns: Livestock Production Limitation - Inadequate livestock water; Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water.
Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management; 516 - Livestock Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; and 614 - Watering Facility.

Before Situation:

Livestock: Current system consists of a series of medium pressure and inefficient pump stations to transport water to a distant and higher-elevation watering facility. Irrigation: An existing irrigation system employs an inefficient, improperly sized pump, that prevents efficient water application resulting in water loss and high energy use. Waste Transfer: Various types of semi-solid or liquid waste are uncollected causing surface and ground water issues. Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

After Situation:

Livestock: A single, efficient, high-pressure pumping plant is installed, eliminating intermediate pump stations, reducing energy use and enabling better system management. Irrigation: A properly designed and efficient pumping plant is installed, reducing energy use and improving irrigation efficiency. Waste Transfer: Collected wastes are now efficiently transferred to an appropriate treatment or storage facility.

Scenario Feature Measure: Pump Power Requirement

Scenario Unit: Horsepower

Scenario Typical Size: 8

Scenario Cost: $3,402.67 **Scenario Cost/Unit:** $425.33

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	0.5	$80.45
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	8	$329.84
Materials						
Pump, > 5 HP to 30 HP, pump and motor, variable cost portion	1012	Variable cost portion of a pump between 5 and 30 HP, including the pump and motor. This portion is dependent on the total horsepower for the pump. The total cost will include this variable cost plus a fixed cost portion. Includes material and shipping	Horsepower	$120.97	7.5	$907.28
Pump, > 5 HP to 30 HP, pump and motor, fixed cost portion	1011	Fixed cost portion of a pump between 5 and 30 HP, including the pump and motor. This portion is a base cost for the pump and is not dependant on horsepower. The total cost will include this fixed cost plus a variable cost portion. Includes material and	Each	$1,900.46	1	$1,900.46

Practice: 533 - Pumping Plant

Scenario: #4 - Electric-Powered Pump >10 to 40 HP

Scenario Description:

A submersible electric-powered pump is installed in a well or structure; or a close-coupled electric-powered centrifugal pump is mounted on a platform that is >10 to 40 Hp. Typical scenario is a close-coupled, 3-phase, 25 Hp electric-powered centrifugal pump mounted on a platform for pressurizing a medium-sized (600 gpm and 50 psi) sprinkler or large microirrigation (850 gpm and 35 psi) system or a large-sized surface irrigaiton system (1,200 gpm) or a large-sized (1,200 gpm and 25 psi) waste transfer system.
Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water.
Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management; 313 - Waste Storage Facility; 634 - Waste Transfer; and 614 - Watering Facility.

Before Situation:

Irrigation: An existing irrigation system employs an inefficient, improperly sized pump that prevents efficient water application resulting in water loss and high energy use. Waste Transfer: Various types of semi-solid or liquid waste are uncollected causing surface and ground water issues. Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

After Situation:

Irrigation: A properly designed and efficient pumping plant is installed, reducing energy use and improving irrigation efficiency.
Waste Transfer: Collected wastes are now efficiently transferred to an appropriate treatment or storage facility or to a distribution system.

Scenario Feature Measure: Pump Power Requirement

Scenario Unit: Horsepower

Scenario Typical Size: 25

Scenario Cost: $10,416.11 **Scenario Cost/Unit:** $416.64

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	8	$449.68
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	2	$321.80
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	8	$300.16
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	8	$305.12
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	56	$2,308.88
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	56	$1,292.48
Materials						
Pump, > 5 HP to 30 HP, pump and motor, variable cost portion	1012	Variable cost portion of a pump between 5 and 30 HP, including the pump and motor. This portion is dependent on the total horsepower for the pump. The total cost will include this variable cost plus a fixed cost portion. Includes material and shipping	Horsepower	$120.97	25	$3,024.25

Materials

Pump, > 5 HP to 30 HP, pump and motor, fixed cost portion	1011	Fixed cost portion of a pump between 5 and 30 HP, including the pump and motor. This portion is a base cost for the pump and is not dependant on horsepower. The total cost will include this fixed cost plus a variable cost portion. Includes material and	Each	$1,900.46	1	$1,900.46

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 533 - Pumping Plant

Scenario: #5 - Electric-Powered Pump >40 HP, Centrifugal

Scenario Description:

A submersible electric-powered pump is installed in a well or structure; or a close-coupled electric-powered centrifugal pump is mounted on a platform that is >40 Hp.Typical scenario is a close-coupled, 3-phase, 50 Hp electric-powered centrifugal pump mounted on a platform for pressurizing a large-sized (1,200 gpm and 50 psi) sprinkler or very large microirrigation (1,700 gpm and 35 psi) system or a very large-sized surface irrigation system (2,800 gpm) or a very large-sized (2,400 gpm and 25 psi) waste transfer system.
Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water.
Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 449 - Irrigation Water Management; 313 - Waste Storage Facility; and 634 - Waste Transfer.

Before Situation:

Irrigation: An existing irrigation system employs an inefficient, improperly sized pump that prevents efficient water application resulting in water loss and high energy use.

After Situation:

Irrigation: A properly designed and efficient pumping plant is installed, reducing energy use and improving irrigation efficiency.

Scenario Feature Measure: Pump Power Requirement

Scenario Unit: Horsepower

Scenario Typical Size: 50

Scenario Cost: $13,440.36 **Scenario Cost/Unit:** $268.81

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	2	$321.80
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	8	$449.68
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	56	$1,292.48
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	8	$300.16
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	56	$2,308.88
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	8	$305.12
Materials						
Pump, > 5 HP to 30 HP, pump and motor, variable cost portion	1012	Variable cost portion of a pump between 5 and 30 HP, including the pump and motor. This portion is dependent on the total horsepower for the pump. The total cost will include this variable cost plus a fixed cost portion. Includes material and shipping	Horsepower	$120.97	50	$6,048.50
Pump, > 5 HP to 30 HP, pump and motor, fixed cost portion	1011	Fixed cost portion of a pump between 5 and 30 HP, including the pump and motor. This portion is a base cost for the pump and is not dependant on horsepower. The total cost will include this fixed cost plus a variable cost portion. Includes material and	Each	$1,900.46	1	$1,900.46
Mobilization						

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 533 - Pumping Plant

Scenario: #6 - Variable Frequency Drive only (no pump) <=15Hp

Scenario Description:

This is an installation of a Varible Frequency Drive (VFD) . The VFD consists of electrical and electronic components designed to vary the frequency of the voltage to an electric motor and thus the ability to vary the speed of the motor. This directly affects pressure and flowrate. This also could give the operator the flexibility to operate several systems separately or at the same time.
Resource concerns: Insufficient water - Inefficient use of irrigation water; Inefficient energy use - Equipment and facilities and Farming/ranching practices and field operations.
Associated Practices: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management; 516 - Livestock Pipeline; and 614 - Watering Facility.

Before Situation:

Standard electrical connection from electrical utility to pump motor. No capability to match pump output pressure and/or flowrate to field(s) need(s). Result is over/under pressure(s) and/or flow rate(s), possible hydraulic anomalies, energy loss, and or inefficient water application in the irrigation system.

After Situation:

VFD Modifications are implemented at the pump site to allow for varying the speed of a 15 Hp electric motor to match the pressure and flow requirements for a center pivot irrigation system.

Scenario Feature Measure: VFD controller

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $3,849.51 **Scenario Cost/Unit:** $3,849.51

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	2	$321.80
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	4	$152.56
Materials						
Variable Speed Drive, 50 HP	1288	Variable speed drive for 50 Horsepower electric motor. Does not include motor. Materials only.	Horsepower	$225.01	15	$3,375.15

Practice: 533 - Pumping Plant

Scenario: #7 - Variable Frequency Drive only (no pump) >15 Hp

Scenario Description:

This is an installation of a Varible Frequency Drive (VFD) . The VFD consists of electrical and electronic components designed to vary the frequency of the voltage to an electric motor and thus the ability to vary the speed of the motor. This directly affects pressure and flowrate. This also could give the operator the flexibility to operate several systems separately or at the same time.
Resource concerns: Insufficient water - Inefficient use of irrigation water; Inefficient energy use - Equipment and facilities and Farming/ranching practices and field operations.
Associated Practices: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management; 516 - Livestock Pipeline; and 614 - Watering Facility.

Before Situation:

Standard electrical connection from electrical utility to pump motor. No capability to match pump output pressure and/or flowrate to field(s) need(s). Result is over/under pressure(s) and/or flow rate(s), possible hydraulic anomalies, energy loss, and or inefficient water application in the irrigation system.

After Situation:

VFD Modifications are implemented at the pump site to allow for varying the speed of a 50 Hp electric motor to match the pressure and flow requirements for a center pivot irrigation system.

Scenario Feature Measure: Pump Power Requirement

Scenario Unit: Horsepower

Scenario Typical Size: 50

Scenario Cost: $11,724.86 **Scenario Cost/Unit:** $234.50

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	2	$321.80
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	4	$152.56
Materials						
Variable Speed Drive, 50 HP	1288	Variable speed drive for 50 Horsepower electric motor. Does not include motor. Materials only.	Horsepower	$225.01	50	$11,250.50

Practice: 533 - Pumping Plant

Scenario: #8 - Internal Combustion-Powered Pump ≤ 7½ HP

Scenario Description:

The typical scenario supports replacement of a pump in an existing irrigation system on cropland with a 5 HP pump. Size of pump is determined by required GPM and pressure derived from a design for specific irrigation system on cropland. Scenario could also be used for a 5 HP pump for silage leachate, barnyard runoff, and milk house waste (as part of a waste transfer system) at farm headquarters. The combination of higher solids content and volume require a larger horse power pump. This liquid manure pump is used to transfer semi-solid manure from a small reception pit located either below a barnyard or at the end of a free-stall barn or scrape alley.
Resource Concerns: Livestock Production Limitation - Inadequate livestock water; Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water.
Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 449 - Irrigation Water Management; 516 - Livestock Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; and 614 - Watering Facility.

Before Situation:

Irrigation: Either an existing irrigation system employs an inefficient, improperly-sized pump that leads to inefficient water delivery resulting in high energy costs,
or
Waste Transfer: various types of semi-solid or liquid waste at the headquarters is uncollected causing surface and ground water issues.

After Situation:

Irrigation Setting: For irrigation system, a properly designed pump is installed, reducing water and energy usage.
Waste Transfer Setting: For semi-solid or liquid waste, wastes that have been collected through a waste transfer system are now efficiently transferred to appropriate treatment or storage facilities or crop application. Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

Scenario Feature Measure: Pump Power Requirement

Scenario Unit: Horsepower

Scenario Typical Size: 5

Scenario Cost: $3,342.39 **Scenario Cost/Unit:** $668.48

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	0.25	$40.23
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	4	$92.32
Materials						
Pump, < 50 HP, Pump & ICE power unit	1027	Materials, labor, controls: < 50 HP Pump & ICE power unit	Horsepower	$594.06	5	$2,970.30

Practice: 533 - Pumping Plant

Scenario: #9 - Internal Combustion-Powered Pump > 7½ to 75 HP

Scenario Description:

The typical scenario supports installation of a pump in an existing irrigation system or installation of a new pump on cropland with a 60 BHP pump. Size of pump is determined by required GPM and pressure derived from a design for specific irrigation system on cropland. The combination of higher solids content and volume require a larger horse power pump. This liquid manure pump is used to transfer semi-solid manure from a small reception pit located either below a barnyard or at the end of a free-stall barn or scrape alley.
Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water.
Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management; 313 - Waste Storage Facility; 634 - Waste Transfer; 436 - Irrigation Reservoir; and 447 - Irrigation System, Tailwater Recovery; and 614 - Watering Facility.

Before Situation:

Irrigation: Either an existing irrigation system employs an inefficient, improperly-sized pump that leads to inefficient water delivery resulting in high energy costs,
or
Waste Transfer: various types of semi-solid or liquid waste at the headquarters is uncollected causing surface and ground water issues.

After Situation:

Irrigation Setting: For irrigation system, a properly designed pump is installed, reducing water and energy usage.
Waste Transfer Setting: For semi-solid or liquid waste, wastes that have been collected through a waste transfer system are now efficiently transferred to appropriate treatment or storage facilities or crop application. Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

Scenario Feature Measure: Pump Power Requirement

Scenario Unit: Horsepower

Scenario Typical Size: 45

Scenario Cost: $30,009.32 **Scenario Cost/Unit:** $666.87

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	8	$449.68
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	1	$160.90
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	4	$149.24
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	8	$300.16
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	32	$738.56
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	8	$305.12
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	16	$659.68
Materials						
Pump, < 50 HP, Pump & ICE power unit	1027	Materials, labor, controls: < 50 HP Pump & ICE power unit	Horsepower	$594.06	45	$26,732.70
Mobilization						

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 533 - Pumping Plant

Scenario: #10 - Internal Combustion-Powered Pump > 75 HP

Scenario Description:

The typical scenario supports replacement of a pump in an existing irrigation system or installation of a new pump on cropland that is 75 break HP pump or larger. Size of pump is determined by required GPM and pressure derived from a design for specific irrigation system on cropland. Scenario could also be used for a pump for silage leachate, barnyard runoff, and milk house waste (as part of a waste transfer system) at farm headquarters.

Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water.

Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management; 313 - Waste Storage Facility; 634 - Waste Transfer; and 614 - Watering Facility.

Before Situation:

Irrigation: Either an existing irrigation system employs an inefficient, improperly-sized pump that leads to inefficient water delivery resulting in high energy costs,

or

Waste Transfer: various types of semi-solid or liquid waste at the headquarters is uncollected causing surface and ground water issues.

After Situation:

Irrigation Setting: For irrigation system, a properly designed pump is installed, reducing water and energy usage.

Waste Transfer Setting: For semi-solid or liquid waste, wastes that have been collected through a waste transfer system are now efficiently transferred to appropriate treatment or storage facilities or crop application. Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

Scenario Feature Measure: Pump Power Requirement

Scenario Unit: Horsepower

Scenario Typical Size: 100

Scenario Cost: $40,358.26 **Scenario Cost/Unit:** $403.58

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	2	$321.80
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	6	$223.86
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	8	$449.68
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	8	$305.12
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	8	$300.16
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	24	$989.52
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	48	$1,107.84
Materials						
Pump, > 70 HP, Pump & ICE power unit	1029	Materials, labor, controls: > 70 HP Pump & ICE power unit	Horsepower	$361.47	100	$36,147.00
Mobilization						

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 533 - Pumping Plant

Scenario: #11 - Windmill-Powered Pump

Scenario Description:

A windmill is installed in order to supply a reliable water source for livestock and/or wildlife. The windmill includes the tower, concrete footings, wheel blade unit, sucker rod, down pipe, gear box, pump, plumbing, and well head protection concrete pad. The typical scenario will be a windmill system with a 10 ft diameter mill and 27-foot tower which is pumping from a 150-foot well. As a result of installing this windmill, resource concerns of inadequate stock water, plant establishment, growth, productivity, health, and vigor, and water quantity can be addressed.
Resource Concerns: Insufficient stockwater.

Before Situation:

In a rangeland or pasture setting, a reliable source of water for livestock is not available, or the spacing between water sources is such that grazing distribution and plant health are adversely impacted.

After Situation:

A windmill, with a wheel ranging from 6' to 16' in diameter, will be installed over a well that is located to provide a reliable source of livestock water at the rate of at least 2 gpm, to facilitate proper grazing distribution and improved plant health. To increase reliability, water is pumped into a storage tank to provide a given number of days of supply. Installation includes the footings, wellhead protection concrete pad, tower, gear box, sail, sucker rod, down hole accessories, and a short outlet pipe to a storage tank.

Scenario Feature Measure: Diameter of Mill Wheel

Scenario Unit: Foot

Scenario Typical Size: 10

Scenario Cost: $10,153.87 **Scenario Cost/Unit:** $1,015.39

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	2	$321.80
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	4	$149.24
Aerial lift, telescoping bucket	1893	Aerial lift, bucket truck or cherry picker, typical 40' boom. Equipment only.	Hour	$46.63	8	$373.04
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	32	$738.56
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	16	$659.68
Materials						
Windmill, 10', fan diameter	1036	Includes materials costs for windmill head and 27’ tower	Each	$7,398.27	1	$7,398.27
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 533 - Pumping Plant

Scenario: #12 - Solar, <1 Hp

Scenario Description:

The typical scenario assumes installation of a submersible solar-powered pump that is less than 1 Hp in a well or a live stream. The installation includes the pump, wiring, drop pipe, solar panels, mounts, inverter, and all appurtenances. Note: It is generally not advisable to use a storage battery for a number of reasons. A storage tank is generally the most efficient method to store energy. Grazing - Livestock exclusion from surface water will result in improved surface water quality and reduced erosion. Irrigation - energy consumption will be reduced and the increased pressure and flow rates will improve irrigation efficiency.
Resource Concerns: Insufficient stockwater.
Associated Practices include: 374 - Farmstead Energy Improvement; 382 - Fence; 430 - Irrigation Pipeline; 436 - Irrigation Reservoir; 516 - Livestock Pipeline; 561 - Heavy Use Area Protection; and, 614 - Watering Facility.

Before Situation:

Livestock: Inadequate supply or location of water for a prescribed grazing system. Eroded stream banks and degraded water quality due to livestock access to stream. Cattle are not well-distributed because of remote water location. Irrigation: Pressure and flow rate is insufficient for uniform irrigation.

After Situation:

The typical scenario assumes installation of a three 230-watt photovoltaic (PV) panel, capable of operating a 3/4 Hp (0.75 Hp) solar-powered submersible pump in a well or other water source (Notes: 1) A PV panel is rated under standard and ideal conditions which will most likely not be replicated in the field; 2) 1 Hp is defined as 746 watts; 3) It is reasonable to expect a 3/4 Hp solar-powered submersible pump to deliver about 4 gpm and develop a pressure at the pump outlet of about 60 psi.). The installation includes the pump, wiring, pipeline in the well, solar panels, frame mounts, inverter, and all appurtenances. Water will be pumped to an existing storage tank at a higher elevation from which it will be used to pressurize the Livestock Pipeline (516) or Irrigation Pipeline (430). Grazing - Livestock exclusion from surface water will result in improved surface water quality and reduced erosion. Grazing has potential to be well distributed. Irrigation: Improved pressure and flow rate will improve irrigation efficiency.

Scenario Feature Measure: Number of Pump(s)

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $7,079.76 **Scenario Cost/Unit:** $7,079.76

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Solar Panels, fixed cost portion	1031	Fixed cost portion of the Solar Panels. This portion is a base cost for all Solar Panels and is not dependant on KiloWatt. The total cost of any Solar Panels will include this fixed cost plus a variable cost portion. The completed Solar Panels will incl	Each	$432.48	1	$432.48
Solar Panels, variable cost portion	1135	Variable cost portion of the Solar Panels. This portion IS dependent on the total Kilowatt for the Solar Panels. The total cost of any Solar Panels will include this variable cost plus the fixed cost portion. The completed Solar Panels will include all ma	Kilowatt	$7,755.90	0.75	$5,816.93
Pump, ≤ 5 HP, pump and motor, variable cost portion	1010	Variable cost portion of a pump less than or equal to 5 HP pump and motor. This portion IS dependent on the total horsepower for the pump. The total cost of any pump will include this variable cost plus the fixed cost portion. The completed pump and moto	Horsepower	$399.47	0.75	$299.60
Pump, ≤ 5 HP, pump and motor, fixed cost portion	1009	Fixed cost portion of a pump less than or equal to 5 HP pump and motor. This portion is a base cost and is not dependant on horsepower. The total cost of any pump will include this fixed cost plus a variable cost portion. The completed pump and motor will	Each	$530.75	1	$530.75

Practice: 533 - Pumping Plant

Scenario: #13 - Solar, 1-3 Hp

Scenario Description:

The typical scenario assumes installation of a submersible solar-powered pump in a deep well. The installation includes the pump, wiring, drop pipe, solar panels, mounts, inverter, and all appurtenances. Note: It is generally not advisable to use a storage battery for a number of reasons. A storage tank is generally the most efficient method to store energy. Grazing - Livestock exclusion from surface water will result in improved surface water quality and reduced erosion. Irrigation - energy consumption will be reduced and the increased pressure and flow rates will improve irrigation efficiency.
Resource Concerns: Insufficient stockwater.
Associated Practices include: 374 - Farmstead Energy Improvement; 382 - Fence; 430 - Irrigation Pipeline; 436 - Irrigation Reservoir; 516 - Livestock Pipeline; 561 - Heavy Use Area Protection; and, 614 - Watering Facility.

Before Situation:

Livestock: Inadequate supply or location of water for a prescribed grazing system. Eroded stream banks and degraded water quality due to livestock access to stream. Cattle are not well-distributed because of remote water location. Irrigation: Pressure and flow rate is insufficient for uniform irrigation.

After Situation:

The typical scenario assumes installation of 6 250-watt photovoltaic (PV) panels, capable of operating a 2 Hp solar-powered submersible pump in a well Notes: 1) A PV panel is rated under standard and ideal conditions which will most likely not be replicated in the field; 2) 1 Hp is defined as 746 watts; 3) It is reasonable to expect a 1 Hp solar-powered submersible pump to deliver about 2.0 gpm at 750 ft of head (325 psi), combined lift and delivery pressure at well head. The installation includes the pump, wiring, pipeline in the well, solar panels, frame mounts, inverter, and all appurtenances. Water will be pumped to an existing storage tank at a higher elevation from which it will be used to pressurize the Livestock Pipeline (516) or Irrigation Pipeline (430). Grazing - Livestock exclusion from surface water will result in improved surface water quality and reduced erosion. Grazing has potential to be well distributed. Irrigation: Improved pressure and flow rate will improve irrigation efficiency. Irrigation expected to be for windbreak/shelterbelt plantings.

Scenario Feature Measure: Pump Power Requirement

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $13,396.02 **Scenario Cost/Unit:** $13,396.02

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Pump, ≤ 5 HP, pump and motor, variable cost portion	1010	Variable cost portion of a pump less than or equal to 5 HP pump and motor. This portion IS dependent on the total horsepower for the pump. The total cost of any pump will include this variable cost plus the fixed cost portion. The completed pump and moto	Horsepower	$399.47	2	$798.94
Solar Panels, fixed cost portion	1031	Fixed cost portion of the Solar Panels. This portion is a base cost for all Solar Panels and is not dependant on KiloWatt. The total cost of any Solar Panels will include this fixed cost plus a variable cost portion. The completed Solar Panels will incl	Each	$432.48	1	$432.48
Solar Panels, variable cost portion	1135	Variable cost portion of the Solar Panels. This portion IS dependent on the total Kilowatt for the Solar Panels. The total cost of any Solar Panels will include this variable cost plus the fixed cost portion. The completed Solar Panels will include all ma	Kilowatt	$7,755.90	1.5	$11,633.85
Pump, ≤ 5 HP, pump and motor, fixed cost portion	1009	Fixed cost portion of a pump less than or equal to 5 HP pump and motor. This portion is a base cost and is not dependant on horsepower. The total cost of any pump will include this fixed cost plus a variable cost portion. The completed pump and motor will	Each	$530.75	1	$530.75

Practice: 533 - Pumping Plant

Scenario: #14 - Solar, >3 Hp

Scenario Description:

The typical scenario assumes installation of a submersible solar-powered pump in a deep well or conveying water to high elevations. The installation includes the pump, wiring, drop pipe, solar panels, mounts, inverter, and all appurtenances. Note: It is generally not advisable to use a storage battery for a number of reasons. A storage tank is generally the most efficient method to store energy. Grazing - Livestock exclusion from surface water will result in improved surface water quality and reduced erosion. Irrigation - energy consumption will be reduced and the increased pressure and flow rates will improve irrigation efficiency.
Resource Concerns: Insufficient stockwater.
Associated Practices include: 374 - Farmstead Energy Improvement; 382 - Fence; 430 - Irrigation Pipeline; 436 - Irrigation Reservoir; 516 - Livestock Pipeline; 561 - Heavy Use Area Protection; and, 614 - Watering Facility.

Before Situation:

Livestock: Inadequate supply or location of water for a prescribed grazing system. Eroded stream banks and degraded water quality due to livestock access to stream. Cattle are not well-distributed because of remote water location. Irrigation: Pressure and flow rate is insufficient for uniform irrigation.

After Situation:

The typical scenario assumes installation of 10 250-watt photovoltaic (PV) panels, capable of operating a 3.5 Hp solar-powered submersible pump in a well Notes: 1) A PV panel is rated under standard and ideal conditions which will most likely not be replicated in the field; 2) 1 Hp is defined as 746 watts; 3) It is reasonable to expect a 1 Hp solar-powered submersible pump to deliver about 2.0 gpm at 750 ft of head (325 psi), combined lift and delivery pressure at well head. The installation includes the pump, wiring, pipeline in the well, solar panels, frame mounts, inverter, and all appurtenances. Water will be pumped to an existing storage tank at a higher elevation from which it will be used to pressurize the Livestock Pipeline (516) or Irrigation Pipeline (430). Grazing - Livestock exclusion from surface water will result in improved surface water quality and reduced erosion. Grazing has potential to be well distributed. Irrigation: Improved pressure and flow rate will improve irrigation efficiency. Irrigation expected to be for windbreak/shelterbelt plantings.

Scenario Feature Measure: Number of pumps

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $21,751.13 **Scenario Cost/Unit:** $21,751.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Solar Panels, fixed cost portion	1031	Fixed cost portion of the Solar Panels. This portion is a base cost for all Solar Panels and is not dependant on KiloWatt. The total cost of any Solar Panels will include this fixed cost plus a variable cost portion. The completed Solar Panels will incl	Each	$432.48	1	$432.48
Solar Panels, variable cost portion	1135	Variable cost portion of the Solar Panels. This portion IS dependent on the total Kilowatt for the Solar Panels. The total cost of any Solar Panels will include this variable cost plus the fixed cost portion. The completed Solar Panels will include all ma	Kilowatt	$7,755.90	2.5	$19,389.75
Pump, ≤ 5 HP, pump and motor, fixed cost portion	1009	Fixed cost portion of a pump less than or equal to 5 HP pump and motor. This portion is a base cost and is not dependant on horsepower. The total cost of any pump will include this fixed cost plus a variable cost portion. The completed pump and motor will	Each	$530.75	1	$530.75
Pump, ≤ 5 HP, pump and motor, variable cost portion	1010	Variable cost portion of a pump less than or equal to 5 HP pump and motor. This portion IS dependent on the total horsepower for the pump. The total cost of any pump will include this variable cost plus the fixed cost portion. The completed pump and moto	Horsepower	$399.47	3.5	$1,398.15

Practice: 533 - Pumping Plant

Scenario: #15 - Water Ram Pump

Scenario Description:

A water ram is used to transfer water from a live stream to a Watering Facility (614) or small Irrigation Reservoir (436) utilizing the energy of moving water to transfer a portion of that water to a higher elevation. It is anchored to a small concrete pad. Bypass water (which could easily be 90% of the water diverted from the stream) is returned to the stream or transferred in a pipe, to a lower elevation tank (614 or 436), without erosion or impairment to water quality. In the livestock scenario, the objective is to provide water to the cattle outside of a live stream or other natural water source thereby eliminating a significant erosion situation while also improving water quality. The cattle thus have access to drinking water without having to enter the stream. The water ram may need to be fenced for protection from curious bovines. While it is generally not considered practical for irrigation, in the irrigation scenario, water can be retrieved from a stream and stored in a small 436 to provide water for a very small (0.1 acre) irrigation system.
Resource Concerns: Insufficient stockwater.
Associated Practices: 374 - Farmstead Energy Improvement; 382 - Fence; 430 - Irrigation Pipeline; 436 - Irrigation Reservoir; 516 - Livestock Pipeline; 561 - Heavy Use Area Protection; and, 614 - Watering Facility.

Before Situation:

Water in a nearby stream is not available at the desired location, pressure and/or flow rate.

After Situation:

A 2" diameter inlet pipe is installed and connected to a water ram pump with all appurtenances and anchored to a concrete pad (9 ft x 4 ft x 5 in) or other appropriate secure base. Depending upon the application, either a 1-inch diameter Livestock Pipeline (516) or an Irrigation Pipeline (430) is installed from the water ram to a 5,000 gallon storage facility. Improved water quantity or quality, grazing management, plant diversity, animal health, and/or irrigation purposes as outlined in the appropriate NRCS irrigation system standard. A 2" water ram, with 10 gpm of inlet flow and 10 feet of drop, can supply about 1.0 gpm to a location about 50 feet higher than the water ram.

Scenario Feature Measure: Nominal Diameter of Inlet Pipe

Scenario Unit: Inches

Scenario Typical Size: 2

Scenario Cost: $2,257.57 **Scenario Cost/Unit:** $1,128.79

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	0.5	$80.45
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	16	$596.96
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	16	$659.68
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	16	$369.28
Materials						
Pump, Ram	1114	Ram pump kit, 2 inch. Includes materials and shipping only.	Each	$551.20	1	$551.20

Practice: 533 - Pumping Plant

Scenario: #16 - Livestock Nose Pump

Scenario Description:

A Nose Pump is a diaphragm pump located in a pasture for the purpose of providing water to cattle. For a permanent installation, it is typical to also install Heavy Use Area Protection (561) (separate contract item) where the cattle congregate around the pump. It is powered and operated by cattle to transfer water from a stream to a drinking bowl. The objective is to provide water to the cattle outside of a live stream or other natural water source thereby eliminating a significant erosion situation and while also improving water quality. The cattle thus have access to drinking water without having to enter the stream. Generally one nose pump is adequate for 20 cattle.
Resource Concerns: Insufficient stockwater; Inefficient energy use - Equipment and facilities.
Associated Practices include: 374 - Farmstead Energy Improvement; 382 - Fence; 516 - Livestock Pipeline; 561 - Heavy Use Area Protection; and, 614 - Watering Facility.

Before Situation:

Livestock have open access to a live stream or other existing natural water supply. Water supply is contaminated due to animal activity and stream banks are eroded on a daily basis. Improper cattle distribution results in poor water quality, poor grazing distribution, over grazing, and soil erosion.

After Situation:

One nose pump is installed with all appurtenances anchored to concrete pad with 6"x6"x10 Gauge reinforcement wire (9 ft x 4 ft x 5 in) or other appropriate secure base to supply water to cattle for improved livestock herd management. Additional Heavy Use Area Protection (561) in the form of crushed rock and at least 5 feet wide, may be installed (separate contract item) surrounding the concrete pad.
Improved: water quality, soil quality, grazing management, plant diversity, and animal health.

Scenario Feature Measure: Number of Pumps

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $361.13 **Scenario Cost/Unit:** $361.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Nose Pump	1052	Materials and delivery.	Each	$361.13	1	$361.13

Practice: 533 - Pumping Plant

Scenario: #17 - Vertical Turbine Pump and drive, <100 Hp

Scenario Description:

The typical scenario supports replacement of a pump in an existing irrigation system or installation of a new pump on cropland that is equal to 100 HP pump or less. This scenairo is intended for use in a deep well system. For standard wells, other scenarios should be used Size of pump is determined by required GPM and pressure derived from a design for specific irrigation system on cropland.
Resource Concerns: Insufficient water - Inefficient use of irrigation water.
Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management;

Before Situation:

Irrigation: Either an existing irrigation system employs an inefficient, improperly-sized pump that leads to inefficient water delivery resulting in high energy costs,

After Situation:

Irrigation Setting: For irrigation system, a properly designed pump is installed, reducing water and energy usage.

Scenario Feature Measure: Pump Power Requirement

Scenario Unit: Horsepower

Scenario Typical Size: 75

Scenario Cost: $38,041.59 **Scenario Cost/Unit:** $507.22

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	36	$2,023.56
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	16	$596.96
Pump, Turbine, Cast Iron, variable cost portion	2149	Variable cost portion of cast iron turbine pump with appurtenances. Includes pump, appurtenances, and labor to install.	Gallons per Minute	$4.17	800	$3,336.00
Portable Welder	1407	Portable field welder. Equipment only. Labor not included.	Hour	$20.21	36	$727.56
Crane, truck mounted, hydraulic, 12 ton	1734	12 ton capacity truck mounted hydraulic crane. Equipment cost only.	Hour	$90.70	36	$3,265.20
Pump, Turbine, Cast Iron, fixed cost portion	2148	Fixed cost portion of cast iron turbine pump with appurtenances. Includes pump, appurtenances, and labor to install.	Each	$8,567.99	1	$8,567.99
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	52	$1,983.28
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	36	$830.88
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	52	$1,161.16
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	36	$1,350.72
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	8	$329.84
Materials						
Pipe, smooth steel, weight priced	1325	Smooth Steel pipe priced by the weight of the pipe materials. Materials only.	Pound	$1.36	7854	$10,681.44

Materials

Swing Check Valve, metal, 8"	2080	8" swing check valve for back flow prevention, ductile iron metal body with flange mount and lever shaft. Materials only.	Each	$1,693.74	1	$1,693.74

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 533 - Pumping Plant

Scenario: #18 - Vertical Turbine Pump and drive, >100 Hp

Scenario Description:

The typical scenario supports replacement of a pump in an existing irrigation system or installation of a new pump on cropland that is equal to 100 HP pump or greater. This scenairo is intended for use in a deep well system. For standard wells, other scenarios should be used
Size of pump is determined by required GPM and pressure derived from a design for specific irrigation system on cropland.
Resource Concerns: Insufficient water - Inefficient use of irrigation water.
Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management;

Before Situation:

Irrigation: Either an existing irrigation system employs an inefficient, improperly-sized pump that leads to inefficient water delivery resulting in high energy costs,

After Situation:

Irrigation Setting: For irrigation system, a properly designed pump is installed, reducing water and energy usage.

Scenario Feature Measure: Pump Power Requirement

Scenario Unit: Horsepower

Scenario Typical Size: 200

Scenario Cost: $73,221.31 **Scenario Cost/Unit:** $366.11

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Crane, truck mounted, hydraulic, 12 ton	1734	12 ton capacity truck mounted hydraulic crane. Equipment cost only.	Hour	$90.70	48	$4,353.60
Portable Welder	1407	Portable field welder. Equipment only. Labor not included.	Hour	$20.21	48	$970.08
Pump, Turbine, Cast Iron, variable cost portion	2149	Variable cost portion of cast iron turbine pump with appurtenances. Includes pump, appurtenances, and labor to install.	Gallons per Minute	$4.17	1000	$4,170.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	56	$2,089.36
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	48	$2,698.08
Pump, Turbine, Cast Iron, fixed cost portion	2148	Fixed cost portion of cast iron turbine pump with appurtenances. Includes pump, appurtenances, and labor to install.	Each	$8,567.99	1	$8,567.99
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	104	$2,322.32
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	96	$3,601.92
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	48	$1,107.84
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	64	$2,440.96
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	8	$329.84
Materials						
Swing Check Valve, metal, 8"	2080	8" swing check valve for back flow prevention, ductile iron metal body with flange mount and lever shaft. Materials only.	Each	$1,693.74	1	$1,693.74

Materials

Pipe, smooth steel, weight priced	1325	Smooth Steel pipe priced by the weight of the pipe materials. Materials only.	Pound	$1.36	27487	$37,382.32

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 533 - Pumping Plant

Scenario: #19 - Piston, manure

Scenario Description:

A piston pump system used to transfer high solids content manure slurry through a pipeline and includes the pump, drive motor and associated equipment. In this system, the pump is 10 hp with a 12" discharge.
Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters;
Associated Practices include: 374 - Farmstead Energy Improvement; 313 - Waste Storage Facility; 634 - Waste Transfer; and 590 - Nutrient Management

Before Situation:

Waste Transfer: Various types of semi-solid or liquid waste are uncollected causing surface and ground water issues. Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

After Situation:

Waste Transfer: Collected wastes are now efficiently transferred to an appropriate treatment or storage facility or to a distribution system.

Scenario Feature Measure: Number

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $19,748.39 **Scenario Cost/Unit:** $19,748.39

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	2	$321.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	56	$1,292.48
Materials						
Pump, Manure, Hollow Piston	2158	Pump, Manure, Hollow Piston, Mechanically Actuated, 12" or greater discharge, 10 HP w/ accessories. Includes delivery.	Each	$18,134.11	1	$18,134.11

Practice: 533 - Pumping Plant

Scenario: #20 - Vertical manure pump, PTO

Scenario Description:

A PTO driven, vertical pump used to transfer liquid manure. In this system, the pump is driven by a 100 hp tractor (not included in cost) with a 6" discharge.
Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters;
Associated Practices include: 374 - Farmstead Energy Improvement; 313 - Waste Storage Facility; 634 - Waste Transfer; and 590 - Nutrient Management

Before Situation:

Waste Transfer: Various types of semi-solid or liquid waste are uncollected causing surface and ground water issues. Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

After Situation:

Waste Transfer: Collected wastes are now efficiently transferred to an appropriate treatment or storage facility or to a distribution system.

Scenario Feature Measure: Number

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $13,581.47 **Scenario Cost/Unit:** $13,581.47

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	15	$346.20
Materials						
Pump, Manure, PTO, Vertical Shaft	2159	Pump, Manure, PTO, Vertical Shaft, 6" discharge, HP 70 to 110 (540 RPM) or HP 125 to 140 (1000 RPM), with agitating nozzle and propeller. Includes delivery.	Each	$13,235.27	1	$13,235.27

Practice: 533 - Pumping Plant

Scenario: #21 - Chopper manure pump

Scenario Description:

A chopper pump used to transfer slurry/liquid manure. Typical system includes a pump and 10 hp motor.
Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters;
Associated Practices include: 374 - Farmstead Energy Improvement; 313 - Waste Storage Facility; 634 - Waste Transfer; and 590 - Nutrient Management

Before Situation:

Waste Transfer: Various types of semi-solid or liquid waste are uncollected causing surface and ground water issues. Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

After Situation:

Waste Transfer: Collected wastes are now efficiently transferred to an appropriate treatment or storage facility or to a distribution system.

Scenario Feature Measure: Number

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $2,057.45 **Scenario Cost/Unit:** $2,057.45

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	15	$346.20
Materials						
Pump, Chopper, Screw, >7 to 15 HP, includes pump & motor	1026	Materials, labor, controls: Chopper/ Screw >7 to 15 HP includes pump & motor	Horsepower	$1,711.25	1	$1,711.25

Practice: 533 - Pumping Plant

Scenario: #22 - Turbine, Pump Only

Scenario Description:

A submersible pumpin a well or structure is removed and replaced with a new pump that has the proper performance requirements, or the existing pump is rebowled to operate at the proper performance required to meet the demand. Typical scenario is a pump driven by a 50 Hp electric motor and is being replaced or rebuilt to meet new conservation performance requirements. This scenario covers the cost for the removal of the pump from the well and the installation of the rebuilt or new pump.

Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water.

Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 449 - Irrigation Water Management; 313 - Waste Storage Facility; and 634 - Waste Transfer.

Before Situation:

Irrigation: An existing irrigation system employs an inefficient, improperly sized pump that prevents efficient water application resulting in water loss and high energy use.

After Situation:

Irrigation: A properly designed and efficient pumping plant is installed, reducing energy use and improving irrigation efficiency. A typical flow for the rebuilt or new pump is 300 gpm.

Scenario Feature Measure: Pump Power Requirement

Scenario Unit: Horsepower

Scenario Typical Size: 50

Scenario Cost: $9,818.99 **Scenario Cost/Unit:** $196.38

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Pump, Turbine, Cast Iron, fixed cost portion	2148	Fixed cost portion of cast iron turbine pump with appurtenances. Includes pump, appurtenances, and labor to install.	Each	$8,567.99	1	$8,567.99
Pump, Turbine, Cast Iron, variable cost portion	2149	Variable cost portion of cast iron turbine pump with appurtenances. Includes pump, appurtenances, and labor to install.	Gallons per Minute	$4.17	300	$1,251.00

Practice: **548 - Grazing Land Mechanical Treatment**

Scenario: **#1 - Range Treatment, 5% slopes or less**

Scenario Description:

Using mechanical equipment or combinations of equipment that modifies a physical soil layer or plant conditions on rangeland with average slopes of 5% or less. Resource concerns addressed include: Plant productivity and health, soil compaction, and soil moisture managment.

Before Situation:

Desired Ecological plant community is limited by a plant or soil condition that physically restricts healthy plant growth.

After Situation:

Desired Ecological plant community has improved because the restriction limiting healthy plant growth has been reduced or eliminated. Prescribed Grazing (528) will follow the treatment.

Scenario Feature Measure: area of treatment

Scenario Unit: Acre

Scenario Typical Size: 250

Scenario Cost: $4,223.56 **Scenario Cost/Unit:** $16.89

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Grazingland Renovation, Chiseling	2027	Chiseling on existing grazingland including tillage implement, power unit and labor.	Acre	$15.41	250	$3,852.50
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	3	$114.42
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: **548 - Grazing Land Mechanical Treatment**

Scenario: **#3 - Pasture Treatment**

Scenario Description:

Aeration or other treatments will be used to break the restrictive layers that will increase water infiltration and break up sod and thatch on introduced forages. Depth of treatment will be 1" deeper than the restictive layer. Resource concerns addressed include: Plant productivity & health and soil compaction.

Before Situation:

Forage growth on pastureland is limited by compacted soils layers and /or dense sod with a thatch build up.

After Situation:

Forage growth is increased due to greater rooting depths and water infiltration. Prescribed Grazing (528) will follow the treatment.

Scenario Feature Measure: area of treatmnent

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $2,285.58 **Scenario Cost/Unit:** $76.19

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Site Preparation, Mechanical	944	Aerator, rolling drum chopper, etc. Includes equipment, power unit and labor costs.	Acre	$66.36	30	$1,990.80
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	1	$38.14
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 550 - Range Planting

Scenario: #1 - NonNative Species Drilled

Scenario Description:

Establishment of a mixture of non-native adapted perennial species on a rangeland unit to improve forage condition, improve wildlife habitat and/or reduce erosion. Seed mix of Predominantly non-native species is chosen based on range conditions and availability of seed. Preparing a seedbed may be required prior to seeding with a no-till drill or range drill.

Before Situation:

Poor or nonexistent stand of herbaceous species. Resource concerns may include undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Suitable non-native species are established to improve or maintain livestock nutrition, provide or increase forage supply, reduce soil erosion, improve soil and water quality, or improve wildlife habitat. The typical size of the practice is 80 acres.

Scenario Feature Measure: Acres of Range Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $10,728.19 **Scenario Cost/Unit:** $134.10

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	80	$1,623.20
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	160	$2,523.20
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	160	$1,692.80
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$17.21	27	$464.67
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Three Species Mix, Cool Season, Introduced Perennial Grass	2315	Cool season, introduced grass mix. Includes material and shipping only.	Acre	$46.58	80	$3,726.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 550 - Range Planting

Scenario: #2 - Native Species High Forb Drilled

Scenario Description:

Establishment of a mixture of predominatley native adapted perennial species on a rangeland unit to improve forage condition, improve wildlife habitat and/or reduce erosion. Seed mix of Predominantly Native species is chosen based on range conditions and availability of seed. Preparing a seedbed may be required prior to seeding with a no-till drill or range drill.

Before Situation:

Poor or nonexistent stand of herbaceous species. Resource concerns may include undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Suitable native species are established to improve or maintain livestock nutrition, provide or increase forage supply, reduce soil erosion, improve soil and water quality, or improve wildlife habitat. The typical size of the practice is 80 acres.

Scenario Feature Measure: Acres of Range Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $33,462.59 **Scenario Cost/Unit:** $418.28

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	160	$1,692.80
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	160	$2,523.20
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	80	$1,623.20
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$17.21	27	$464.67
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
One Species, Native Forb, Low Cost	2329	Native forb. Includes material and shipping only.	Acre	$186.18	80	$14,894.40
Three Species Mix, Cool Season, Native Perennial Grass	2316	Cool season, native grass mix. Includes material and shipping only.	Acre	$144.58	80	$11,566.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 550 - Range Planting

Scenario: #3 - Native Species Low Forb Drilled

Scenario Description:

Establishment of a mixture of predominatley native adapted perennial species on a rangeland unit to improve forage condition, improve wildlife habitat and/or reduce erosion. Seed mix of Predominantly Native species is chosen based on range conditions and availability of seed. Preparing a seedbed may be required prior to seeding with a no-till drill or range drill.

Before Situation:

Poor or nonexistent stand of herbaceous species. Resource concerns may include undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Suitable native species are established to improve or maintain livestock nutrition, provide or increase forage supply, reduce soil erosion, improve soil and water quality, or improve wildlife habitat. The typical size of the practice is 80 acres.

Scenario Feature Measure: Acres of Range Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $22,291.79 **Scenario Cost/Unit:** $278.65

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	160	$1,692.80
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	160	$2,523.20
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	80	$1,623.20
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$17.21	27	$464.67
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Three Species Mix, Cool Season, Native Perennial Grass	2316	Cool season, native grass mix. Includes material and shipping only.	Acre	$144.58	80	$11,566.40
One Species, Native Forb, Low Cost	2329	Native forb. Includes material and shipping only.	Acre	$186.18	20	$3,723.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 550 - Range Planting

Scenario: #4 - Non-Native Species Broadcast

Scenario Description:

Establishment of a mixture of non-native adapted perennial species on a rangeland unit to improve forage condition, improve wildlife habitat and/or reduce erosion. Seed mix of Predominantly non-native species is chosen based on range conditions and availability of seed. Preparing a seedbed may be required prior to broadcast seeding .Typical seeding rate is 18lbs PLS.Equipment used can be ground or aerial application.

Before Situation:

Poor or nonexistent stand of herbaceous species. Resource concerns may include undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Suitable non-native species are established to improve or maintain livestock nutrition, provide or increase forage supply, reduce soil erosion, improve soil and water quality, or improve wildlife habitat. The typical size of the practice is 80 acres.

Scenario Feature Measure: Acres of Range Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $13,554.59 **Scenario Cost/Unit:** $169.43

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	160	$1,692.80
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	160	$3,246.40
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$17.21	27	$464.67
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Three Species Mix, Cool Season, Introduced Perennial Grass	2315	Cool season, introduced grass mix. Includes material and shipping only.	Acre	$46.58	160	$7,452.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 550 - Range Planting

Scenario: #5 - Native Species Broadcast

Scenario Description:

Establishment of a mixture of predominatley native adapted perennial species on a rangeland unit to improve forage condition, improve wildlife habitat and/or reduce erosion. Seed mix of Predominantly Native species is chosen based on range conditions and availability of seed. Preparing a seedbed may be required prior to broadcast seeding .Typical seeding rate is 18lbs PLS.Equipment used can be ground or aerial application.

Before Situation:

Poor or nonexistent stand of herbaceous species. Resource concerns may include undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Suitable native species are established to improve or maintain livestock nutrition, provide or increase forage supply, reduce soil erosion, improve soil and water quality, or improve wildlife habitat. The typical size of the practice is 80 acres.

Scenario Feature Measure: Acres of Range Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $36,681.79 **Scenario Cost/Unit:** $458.52

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	160	$1,692.80
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	160	$3,246.40
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$17.21	27	$464.67
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Three Species Mix, Cool Season, Native Perennial Grass	2316	Cool season, native grass mix. Includes material and shipping only.	Acre	$144.58	160	$23,132.80
One Species, Native Forb, Low Cost	2329	Native forb. Includes material and shipping only.	Acre	$186.18	40	$7,447.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 550 - Range Planting

Scenario: #6 - Shrub Plugs

Scenario Description:

The field is seeded to shrub species such as Sage Brush, Bitter Brush or other species for re-establishment or enhancement of desirable vegetation. Plug plantings are typically 1000 per acre. This practice scenario is typically used to improve plant composition/structure and provide or increase wildlife forage, reduce soil erosion, or improve soil and water quality. This scenario can also be used for flowering plant pollinator seedings in all precipitation zones.

Before Situation:

Poor or nonexistent stand of herbaceous species. Resource concerns may include undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Suitable non-native species are established to improve or maintain livestock nutrition, provide or increase forage supply, reduce soil erosion, improve soil and water quality, or improve wildlife habitat. The typical size of the practice is 5 acres.

Scenario Feature Measure: Acres of Range Planting

Scenario Unit: Acre

Scenario Typical Size: 5

Scenario Cost: $10,037.87 **Scenario Cost/Unit:** $2,007.57

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$17.21	27	$464.67
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	40	$923.20
Materials						
Shrub, seedling or transplant, bare root, 36-60"	1508	Bare root shrubs 3 to 5 foot tall. Includes materials and shipping only.	Each	$1.73	5000	$8,650.00

Practice: 554 - Drainage Water Management

Scenario: #1 - Drainage Water Management (DWM)

Scenario Description:

This scenario is the process of managing water discharges from surface and/or subsurface agricultural drainage systems by reducing nutrient loading into surface waters. Typical systems consist of a 75 acre field with existing drainage tile lines and installed water control structures. The operator goes to the field in order to adjust water control structures (riser boards). While on site the date and adjustment information is recorded/logged. The number of yearly adjustments is based on 6 trips to a field 5 miles from headquarters. The field time to make and record each adjustment is 0.5 hours per structure (including travel time). The typical field will contain 5 water control structures; 3 structures control field water levels and 2 structures control a single denitrifying bioreactor.
Resource Concern: Water Quality - Excess Nutrients in surface and ground waters.
Associated Practices: 606-Subsurface Drain; 607-Surface Drain, Field Ditch; 608-Surface Drain, Main or Lateral; 587-Structure for Water Control; 590-Nutrient Management .

Before Situation:

Existing drainage systems are in place and water flows uncontrolled.

After Situation:

Existing drainage systems are managed to reduce flow of field drainage waters from the site and reduce nitrate loading by denitrification.

Scenario Feature Measure: Number of Control Structures

Scenario Unit: Each

Scenario Typical Size: 5

Scenario Cost: $586.68 **Scenario Cost/Unit:** $117.34

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$44.18	0.33	$14.58
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	15	$572.10

Practice: 557 - Row Arrangement

Scenario: #1 - Establishing Row Direction, Grade, & Length.

Scenario Description:

Row Arrangement establishes the direction, grade and length for crop rows by setting a baseline by ground survey, GPS, GIS, or other appropriate methods that will provide the planned results to provide drainage, erosion control. Used as part of drainage system, control runoff, reduces soil erosion. Crop rows will be on planned grades and lengths. Direction and length of rows will vary according to local situation. Planner will consider crop, exposure, aspect, flow of water, and use of additional practices. May be used on dryland areas to fully and effectively utilize rainfall. This scenario addresses the resource concern of Soil Erosion / irrigation induced soil erosion / sheet & rill.

Before Situation:

This practice applies to all crop land areas where there is a need for reducing soil erosion ,improving irrigation efficiency, improving drainage and improving production practices which improve energy efficiency and minimize the application of chemicals and nutrients overlapping (Parallel System) while improving the water quality to receiving water bodies. Row arrangement is applied as part of a surface drainage system for a field where the rows are planned to carry runoff to main or lateral drains; to facilitate optimum use of water in graded furrow irrigation systems; in dryland areas where it is necessary to control the grade of rows to more fully utilize available rainfall; on sloping land where control of the length, grade and direction of the rows can help reduce soil erosion, as a stand-alone practice or in conjunction with other conservation practices

After Situation:

Crop rows are established in direction, grade and length by setting a baseline by ground survey, GPS, GIS, or other appropriate methods on approximately 25 acres that will provide the planned results. To remove irregularities on land surface with special equipment, that may require a needed change of length, direction, or slope of crop rows and slope, the field will need to be smoothed or leveled to correct irregularities and address drainage or Irrigation Issues, then other Conservation Practices should be used to address these concerns by using Land Smoothing (466), Precision Land Leveling (462), Irrigation Land Leveling (464), Other associated practices that maybe used are Grassed Waterway (412), Sediment Basin (350), Terrace (600), Filter Strip (393), Irrigation Water Management (449), Grade Stabilization (410), Conservation Cover (327), and Cover Crop (340)

Scenario Feature Measure: Area to Set Row Direction, Grade, & Length

Scenario Unit: Acre

Scenario Typical Size: 25

Scenario Cost: $242.62 **Scenario Cost/Unit:** $9.70

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	2	$47.06
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	2	$44.66
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	2	$76.28

Practice: 558 - Roof Runoff Structure

Scenario: #1 - Roof Gutter, small

Scenario Description:

A roof runoff structure, consisting of 4"-6" gutter(s), downspout(s), and a 50' section of outlet line. Used to keep roof clean water runoff uncontaminated and provide a stable outlet to ground surface. Facilitates waste management and protects environment by minimizing clean water additions to waste systems and addresses water quality concerns. Outlet lines in excess of 50' should be contracted under Underground Outlet, 620.

Associated practices include Waste Storage Facility (313), Composting Facility (317), Heavy Use Area Protection (561), Watering Facility (614), Underground Outlet (620), Diversion (362), and any relevant irrigation practices.

Before Situation:

Roofs have no gutter. Roof runoff water enters areas where it mixes with contaminated materials and causes a resource concern. Applicable where: (1) a roof runoff management facility is included in an overall plan for an overall plan for a waste management system; (2) roof runoff needs to be diverted away from structures or contaminated areas; (3) there is a need to collect, control, and transport runoff from roofs to a stable outlet.

After Situation:

A gutter, downspout, and outlet system servicing the portion of the building roof that would otherwise drain into a waste management system or create erosion. The typical scenario is for a roof line of 200 ft serviced with 5" gutters, downspouts, and 50' of outlet line. Outlet line in excess of 50' is contracted using Underground Outlet, 620 as needed to allow for discharge of roof water in an acceptable, stable site.

Scenario Feature Measure: Linear Length of Roof to be Guttered

Scenario Unit: Linear Foot

Scenario Typical Size: 200

Scenario Cost: $1,917.24 **Scenario Cost/Unit:** $9.59

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	24	$553.92
Materials						
Pipe, HDPE, 4", PCPT, Single Wall	1270	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 4" diameter - ASTM F405. Material cost only.	Foot	$0.45	50	$22.50
Downspout, Aluminum, Small	1700	Aluminum downspout (3" to 5") in width with hangers. Materials only.	Foot	$3.28	120	$393.60
Gutter, Aluminum, Small	1689	Aluminum gutter (4" to 6") in width with hangers. Materials only.	Foot	$3.01	200	$602.00
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: **558 - Roof Runoff Structure**

Scenario: **#2 - Roof Gutter, medium**

Scenario Description:

A roof runoff structure, consisting of 7"-9" gutter(s), downspout(s), and a 50' section of outlet line. Used to keep roof clean water runoff uncontaminated and provide a stable outlet to ground surface. Facilitates waste management and protects environment by minimizing clean water additions to waste systems and addresses water quality concerns. Outlet lines in excess of 50' should be contracted under Underground Outlet, 620.

Associated practices include Waste Storage Facility (313), Composting Facility (317), Heavy Use Area Protection (561), Watering Facility (614), Underground Outlet (620), Diversion (362), and any relevant irrigation practices.

Before Situation:

Roofs have no gutter. Roof runoff water enters areas where it mixes with contaminated materials and causes a resource concern. Applicable where: (1) a roof runoff management facility is included in an overall plan for an overall plan for a waste management system; (2) roof runoff needs to be diverted away from structures or contaminated areas; (3) there is a need to collect, control, and transport runoff from roofs to a stable outlet.

After Situation:

A gutter, downspout, and outlet system servicing the portion of the building roof that would otherwise drain into a waste management system or create erosion. The typical scenario is for a roof line of 200 ft serviced with 8" gutters, downspouts, and 50' of outlet line. Outlet line in excess of 50' is contracted using Underground Outlet, 620 as needed to allow for discharge of roof water in an acceptable, stable site.

Scenario Feature Measure: Linear Length of Roof to be Guttered

Scenario Unit: Foot

Scenario Typical Size: 200

Scenario Cost: $3,056.54 **Scenario Cost/Unit:** $15.28

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	24	$553.92
Materials						
Downspout, Aluminum, Medium	1701	Aluminum downspout (6" to 8") in width with hangers. Materials only.	Foot	$30.89	10	$308.90
Pipe, HDPE, 4", PCPT, Single Wall	1270	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 4" diameter - ASTM F405. Material cost only.	Foot	$0.45	50	$22.50
Gutter, Aluminum, Medium	1690	Aluminum gutter (7" to 9") in width with hangers. Materials only.	Foot	$9.13	200	$1,826.00
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 558 - Roof Runoff Structure

Scenario: #3 - Roof Gutter, large

Scenario Description:

A roof runoff structure, consisting of 10"-12" gutter(s), downspout(s), and a 50' section of outlet line. Used to keep roof clean water runoff uncontaminated and provide a stable outlet to ground surface. Facilitates waste management and protects environment by minimizing clean water additions to waste systems and addresses water quality concerns. Outlet lines in excess of 50' should be contracted under Underground Outlet, 620.

Associated practices include Waste Storage Facility (313), Composting Facility (317), Heavy Use Area Protection (561), Watering Facility (614), Underground Outlet (620), Diversion (362), and any relevant irrigation practices.

Before Situation:

Roofs have no gutter. Roof runoff water enters areas where it mixes with contaminated materials and causes a resource concern. Applicable where: (1) a roof runoff management facility is included in an overall plan for an overall plan for a waste management system; (2) roof runoff needs to be diverted away from structures or contaminated areas; (3) there is a need to collect, control, and transport runoff from roofs to a stable outlet.

After Situation:

A gutter, downspout, and outlet system servicing the portion of the building roof that would otherwise drain into a waste management system or create erosion. The typical scenario is for a roof line of 200 ft serviced with 10" gutters, downspouts, and 50' of outlet line. Outlet line in excess of 50' is contracted using Underground Outlet, 620 as needed to allow for discharge of roof water in an acceptable, stable site.

Scenario Feature Measure: Linear Length of Roof to be Guttered

Scenario Unit: Linear Feet

Scenario Typical Size: 200

Scenario Cost: $6,335.54 **Scenario Cost/Unit:** $31.68

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	24	$553.92
Materials						
Pipe, PVC, 6", SCH 40	980	Materials: - 6" - PVC - SCH 40 - ASTM D1785	Foot	$6.55	50	$327.50
Downspout, Aluminum, Medium	1701	Aluminum downspout (6" to 8") in width with hangers. Materials only.	Foot	$30.89	10	$308.90
Gutter, Aluminum, Large	1691	Aluminum gutter (10" to 12") in width with hangers. Materials only.	Foot	$24.00	200	$4,800.00
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 560 - Access Road

Scenario: #1 - New Road, Earth, <10% Hillside Slope

Scenario Description:

Newly constructed compacted earth road on a site where the hillside slope (slope across the road prism) is <10%. A properly constructed, well defined access road will address resource concerns related with compaction, emissions of fugitive dust, and excessive sediment in surface water. It also improves the plant productivity, vigor and health and substantially reduces the chance of wild fire. Short term air quality deterioration may result if proper dust control measures are not implemented during the practice installation. Costs include excavation, shaping, grading, and all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

An agricultural or forestry enterprise which requires, but does not have, a fixed travelway for equipment and vehicles for various resource activities and where use of equipment and vehicles within the enterprise without a defined access road would result in compaction, excessive sediment and turbidity in surface water, reduced visibility, and emissions of fugitive dust. This scenario is applicable where the resource activity areas consist of relatively dry and level terrain lands.

After Situation:

The typical scenario is for a road a minimum of 14 feet wide at the top, minimal embankment with 1' of fill imported for grading, typical side slopes 2:1. Typical constructed road length is 1,000 feet. A properly constructed, well defined access road will greatly reduce or eliminate compaction in land use areas where it is harmful, reduce emissions of fugitive dust and also reduce excessive sediment in surface water by reducing uncontrolled sediment transport and improving drainage of irrigated lands. Planned grades will include all dips and water bars. If clearing and grubbing of land or brush clearing in the alignment area is required, use Land Clearing (460). Pipe culverts installed as part of access road should be covered by either Structures for Water Control (587), Stream Crossings (578) or Fish Passage (396) depending on the type of structure. Diversions constructed as part of access road should be covered by Diversion (362). When seeding or revegetation is required, use Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of Roadway Treated

Scenario Unit: Linear Foot

Scenario Typical Size: 1,000

Scenario Cost: $6,033.90 **Scenario Cost/Unit:** $6.03

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	670	$2,948.00
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	670	$2,418.70
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	300	$258.00
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	4	$152.56
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 560 - Access Road

Scenario: #3 - Road Rehab, Earth, <10% Hillside Slope

Scenario Description:

Repair and rehabilitation of compacted earth road in existing alignment where the hillside slope (slope across the road prism) is <10%. The extent of construction work over an existing alignment is assumed to average 20% of the work for a new installation. A properly constructed, well defined access road will address resource concerns related to compaction, emissions of fugitive dust, and excessive sediment in surface water. It also will improve the plant productivity, vigor and health and substantially reduce the chance of wild fire. Short term air quality deterioration may result if proper dust control measures are not implemented during the practice installation. Costs include excavation, shaping, grading, and all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

An agricultural or forestry enterprise with an existing access road which is beyond its useful lifespan can no longer be used as intended without rehabilitation. If left in its current condition, it will result in continued compaction, excessive sediment in surface water and emissions of fugitive dusts. This scenario is applicable where the resource activity areas with an existing but dilapidated access road consist of relatively dry and level terrain lands.

After Situation:

The typical scenario is for a road will be a minimum of 14 feet wide at the top, minimal embankment with 1' of fill imported for grading, typical side slopes 2:1with 8" of gravel surfacing. Typical length of road is 1,000 feet, 20% repaired. A properly repaired access road will greatly reduce or eliminate compaction in land use areas where it is harmful, reduce emissions of fugitive dust and also reduce excessive sediment in surface water by reducing uncontrolled sediment transport and improving drainage of irrigated lands. Planned grades will include all dips and water bars. If brush clearing in the alignment area is required, use Land Clearing (460). Pipe culverts installed as part of access road should be covered by either Structures for Water Control (587) or Stream Crossings (578) or Fish Passage (396) depending on the type of structure. Diversions constructed as part of access road should be covered by Diversion (362). When seeding or revegetation is required, use Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of Roadway Treated

Scenario Unit: Linear Foot

Scenario Typical Size: 1,000

Scenario Cost: $1,406.26 **Scenario Cost/Unit:** $1.41

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	134	$589.60
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	134	$483.74
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	2	$76.28
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 560 - Access Road

Scenario: #5 - New Road, Earth, >10% Hillside Slope

Scenario Description:

Newly constructed compacted earth road (typically constructed using side cast methods) in areas where the hillside slope (slope across the road prism) is equal to or greater than 10%. A properly constructed, well defined access road will address resource concerns related to compaction, emissions of fugitive dust, and excessive sediment in surface water. It also will improve the plant productivity, vigor and health and substantially reduce the chance of wild fire. Short term air quality deterioration may result if proper dust control measures are not implemented during the practice installation. Costs include excavation, shaping, grading, and all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

An agricultural or forestry enterprise which requires, but does not have, a fixed travelway for equipment and vehicles for various resource activities and where use of equipment and vehicles within the enterprise without a defined access road would result in compaction, excessive sediment and turbidity in surface water, reduced visibility, and emissions of fugitive dust. This scenario is applicable where the resource activity areas consist of relatively dry lands with steep slopes.

After Situation:

The road will be a minimum of 14 feet wide at the top, 50% in embankment and 50% in excavation less than 3 feet in height, (average 2 ft) typical cut and fill side slopes 2:1 with 12 inches of gravel surface. Out of total excavation, 80% is considered common earth and 20% hard dig or rocks. A properly constructed, well defined access road will greatly reduce or eliminate compaction in land use areas where it is harmful, reduce emissions of fugitive dust and also reduce excessive sediment in surface water by reducing uncontrolled sediment transport and improving drainage of irrigated lands. Planned grades will include all dips and water bars. If brush clearing of land in the alignment area is required, use Land Clearing (460). Pipe culverts installed as part of access road should be covered by either Structures for Water Control (587), Stream Crossings (578) or Fish Passage (396) depending on the type of structure. Diversions constructed as part of access road should be covered by Diversion (362). When seeding or revegetation is required, use Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of Roadway Treated

Scenario Unit: Linear Foot

Scenario Typical Size: 1,000

Scenario Cost: $12,080.73 **Scenario Cost/Unit:** $12.08

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	300	$258.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	925	$4,070.00
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	2	$134.90
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	555	$1,315.35
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	925	$3,339.25
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	370	$1,835.20
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	10	$381.40
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 560 - Access Road

Scenario: #7 - Road Rehab, Earth, >10% Hillside Slope

Scenario Description:

Repair and rehabilitation of compacted earth road in existing alignment (typically constructed using side cast methods) in areas where the hillside slope (slope across the road prism) is greater than or equal to 10%. Typical length of road repaired is 1,000 feet. The extent of construction work over an existing alignment is assumed to average 20% of the work for a new installation. A properly constructed, well defined access road will address resource concerns related with compaction, emissions of fugitive dust, and excessive sediment in surface water. It also will improve the plant productivity, vigor and health and substantially reduce the chance of wild fire. Short term air quality deterioration may result if proper dust control measures are not implemented during the practice installation. Costs include excavation, shaping, grading, and all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

An agricultural or forestry enterprise with an existing access road which is beyond its useful lifespan can no longer be used as intended without rehabilitation. If left in its current condition, it will result in continued compaction, excessive sediment in surface water and emissions of fugitive dusts. This scenario is applicable where the resource activity areas with an existing but dilapidated access road consist of relatively dry lands with steep sloped terrain.

After Situation:

The damaged portions of the road will be repaired to a minimum of a full 14 feet width at the top, 50% in embankment and 50% in excavation less than 3 feet in height, (average 2 ft), typical side slopes 2:1. Out of total excavation, 80% is considered common earth excavation and 20% hard dig or rocks. Typical length is 1,000 of road treated with 200' of rehabilitation. A properly repaired access road will greatly reduce or eliminate compaction in land use areas where it is harmful, reduce emissions of fugitive dust and also reduce excessive sediment in surface water by reducing uncontrolled sediment transport and improving drainage of irrigated lands. Planned grades will include all dips and water bars. If brush clearing of land in the alignment area is required, use Land Clearing (460). Pipe culverts installed as part of access road should be covered by either Structures for Water Control (587), Stream Crossings (578) or Fish Passage (396) depending on the type of structure. Diversions constructed as part of access road should be covered by Diversion (362). When seeding or revegetation is required, use Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of Roadway Treated

Scenario Unit: Linear Foot

Scenario Typical Size: 1,000

Scenario Cost: $3,072.36 **Scenario Cost/Unit:** $3.07

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	185	$814.00
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	2	$134.90
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	110	$260.70
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	185	$667.85
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	75	$372.00
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	2	$76.28
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 560 - Access Road

Scenario: #8 - Road Rehab, Surfaced, 10%-40% Slope

Scenario Description:

Repair and rehabilitation of a gravel road with surfacing (typically min. 12 inch thick compacted gravel surface) in existing alignment (typically constructed using side cast methods) in areas where the hillside slope (slope across the road prism) is 10%-40%. Except for the quantity of gravel, the extent of construction work over an existing alignment is assumed to average 20% of the work for a new installation. The quantity of gravel for a rehabilitated road surface is the same as for a new road surface. A properly constructed, well defined access road will address resource concerns related with compaction, emissions of fugitive dust, and excessive sediment in surface water. It also will improve the plant productivity, vigor and health and substantially reduce the chance of wild fire. Short term air quality deterioration may result if proper dust control measures are not implemented during the practice installation. Costs include excavation, shaping, grading, and all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

An agricultural or forestry enterprise with an existing access road which is beyond its useful lifespan can no longer be used as intended without rehabilitation. If left in its current condition, it will result in continued compaction, excessive sediment in surface water and emissions of fugitive dust. This scenario is applicable where the resource activity areas with an existing but dilapidated access road consist of relatively wet and swampy land with steep sloped terrain.

After Situation:

The damaged portions of the road will be repaired to a minimum of a full 14 feet width with a 12" gravel surface at the top, 50% in embankment and 50% in excavation less than 3 feet in height, (average 2 ft), typical side slopes 2:1 with 12 inches: of gravel surfacing. . Typical length is 1,000 of road treated with 200' of rehabilitation. A properly repaired access road will greatly reduce or eliminate compaction in land use areas where it is harmful, reduce emissions of fugitive dust and also reduce excessive sediment in surface water by reducing uncontrolled sediment transport and improving drainage of irrigated lands. Planned grades will include all dips and water bars. If brush clearing of land in the alignment area is required, use Land Clearing (460). Pipe culverts installed as part of access road should be covered by either Structures for Water Control (587), Stream Crossings (578) or Fish Passage depending on the type of structure. Diversions constructed as part of access road should be covered by Diversion (362). When seeding or revegetation is required, use Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of Raodway Treated

Scenario Unit: Linear Foot

Scenario Typical Size: 1,000

Scenario Cost: $19,076.67 **Scenario Cost/Unit:** $19.08

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	185	$814.00
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	75	$372.00
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	400	$980.00
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	2	$134.90
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	185	$667.85
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	110	$260.70
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	2	$75.04
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	10	$381.40
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	545	$14,644.15

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 560 - Access Road

Scenario: #9 - Erosion Control, Unsurfaced

Scenario Description:

Installation of water bars, ditch outs, rolling dips, in sloping, out sloping, and crowning on existing earthen roads to divert water and provide erosion control. A properly constructed, well defined access road will address resource concerns related with compaction, emissions of fugitive dust, and excessive sediment in surface water. It also will improve the plant productivity, vigor and health and substantially reduce the chance of wild fire. Short term air quality deterioration may result if proper dust control measures are not implemented during the practice installation. Costs include excavation, shaping, grading, and all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

An agricultural or forestry enterprise with an existing unsurfaced access road that has surface erosion causing sediment to enter nearby water bodies. If left in its current condition, it will result in continued compaction, excessive sediment in surface water and emissions of fugitive dusts. This scenario is applicable where the overall road bed is functional but is causing sediment transport off the road.

After Situation:

Practices such as water bars, rolling dips, and ditch out's are installed along with road crowning or sloping, as needed, to break up the flow of water on the road and reduce or eliminate sediment transport. The eroding portions of the road will be repaired to a minimum of 14 feet wide at the top. A properly repaired access road will greatly reduce or eliminate excessive sediment in surface water by reducing uncontrolled sediment transport, reduce soil erosion, and improving drainage of irrigated lands. Planned grades will include all dips and water bars. Pipe culverts installed as part of access road to create or maintain hydrologic connectivity should be covered by either Structures for Water Control (587) (cross drains), Stream Crossings (578) or Fish Passage (396) depending on the type of structure. When seeding or revegetation is required, use Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of Roadway Treated

Scenario Unit: Linear Foot

Scenario Typical Size: 1,000

Scenario Cost: $1,644.66 **Scenario Cost/Unit:** $1.64

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	11	$741.95
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	11	$412.72
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 560 - Access Road

Scenario: #10 - Erosion Control, Surfaced

Scenario Description:

Installation of water bars, ditch outs, rolling dips, in sloping, out sloping, and crowning on existing gravel roads to divert water and provide erosion control. Except for the quantity of gravel, the extent of construction work over an existing alignment is assumed to average 20% of the work for a new installation. The quantity of gravel for a erosion control is about 20% of that for a new road surface. A properly constructed, well defined access road will address resource concerns related with compaction, emissions of fugitive dust, and excessive sediment in surface water. It also will improve the plant productivity, vigor and health and substantially reduce the chance of wild fire hazards. Short term air quality deterioration may result if proper dust control measures are not implemented during the practice installation. Costs include excavation, shaping, grading, and all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

An agricultural or forestry enterprise with an existing access road that has surface erosion causing sediment to enter nearby water bodies. If left in its current condition, it will result in continued compaction, excessive sediment in surface water and emissions of fugitive dusts. This scenario is applicable where the overall road bed is functional but is causing sediment transport off the road.

After Situation:

Practices such as water bars, rolling dips, and ditch out's are installed along with road crowning or sloping, as needed, to break up the flow of water on a surfaced road and reduce or eliminate sediment transport. The eroding portions of the road will be repaired to a minimum of 14 feet wide at the top. Treated road length is 1,000 feet. Gravel surfacing is placed on ~200' of road length. A properly repaired access road will greatly reduce or eliminate excessive sediment in surface water by reducing uncontrolled sediment transport, reduce soil erosion, and improving drainage of irrigated lands. Planned grades will include all dips and water bars. Pipe culverts installed as part of access road to create or maintain hydrologic connectivity should be covered by either Structures for Water Control (587) (cross drains), Stream Crossings (578) or Fish Passage (396) depending on the type of structure. When seeding or revegetation is required, use Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of Roadway Treated

Scenario Unit: Linear Foot

Scenario Typical Size: 1,000

Scenario Cost: $5,372.11 **Scenario Cost/Unit:** $5.37

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	315	$771.75
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	11	$741.95
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	11	$412.72
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	110	$2,955.70
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 560 - Access Road

Scenario: #11 - Rolling dip addition

Scenario Description:

Installation of one or more rolling dips on an existing road to divert water and provide erosion control. A properly constructed, well defined access road will address resource concerns related with compaction, emissions of fugitive dust, and excessive sediment in surface water. It also will improve the plant productivity, vigor and health and substantially reduce the chance of wild fire. Short term air quality deterioration may result if proper dust control measures are not implemented during the practice installation. Costs include excavation, shaping, grading, and all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

An agricultural or forestry enterprise with an existing access road that has surface erosion causing sediment to enter nearby water bodies. If left in its current condition, it will result in continued compaction, excessive sediment in surface water and emissions of fugitive dusts. This scenario is applicable where the overall road bed is functional but is causing sediment transport off the road.

After Situation:

Rolling dips are in place to break up the flow of water on the road and reduce or eliminate sediment transport. A properly repaired access road will greatly reduce or eliminate excessive sediment in surface water by reducing uncontrolled sediment transport, reduce soil erosion, and improving drainage of irrigated lands. Pipe culverts installed as part of access road to create or maintain hydrologic connectivity should be covered by either Structures for Water Control (587) (cross drains), Stream Crossings (578) or Fish Passage (396) depending on the type of structure. When seeding or revegetation is required, use Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of roadway treated

Scenario Unit: Linear Foot

Scenario Typical Size: 100

Scenario Cost: $796.73 **Scenario Cost/Unit:** $7.97

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	22	$96.80
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	2	$134.90
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	2	$75.04
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 560 - Access Road

Scenario: #12 - Waterbar addition

Scenario Description:

Installation of one or more water bars on an existing road to divert water and provide erosion control. A properly constructed, well defined access road will address resource concerns related with compaction, emissions of fugitive dust, and excessive sediment in surface water. It also will improve the plant productivity, vigor and health and substantially reduce the chance of wild fire. Short term air quality deterioration may result if proper dust control measures are not implemented during the practice installation. Costs include excavation, shaping, grading, and all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

An agricultural or forestry enterprise with an existing access road that has surface erosion causing sediment to enter nearby water bodies. If left in its current condition, it will result in continued compaction, excessive sediment in surface water and emissions of fugitive dusts. This scenario is applicable where the overall road bed is functional but is causing sediment transport off the road.

After Situation:

Water bars are in place to break up the flow of water on the road and reduce or eliminate sediment transport. A properly repaired access road will greatly reduce or eliminate excessive sediment in surface water by reducing uncontrolled sediment transport, reduce soil erosion, and improving drainage of irrigated lands. Pipe culverts installed as part of access road to create or maintain hydrologic connectivity should be covered by either Structures for Water Control (587) (cross drains), Stream Crossings (578) or Fish Passage (396) depending on the type of structure. When seeding or revegetation is required, use Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of roadway treated

Scenario Unit: Linear Foot

Scenario Typical Size: 50

Scenario Cost: $561.55 **Scenario Cost/Unit:** $11.23

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	0.5	$33.73
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	0.5	$19.07
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	0.5	$18.76
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 561 - Heavy Use Area Protection

Scenario: #1 - Reinforced Concrete

Scenario Description:

Provide a stable, non-eroding surface by surfacing with reinforced concrete on a sand or gravel foundation to stabilize areas around facilities that are frequently and intensively used by people, animals, or vehicles. Installation includes all materials, equipment, and labor to install this practice. The stabilized area will address the resource concerns of soil erosion and water quality degradation.

Before Situation:

An area used by animals/equipment has excessive mud and poses a resource concern for soil erosion and water quality. This practice applies to agricultural, urban, recreational and other frequently and/or intensively used areas requiring treatment to address soil erosion and water quality degradation.

After Situation:

Areas around facilities that are frequently and intensively used by people, animals or vehicles are stabilized with a 6" thick reinforced concrete slab with a 6" base of sand or gravel material. Surfacing will address soil erosion and water quality degradation. All needed roads must use Access Road (560). Any needed treatment of stream crossings must use Stream Crossing (578). Any needed vegetation of disturbed areas must use Critical Area Planting (342). Provisions to collect, store, utilize, and or treat contaminated runoff must use Sediment Basin (350), Waste Storage Facility (313), or Waste Treatment (629) as appropriate. To reduce the potential for air quality problems from particulate matter associated with heavy use areas, consider the use of Windbreak/Shelterbelt Establishment (380) or Herbaceous Wind Barriers (603).

Scenario Feature Measure: Area

Scenario Unit: Square Foot

Scenario Typical Size: 630

Scenario Cost: $2,648.84 **Scenario Cost/Unit:** $4.20

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	12	$1,930.80
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	12	$461.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 561 - Heavy Use Area Protection

Scenario: #2 - Non-reinforced Concrete with sand or gravel foundation

Scenario Description:

Provide a stable, non-eroding surface by surfacing with non-reinforced concrete on a sand or gravel foundation to stabilize areas around facilities that are frequently and intensively used by people, animals, or vehicles. Installation includes all materials, equipment, and labor to install this practice. The stabilized area will address the resource concerns of soil erosion and water quality degradation.

Before Situation:

An area used by animals/equipment has excessive mud and poses a resource concern for soil erosion and water quality. This practice applies to agricultural, urban, recreational and other frequently and/or intensively used areas requiring treatment to address soil erosion and water quality degradation.

After Situation:

Areas around facilities that are frequently and intensively used by people, animals or vehicles are stabilized with a 6" thick non-reinforced concrete slab with a 6" base of sand or gravel material. Surfacing will address soil erosion and water quality degradation. All needed roads must use Access Road (560). Any needed treatment of stream crossings must use Stream Crossing (578). Any needed vegetation of disturbed areas must use Critical Area Planting (342). Provisions to collect, store, utilize, and or treat contaminated runoff must use Sediment Basin (350), Waste Storage Facility (313), or Waste Treatment (629) as appropriate. To reduce the potential for air quality problems from particulate matter associated with heavy use areas, consider the use of Windbreak/Shelterbelt Establishment (380) or Herbaceous Wind Barriers (603).

Scenario Feature Measure: Area

Scenario Unit: Square Foot

Scenario Typical Size: 630

Scenario Cost: $2,648.84 **Scenario Cost/Unit:** $4.20

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formless, non reinforced	36	Non reinforced concrete cast-in-placed without forms by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	12	$1,930.80
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	12	$461.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 561 - Heavy Use Area Protection

Scenario: #3 - Rock/Gravel

Scenario Description:

Provide a stable, non-eroding surface by surfacing with rock and/or gravel to stabilize areas around facilities that are frequently and intensively used by people, animals, or vehicles. Installation includes all materials, equipment, and labor to install this practice. The stabilized area will address the resource concerns of soil erosion and water quality degradation.

Before Situation:

An area used by animals/equipment has excessive mud and poses a resource concern for soil erosion and water quality. This practice applies to agricultural, urban, recreational and other frequently and/or intensively used areas requiring treatment to address soil erosion and water quality degradation.

After Situation:

Areas around facilities that are frequently and intensively used by people, animals or vehicles are stabilized with rock and/or gravel. Practice will address soil erosion and water quality degradation. Typical scenario is for 630 sq ft of surface treated with 8" layer of gravel. All needed roads must use Access Road (560). Any needed treatment of stream crossings must use Stream Crossing (578). Any needed vegetation of disturbed areas must use Critical Area Planting (342). Provisions to collect, store, utilize, and or treat contaminated runoff must use Sediment Basin (350), Waste Storage Facility (313), or Waste Treatment (629) as appropriate. To reduce the potential for air quality problems from particulate matter associated with heavy use areas, consider the use of Windbreak/Shelterbelt Establishment (380) or Herbaceous Wind Barriers (603).

Scenario Feature Measure: Area of Rock and or Gravel

Scenario Unit: Square Foot

Scenario Typical Size: 630

Scenario Cost: $918.08 **Scenario Cost/Unit:** $1.46

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	16	$37.92
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	16	$623.52
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 561 - Heavy Use Area Protection

Scenario: #4 - Rock/Gravel on Geotextile

Scenario Description:

Provide a stable, non-eroding surface by surfacing with rock and/or gravel on a geotextile fabric foundation to stabilize areas around facilities that are frequently and intensively used by people, animals, or vehicles. Installation includes all materials, equipment, and labor to install this practice. The stabilized area will address the resource concerns of soil erosion and water quality degradation.

Before Situation:

An area used by animals/equipment has excessive mud and poses a resource concern for soil erosion and water quality. This practice applies to agricultural, urban, recreational and other frequently and/or intensively used areas requiring treatment to address soil erosion and water quality degradation.

After Situation:

Areas around facilities that are frequently and intensively used by people, animals or vehicles are stabilized with rock and/or gravel on a geotextile fabric foundation material. Practice will address soil erosion and water quality degradation. Typical scenario is for 630 sq ft of surface treated with geotextile and an 8" layer of gravel. All needed roads must use Access Road (560). Any needed treatment of stream crossings must use Stream Crossing (578). Any needed vegetation of disturbed areas must use Critical Area Planting (342). Provisions to collect, store, utilize, and or treat contaminated runoff must use Sediment Basin (350), Waste Storage Facility (313), or Waste Treatment (629) as appropriate. To reduce the potential for air quality problems from particulate matter associated with heavy use areas, consider the use of Windbreak/Shelterbelt Establishment (380) or Herbaceous Wind Barriers (603).

Scenario Feature Measure: Area of Rock and or Gravel

Scenario Unit: Square Foot

Scenario Typical Size: 630

Scenario Cost: $1,089.58 **Scenario Cost/Unit:** $1.73

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	16	$37.92
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	70	$171.50
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	16	$623.52
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 561 - Heavy Use Area Protection

Scenario: #5 - Rock/Gravel-GeoCell on Geotextile

Scenario Description:

Provide a stable, non-eroding surface by surfacing with rock and/or gravel in a cellular containment grid on a geotextile fabric foundation to stabilize areas around facilities that are frequently and intensively used by people, animals, or vehicles. Installation includes all materials, equipment, and labor to install this practice. The stabilized area will address the resource concerns of soil erosion and water quality degradation.

Before Situation:

An area used by animals/equipment has excessive mud and poses a resource concern for soil erosion and water quality. This practice applies to agricultural, urban, recreational and other frequently and/or intensively used areas requiring treatment to address soil erosion and water quality
degradation.

After Situation:

Areas around facilities that are frequently and intensively used by people, animals or vehicles are stabilized with rock and/or gravel on cellular containment grid with a geotextile fabric foundation material. Practice will address soil erosion and water quality degradation. All needed roads must use Access Road (560). Any needed treatment of stream crossings must use Stream Crossing (578). Any needed vegetation of disturbed areas must use Critical Area Planting (342). Provisions to collect, store, utilize, and or treat contaminated runoff must use Sediment Basin (350), Waste Storage Facility (313), or Waste Treatment (629) as appropriate. To reduce the potential for air quality problems from particulate matter associated with heavy use areas, consider the use of Windbreak/Shelterbelt Establishment (380) or Herbaceous Wind Barriers (603).

Scenario Feature Measure: Area of Rock and or Gravel

Scenario Unit: Square Foot

Scenario Typical Size: 630

Scenario Cost: $3,068.55 **Scenario Cost/Unit:** $4.87

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	70	$171.50
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	4	$9.48
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	15.6	$607.93
GeoCell, 4"	1054	Polymer 3-D cellular grid 4" deep that is filled with stone or earth. Includes materials, labor and equipment for the geocell only, does not include backfill.	Square Yard	$28.90	70	$2,023.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 561 - Heavy Use Area Protection

Scenario: #6 - Sand-topped Rock/Gravel on Geotextile

Scenario Description:

Provide a stable, non-eroding surface by surfacing with rock and/or gravel topped with a sand layer on a geotextile fabric foundation to stabilize areas around facilities that are frequently and intensively used by people, animals, or vehicles. Installation includes all materials, equipment, and labor to install this practice. The stabilized area will address the resource concerns of soil erosion and water quality degradation.

Before Situation:

An area used by animals/equipment has excessive mud and poses a resource concern for soil erosion and water quality. This practice applies to agricultural, urban, recreational and other frequently and/or intensively used areas requiring treatment to address soil erosion and water quality
degradation.

After Situation:

Areas around facilities that are frequently and intensively used by people, animals or vehicles are stabilized with rock and/or gravel topped with sand on a geotextile fabric foundation material. Practice will address soil erosion and water quality degradation. All needed roads must use Access Road (560). Any needed treatment of stream crossings must use Stream Crossing (578). Any needed vegetation of disturbed areas must use Critical Area Planting (342). Provisions to collect, store, utilize, and or treat contaminated runoff must use Sediment Basin (350), Waste Storage Facility (313), or Waste Treatment (629) as appropriate. To reduce the potential for air quality problems from particulate matter associated with heavy use areas, consider the use of Windbreak/Shelterbelt Establishment (380) or Herbaceous Wind Barriers (603).

Scenario Feature Measure: Area of Rock and or Gravel

Scenario Unit: Square Foot

Scenario Typical Size: 630

Scenario Cost: $1,376.51 **Scenario Cost/Unit:** $2.18

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	70	$171.50
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	15.5	$36.74
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	15.5	$604.04
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	8	$307.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 570 - Stormwater Runoff Control

Scenario: #1 - Average Slope ≤ 3%

Scenario Description:

This scenario involves installation of silt fence, straw wattles, straw bales, including woven or non woven geotextile on the construction site as part of one conservation engineering system. The combined system shall include two or more components and will address the resource concerns related with concentrated flow erosion, excessive sediment in surface waters as well as protection of existing inlets and structures depending on the combination.

Before Situation:

The combination scenario is applicable in all construction sites and watersheds including those in the urban and suburban areas. Which component would apply in a particular situation would depend on the site condition, slope etc.

After Situation:

When properly installed, the combination structures slow down runoff flow velocity and reduce high velocity erosion, detain and filter the stormwater runoff and provide a controlled release to the downstream areas. In seeded areas, straw wattles also enable seeds to settle and germinate, aiding the revegetation process. By filtering overland runoff and holding sediment on the slope, Straw Wattles also help to protect lakes, ponds, rivers and streams from sediment pollution. By filtering overland runoff and holding sediment on the slope, geotextile fabrics also help to protect water quality. When properly installed, coconut mats slow and spread the overland water flow and provide a filtering effect. They also help to reduce sediment transport and stabilize the construction area. Silt fence are installed along the downstream perimeter of a construction site to prevent sediment transport off construction areas. A typical silt fence consists of a synthetic filter fabric stretched between a series of fence stakes, with the stakes installed on the downstream side of the perimeter and the fabric trenched into the soil on the upstream side and backfilled. If earthen basins are warranted for water quality improvement purpose, use Sediment Basin (350). If seeding is warranted for water quality and erosion control purpose, use Critical Area Planting (342). Mulching (484) is an associated practice.

Scenario Feature Measure: Area of construction site

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $2,317.96 **Scenario Cost/Unit:** $2,317.96

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	1.5	$55.97
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	480	$1,176.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	1.5	$61.85
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80
Materials						
Wattles, straw, 8-9"x25'	1405	Tubes of rice straw, approximately 8-9 inch in diameter, 25 feet long . Includes materials and shipping only (including stakes).	Foot	$0.91	100	$91.00
Silt Fence	43	Silt Fence with support post. Includes materials, equipment and labor	Foot	$0.80	100	$80.00
Straw bales	2186	Straw bales buried at defined intervals to halt rill and gulley formation. Materials and shipping only.	Each	$4.61	135	$622.35

Practice: 570 - Stormwater Runoff Control

Scenario: #2 - Average Slope > 3% Scenario

Description:

This scenario involves installation of silt fence, straw wattles, straw bales, including woven or non woven geotextile on the construction site as part of one conservation engineering system. Relatively steep slopes call for down slope and split slope treatments. The combined system shall include two or more components and will address the resource concerns related with concentrated flow erosion, excessive sediment in surface waters as well as protection of existing inlets and structures depending on the combination.

Before Situation:

The combination scenario is applicable in all construction sites and watersheds including those in the urban and suburban areas. Which component would apply in a particular situation would depend on the site condition, slope etc.

After Situation:

When properly installed, the combination structures slow down runoff flow velocity and reduce high velocity erosion, detain and filter the stormwater runoff and provide a controlled release to the downstream areas. In seeded areas, straw wattles also enable seeds to settle and germinate, aiding the revegetation process. By filtering overland runoff and holding sediment on the slope, Straw Wattles also help to protect lakes, ponds, rivers and streams from sediment pollution. By filtering overland runoff and holding sediment on the slope, geotextile fabrics also help to protect water quality. When properly installed, coconut mats slow and spread the overland water flow and provide a filtering effect. They also help to reduce sediment transport and stabilize the construction area. Silt fence are installed along the downstream perimeter of a construction site to prevent sediment transport off construction areas. A typical silt fence consists of a synthetic filter fabric stretched between a series of fence stakes, with the stakes installed on the downstream side of the perimeter and the fabric trenched into the soil on the upstream side and backfilled. If earthen basins are warranted for water quality improvement purpose, use Sediment Basin (350). If seeding is warranted for water quality and erosion control purpose, use Critical Area Planting (342). Mulching (484) is an associated practice.

Scenario Feature Measure: Area of construction site

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $4,635.92 **Scenario Cost/Unit:** $4,635.92

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	3	$111.93
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	960	$2,352.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	3	$123.69
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	20	$461.60
Materials						
Wattles, straw, 8-9"x25'	1405	Tubes of rice straw, approximately 8-9 inch in diameter, 25 feet long . Includes materials and shipping only (including stakes).	Foot	$0.91	200	$182.00
Silt Fence	43	Silt Fence with support post. Includes materials, equipment and labor	Foot	$0.80	200	$160.00
Straw bales	2186	Straw bales buried at defined intervals to halt rill and gulley formation. Materials and shipping only.	Each	$4.61	270	$1,244.70

Practice: **572 - Spoil Spreading**

Scenario: **#1 - Spoil Spreading**

Scenario Description:

A spoil pile is spread over a designated area according to an approved plan. The resource concerns are Soil Erosion and Water Quality Degradation.

Before Situation:

Spoil material is available from excavation of channels, drainage ditches, irrigation canals, or other construction sites.

After Situation:

Land has been shaped to the required elevations and grades. Resource concerns have been treated. Associated practices, like critical area planting or irrigation/drainage water management practices, would be contracted seperately as needed.

Scenario Feature Measure: Cubic yards of spoil spread

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,000

Scenario Cost: $1,778.60 **Scenario Cost/Unit:** $1.78

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Scraper, pull, 7 CY	1206	Pull type earthmoving scraper with 7 CY capacity. Does not include pulling equipment or labor. Add Tractor or Dozer, 160 HP typically required for single scraper.	Hour	$15.56	10	$155.60
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	10	$1,247.80
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	10	$375.20

Practice: 574 - Spring Development

Scenario: #1 - Spring Development with Headwall

Scenario Description:

Develop a water source from a natural spring or seep (i.e., spring development) to provide water for livestock and/or wildlife needs on sites requiring a structural headwall. This typical scenario includes excavating and exposing the water source at the spring/seep (typically on a hillside), constructing a water collection structure by installing a 50 ft long, 4 inch diameter HDPE perforated pipe enclosed in a sand/gravel envelope overlaid by 2 ft wide filter fabric (50 ft long) and behind a concrete cutoff wall (6 inch x 4 ft height x 25 ft long) to retain water. Water is directed (via 20 ft long, 4 inch PVC) to a spring box (48 inch diameter x 6 ft long CMP) that is located at the cutoff wall or below the wall, equipped with a watertight lid and two outlets. One outlet serves as overflow pipe to account for occasions where inflow exceeds outflow. The collection system is commonly composed of a single or a network of perforated 4 inch diameter drainage pipe placed in an excavated collection trench that runs across the slope. The outflow pipe from the spring box can be directed to buried large storage tank an/or to a watering facility/trough system.
Resource Concern: Livestock production limitation - Inadequate livestock water.
Associated Practices: 516-Livestock Pipeline; 614-Watering Facility; 382-Fence; Critical Area Planting (342).

Before Situation:

Livestock operation with inadequate fresh water for livestock. The operation contains on-site undeveloped spring/seep.

After Situation:

Spring development system provides adequate water for the intended use. The system typically runs all year long in most zones.

Scenario Feature Measure: Number of Developments

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $4,529.93 **Scenario Cost/Unit:** $4,529.93

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	2.5	$1,270.93
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	11	$26.95
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	16	$899.36
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	16	$357.28
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	20	$461.60
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	2	$77.94
Pipe, PVC, 4", SCH 40	978	Materials: - 4" - PVC - SCH 40 - ASTM D1785	Foot	$3.98	20	$79.60
Pipe, HDPE, 4", PCPT, Single Wall	1270	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 4" diameter - ASTM F405. Material cost only.	Foot	$0.45	50	$22.50
Pipe, CMP, 48", 14 Gauge	1280	48" Corrugated Metal Pipe, Galvanized, Uncoated, 14 gage. Material cost only.	Foot	$32.20	6	$193.20
Spring Collection Box Cover, steel, 4' diameter	1281	4' diameter x 1/4" thick Steel lid with handle for spring collection box. Materials and fabrication.	Each	$189.89	1	$189.89

Materials

Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	2	$76.90

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28
Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been i	Dollar	$1.03	350	$360.50

Practice: 574 - Spring Development

Scenario: #2 - Spring Development without Headwall

Scenario Description:

Develop a water source from a natural spring or seep (i.e., spring development) to provide water for livestock and/or wildlife needs on sites that do not require a structural headwall. This typical scenario includes excavating and exposing the water source at the spring/seep (typically on a hillside), constructing a water collection structure by installing a 50 ft long, 4 inch diameter HDPE perforated pipe enclosed in a sand/gravel envelope overlaid by 2 ft wide filter fabric (50 ft long) to retain water. Water is directed (via 20 ft long, 4 inch PVC) to a spring box (48 inch diameter x 6 ft long CMP) that is equipped with a watertight lid and two outlets. One outlet serves as overflow pipe to account for occasions where inflow exceeds outflow. The collection system is commonly composed of a single or a network of perforated 4 inch diameter drainage pipe placed in an excavated collection trench that runs across the slope. The outflow pipe from the spring box can be directed to buried large storage tank an/or to a watering facility/trough system.
Resource Concern: Livestock production limitation - Inadequate livestock water.
Associated Practices: 516-Livestock Pipeline; 614-Watering Facility; 382-Fence; Critical Area Planting (342).

Before Situation:

Livestock operation with inadequate fresh water for livestock. The operation contains on-site undeveloped spring/seep.

After Situation:

Spring development system provides adequate water for the intended use. The system typically runs all year long in most zones.

Scenario Feature Measure: Number of Developments

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $2,852.52 **Scenario Cost/Unit:** $2,852.52

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	11	$26.95
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	12	$674.52
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	12	$267.96
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	16	$369.28
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	2	$77.94
Pipe, PVC, 4", SCH 40	978	Materials: - 4" - PVC - SCH 40 - ASTM D1785	Foot	$3.98	20	$79.60
Pipe, HDPE, 4", PCPT, Single Wall	1270	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 4" diameter - ASTM F405. Material cost only.	Foot	$0.45	50	$22.50
Pipe, CMP, 48", 14 Gauge	1280	48" Corrugated Metal Pipe, Galvanized, Uncoated, 14 gage. Material cost only.	Foot	$32.20	6	$193.20
Spring Collection Box Cover, steel, 4' diameter	1281	4' diameter x 1/4" thick Steel lid with handle for spring collection box. Materials and fabrication.	Each	$189.89	1	$189.89
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	2	$76.90
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Mobilization

Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been i	Dollar	$1.03	350	$360.50

Practice: 575 - Trails and Walkways

Scenario: #1 - Trail, Unsurfaced, Level Terrain

Scenario Description:

Layout and construct a lane or travel way on level ground without surfacing materials to facilitate animal movement on farmstead areas, pasture or rangeland. Trails and walkways provide or improve access to forage, water, shelter or working/handling facilities; or improve grazing efficiency and distribution; and/or protect ecologically sensitive, erosive and/or potentially erosive sites and address soil erosion and water quality. Costs include excavation, shaping, grading, and all equipment, labor and incidental materials necessary to install the practices.

Before Situation:

Animals utilize a travelway that is eroding or has excessive soil runoff due to mud or animals are not confined to one stable area and have access to sensitive areas. Active soil erosion is occuring and plant health and vigor is affected.

After Situation:

The typical scenario will be for the construction of a new unsurfaced trail or walkway that will be 12 foot wide 300 foot long, 3600 square foot lane. All excavation, grading and shaping necessary to provide a smooth permanent travel surface for livestock. No surface materials are included with this practice. Consider the adequacy of natural surfacing. If the lane is vegetated and requires planting, the vegetation shall be planted according to Critical Area Planting (342). Where vegetation is not practical, and surface protection is needed, refer to Heavy Use Area Protection (561). Stream Crossing (578) will be used when the trail or lane crosses streams or shallow water areas. Consider the use of water bars or culverts to control and direct water flow, use Access Road (560). Diversion (362) may also be beneficial. Fencing (382) will be used when needed to control animal movement.

Scenario Feature Measure: Area of lane or trail

Scenario Unit: Square Foot

Scenario Typical Size: 3,600

Scenario Cost: $1,143.10 **Scenario Cost/Unit:** $0.32

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	6	$404.70
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	6	$225.12
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: **575 - Trails and Walkways**

Scenario: **#2 - Trail, Unsurfaced, Sloping Terrain**

Scenario Description:

Layout and construct a lane or travel way on ground with a slope of greater than 5% without surfacing materials to facilitate animal movement on farmstead areas, pasture or rangeland. Trails and walkways provide or improve access to forage, water, shelter or working/handling facilities; or improve grazing efficiency and distribution; and/or protect ecologically sensitive, erosive and/or potentially erosive sites and address soil erosion and water quality. Costs include excavation, shaping, grading, and all equipment, labor and incidental materials necessary to install the practices.

Before Situation:

Animals utilize a travelway that is eroding or has excessive soil runoff due to mud or animals are not confined to one stable area and have access to sensitive areas. Active soil erosion is occuring and plant health and vigor is affected.

After Situation:

The typical scenario will be for the construction of a new trail or walkway that will be a 12 foot wide 300 foot long, 3600 square foot lane in sloping terrain. All excavation, grading and shaping necessary to provide a smooth permanent travel surface for livestock in areas where the natural surfacing is adequate. If the lane is vegetated and requires planting, the vegetation shall be planted according to Critical Area Planting (342). Where vegetation is not practical, and surface protection is needed, refer to Heavy Use Area Protection (561). Stream Crossing (578) or Fish Passage (396) will be contracted when the trail or lane crosses streams or shallow water areas. Diversion (362) may also be beneficial. Fencing (382) will be used when needed to control animal movement.

Scenario Feature Measure: Area of Trail

Scenario Unit: Square Foot

Scenario Typical Size: 3,600

Scenario Cost: $1,772.92 **Scenario Cost/Unit:** $0.49

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	12	$809.40
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	12	$450.24
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 575 - Trails and Walkways

Scenario: #3 - Road Tunnel for livestock movement

Scenario Description:

Construct a tunnel under a public road so that livestock can utilize forage by walking through the tunnel to pastures on the other side of the road. This scenario will address an inadequate feed resource concern in a grazing system by giving access to adequate feed on the opposite side of the road. Pasture on both sides of the road must be part of a single grazing plan. This scenario applies only to livestock that must be milked daily as part of established dairy operation.

Before Situation:

Landowner controls pasture on both sides of a public road. Livestock is unable to utilize pasture on both sides due to access. Hauling livestock is not feasible due to the need of moving animals back and forth on a daily basis. Forage on the opposite side of the road is under utilized as shown in a grazing plan.

After Situation:

The typical scenario will be for the construction of a new road tunnel used as a trail or walkway. The tunnel may be constructed of any material, but based on an 8 foot diameter CMP pipe. Typical tunnel length is 80 feet passing beneath a modern 2 lane public road. All excavation, grading and shaping necessary to provide a smooth permanent travel surface for livestock is included. If the lane is vegetated and requires planting, the vegetation shall be planted according to Critical Area Planting (342). Where vegetation is not practical, and surface protection is needed, refer to Heavy Use Area Protection (561). Fencing (382) will be used when needed to control animal movement.

Scenario Feature Measure: Length of Tunnel

Scenario Unit: Linear Foot

Scenario Typical Size: 80

Scenario Cost: $30,281.52 **Scenario Cost/Unit:** $378.52

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	160	$18,316.80
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	89	$514.42
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	160	$6,003.20
Materials						
Corrugated Steel, 21 gauge	224	Corrugated or ribbed, galvanized, 21 gauge, includes fasteners, materials only.	sq ft	$2.71	2010	$5,447.10

Practice: 578 - Stream Crossing

Scenario: #1 - Culvert, < 3 ft diameter

Scenario Description:

Install a CMP culvert with a diameter of less than 3 feet. Work includes dewatering, site preparation and removing any old crossing, acquiring and installing culvert pipe with gravel bedding and fill (compacted), and building headwalls. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Use (396) Aquatic Organism Passage instead, when the primary intent is biological concerns, not hydrologic. Use (587) Structure for Water Control instead, for ditch cross culverts and other intermittent flows.

Before Situation:

Water flow could not cross access road or trail without erosion; or access road or trail could not cross channel.

After Situation:

Access road and waterflow are able to cross each other in a stable manner.Stream flow is not impeded and a stable base exists for equipment, people and/or animals to cross. Typical scenario is for a 2' diameter Culvert installation. 15' road with 4' of fill over the culvert, 2.5:1 side slopes for a total pipe length of 50'. Associated practices could be (342) Critical Area Planting, (560) Access Road, (575) Animal Trails and Walkways, (566) Recreational Trails and Walkways, (500) Obstruction Removal, or (584) Channel Stabilization.

Scenario Feature Measure: Culvert

Scenario Unit: Foot

Scenario Typical Size: 50

Scenario Cost: $22,274.82 **Scenario Cost/Unit:** $445.50

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	40	$1,732.80
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	10	$2,135.90
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	8	$777.52
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	25	$4,784.25
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	23	$877.22
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	82	$1,892.56
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	42	$937.86
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	35	$1,313.20
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	5	$206.15
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	42	$4,617.48
Materials						
Pipe, CMP, 14-12 gauge, weight priced	1589	14 and 12 gauge galvanized helical corrugated metal pipe priced by the weight of the pipe materials. Materials only.	Pound	$0.75	1200	$900.00

Materials

Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	4	$261.40

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 578 - Stream Crossing

Scenario: #2 - Culvert, 3-6 ft diameter

Scenario Description:

Install a CMP culvert with a diameter of 3 to 6 feet. Work includes dewatering, site preparation and removing any old crossing, acquiring and installing culvert pipe with gravel bedding and fill (compacted), and building headwalls. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Use (396) Aquatic Organism Passage instead, when the primary intent is biological concerns, not hydrologic. Use (587) Structure for Water Control instead, for ditch cross culverts and other intermittent flows.

Before Situation:

Water flow could not cross access road or trail without erosion; or access road or trail could not cross channel.

After Situation:

Access road and waterflow are able to cross each other in a stable manner.Stream flow is not impeded and a stable base exists for equipment, people and/or animals to cross. Typical scenario is for a 4' diameter Culvert installation. 15' road with 4' of fill over the culvert, 2.5:1 side slopes for a total pipe length of 50'. Associated practices could be (342) Critical Area Planting, (560) Access Road, (575) Animal Trails and Walkways, (566) Recreational Trails and Walkways, (500) Obstruction Removal, or (584) Channel Stabilization.

Scenario Feature Measure: Culvert

Scenario Unit: Foot

Scenario Typical Size: 50

Scenario Cost: $24,319.27 **Scenario Cost/Unit:** $486.39

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	30	$5,741.10
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	40	$1,732.80
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	10	$2,135.90
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	8	$777.52
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	42	$4,617.48
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	5	$206.15
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	40	$1,500.80
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	82	$1,892.56
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	23	$877.22
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	42	$937.86
Materials						
Pipe, CMP, 14-12 gauge, weight priced	1589	14 and 12 gauge galvanized helical corrugated metal pipe priced by the weight of the pipe materials. Materials only.	Pound	$0.75	2400	$1,800.00

Materials

Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	4	$261.40

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 578 - Stream Crossing

Scenario: #3 - Culvert, >6 ft diameter

Scenario Description:

Install a CMP culvert with a diameter greater than 6'. Work includes dewatering, site preparation and removing any old crossing, acquiring and installing culvert pipe with gravel bedding and fill (compacted), and building headwalls. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Use (396) Aquatic Organism Passage instead when the primary intent is biological concerns, not hydrologic. Use (587) Structure for Water Control instead, for ditch cross culverts and other intermittent flows.

Before Situation:

Water flow could not cross access road or trail without erosion; or access road or trail could not cross channel.

After Situation:

Access road and waterflow are able to cross each other in a stable manner.Stream flow is not impeded and a stable base exists for equipment, people and/or animals to cross. Typical scenario is for a 8' diameter Culvert installation. 15' road with 8' of fill over the culvert, 2.5:1 side slopes for a total pipe length of 50'. Associated practices could be (342) Critical Area Planting, (560) Access Road, (575) Animal Trails and Walkways, (566) Recreational Trails and Walkways, (500) Obstruction Removal, or (584) Channel Stabilization.

Scenario Feature Measure: Culvert

Scenario Unit: Foot

Scenario Typical Size: 50

Scenario Cost: $28,048.57 **Scenario Cost/Unit:** $560.97

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	45	$1,949.40
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	10	$2,135.90
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	8	$777.52
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	35	$6,697.95
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	45	$1,688.40
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	42	$4,617.48
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	23	$877.22
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	47	$1,049.51
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	5	$206.15
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	82	$1,892.56
Materials						
Pipe, CMP, 96", 14 Gauge	1835	96" Corrugated Metal Pipe, Galvanized, Uncoated, 14 gage. Material cost only.	Foot	$86.36	50	$4,318.00

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 578 - Stream Crossing

Scenario: #5 - Bridge, Treated Timber

Scenario Description:

Installation of a timber and steel bridge. Constructed of timber and i-beams bridges are attached at either end to prefabricated, reinforced and poured-in-place, or piling abutments capped/surrounded with concrete. Bridge decking is timber. Bridge design is completed to conform to loading requirements and site conditions. The bridge deck is designed to rest on abutments placed on the adjacent floodplain. Work includes dewatering, site preparation and removing any old crossing, acquiring and installing culvert pipe with gravel bedding and fill (compacted), and building headwalls. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Use (396) Aquatic Organism Passage instead, when the primary intent is biological concerns, not hydrologic. Use (587) Structure for Water Control instead, for ditch cross culverts and other intermittent flows.

Before Situation:

Water flow could not cross access road or trail without erosion; or access road or trail could not cross channel.

After Situation:

The undersized culvert is replaced with a timber bridge placed on precast concrete abutments. Stream flow is not impeded and a stable base exists for equipment, people and/or animals to cross. Typical Scenario is for a 30' span bridge 15' wide on precast concrete abutments.Access road and waterflow are able to cross each other in a stable manner.Associated practices could be (342) Critical Area Planting, (560) Access Road, (575) Animal Trails and Walkways, (566) Recreational Trails and Walkways, (500) Obstruction Removal, or (584) Channel Stabilization.

Scenario Feature Measure: Linear feet of bridge

Scenario Unit: Linear Foot

Scenario Typical Size: 30

Scenario Cost: $51,296.56 **Scenario Cost/Unit:** $1,709.89

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	10	$971.90
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	18	$9,150.66
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	40	$2,248.40
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	20	$3,827.40
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	50	$10,679.50
Truck, Concrete Pump	1211	Concrete pump, normally truck mounted. Use this item in association with other concrete components when job requires placement by other than normal chutes. Include drive and setup time in quantity; therefore, do not include mobilization. Includes equi	Hour	$181.53	4	$726.12
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	81	$8,905.14
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	20	$824.60

Labor

Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	70	$2,626.40
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	35	$1,334.90
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	81	$1,869.48

Materials

Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.85	1000	$850.00
Steel, structural steel members	1779	Structural steel, includes materials and fabrication.	Pound	$1.08	5360	$5,788.80

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 578 - Stream Crossing

Scenario: #6 - Bridge, Rail Car

Scenario Description:

Installation of a rail car bridge. Constructed of a recycled rail car, bridges are attached at either end to prefabricated, reinforced and poured-in-place, or piling abutments capped/surrounded with concrete. Bridge decking is timber. Bridge design is completed to conform to loading requirements and site conditions. The bridge deck is designed to rest on abutments placed on the adjacent floodplain.
Work includes dewatering, site preparation and removing any old crossing, acquiring and installing culvert pipe with gravel bedding and fill (compacted), and building headwalls. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Use (396) Aquatic Organism Passage instead, when the primary intent is biological concerns, not hydrologic. Use (587) Structure for Water Control instead, for ditch cross culverts and other intermittent flows.

Before Situation:

Water flow could not cross access road or trail without erosion; or access road or trail could not cross channel.

After Situation:

The undersized culvert is replaced with a rail car bridge placed on precast concrete abutments. Stream flow is not impeded and a stable base exists for equipment, people and/or animals to cross. Typical Scenario is for a 30' span bridge 14' wide on precast concrete abutments.Access road and waterflow are able to cross each other in a stable manner.Associated practices could be (342) Critical Area Planting, (560) Access Road, (575) Animal Trails and Walkways, (566) Recreational Trails and Walkways, (500) Obstruction Removal, or (584) Channel Stabilization.

Scenario Feature Measure: Linear feet of bridge

Scenario Unit: Linear Foot

Scenario Typical Size: 30

Scenario Cost: $69,485.14 **Scenario Cost/Unit:** $2,316.17

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	10	$971.90
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	18	$9,150.66
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	40	$2,248.40
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	20	$3,827.40
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	50	$10,679.50
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	50	$1,876.00
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	80	$8,795.20
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	60	$1,384.80
Materials						

Materials

Railcar Bridge	2261	A 'pre assembeled' bridge constructed from a used rail car with a railing. The structure has been evaluated by a PE and modified as needed to provide structural stability for highway loadings. Typical loadings are HS 20. Typical widths are 14', length.	Foot	$985.71	30	$29,571.30

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 578 - Stream Crossing

Scenario: #7 - Bridge, Manufactured

Scenario Description:

Installation of a manufactured steel or concrete bridge. Constructed of a manufactured structure, bridges are attached at either end to prefabricated, reinforced and poured-in-place, or piling abutments capped/surrounded with concrete. Bridge decking is timber. Bridge design is completed to conform to loading requirements and site conditions. The bridge deck is designed to rest on abutments placed on the adjacent floodplain.

Work includes dewatering, site preparation and removing any old crossing, acquiring and installing culvert pipe with gravel bedding and fill (compacted), and building headwalls. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Use (396) Aquatic Organism Passage instead, when the primary intent is biological concerns, not hydrologic. Use (587) Structure for Water Control instead, for ditch cross culverts and other intermittent flows.

Before Situation:

Water flow could not cross access road or trail without erosion; or access road or trail could not cross channel.

After Situation:

The undersized culvert is replaced with a rail car bridge placed on precast concrete abutments. Stream flow is not impeded and a stable base exists for equipment, people and/or animals to cross. Typical Scenario is for a 30' span bridge 15' wide on precast concrete abutments.Access road and waterflow are able to cross each other in a stable manner.Associated practices could be (342) Critical Area Planting, (560) Access Road, (575) Animal Trails and Walkways, (566) Recreational Trails and Walkways, (500) Obstruction Removal, or (584) Channel Stabilization.

Scenario Feature Measure: Linear feet of bridge

Scenario Unit: Linear Foot

Scenario Typical Size: 30

Scenario Cost: $72,048.81 **Scenario Cost/Unit:** $2,401.63

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	20	$3,827.40
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	50	$10,679.50
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	40	$2,248.40
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	18	$9,150.66
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	10	$971.90
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	34	$1,296.76
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	61	$1,407.88
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	51	$1,913.52
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	21	$865.83

Labor

Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	80	$8,795.20

Materials

Bridge, steel or concrete, pre-Manufactured Bridge	2193	A premanufactured steel or precast prestressed concrete bridge rated for an HS 25 highway loading. Typical width is 14', length is variable. Includes railing system. Includes materials and shipping only.	Square Foot	$65.33	450	$29,398.50

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 578 - Stream Crossing

Scenario: #9 - Low water crossing, Hard armor

Scenario Description:

Stabilize the bottom and slope of a stream channel using rock riprap or other materials. This scenario includes site preparation, dewatering, acquiring and installing gravel or geotextile with rock riprap or cast in place concrete on channel bottom and approaches. Final travel surface shall be the rocks or concrete. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Typical stream has 30 foot bottom width and approaches. Width is 14 feet for a total area as 420sf. Use (396) Aquatic Organism Passage instead, when the primary intent is biological concerns, not hydrologic.

Before Situation:

Water flow could not cross access road or trail without erosion; or access road or trail could not cross channel.

After Situation:

Stream flow is not impeded and a stable base exists for equipment, people and/or animals to cross. Associated practices could be (342) Critical Area Planting, (560) Access Road, (575) Animal Trails and Walkways, (566) Recreational Trails and Walkways, (500) Obstruction Removal, or (584) Channel Stabilization.

Scenario Feature Measure: Crossing dimensions

Scenario Unit: Square Foot

Scenario Typical Size: 420

Scenario Cost: $8,378.38 **Scenario Cost/Unit:** $19.95

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	10	$2,135.90
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	2	$194.38
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	18	$32.58
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	41	$4,507.54
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	2	$75.04
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	18	$1,176.30
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: **578 - Stream Crossing**

Scenario: **#10 - Low water crossing, Prefabricated products**

Scenario Description:

To install a stable crossing medium on channel bottom and approaches. Medium includes but not limited to precast concrete blocks, geocells, pavers, and gabions. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Typical stream has 30 foot bottom width and approaches. Width is 14 feet for a total area as 420sf. Use (396) Aquatic Organism Passage instead, when the primary intent is biological concerns, not hydrologic.

Before Situation:

Water flow could not cross access road or trail without erosion; or access road or trail could not cross channel.

After Situation:

Access road and waterflow are able to cross each other in a stable manner.Stream flow is not impeded and a stable base exists for equipment, people and/or animals to cross. Associated practices could be (342) Critical Area Planting, (560) Access Road, (575) Animal Trails and Walkways, (566) Recreational Trails and Walkways, (500) Obstruction Removal, or (584) Channel Stabilization.

Scenario Feature Measure: low water crossing

Scenario Unit: Square Foot

Scenario Typical Size: 420

Scenario Cost: $10,196.46 **Scenario Cost/Unit:** $24.28

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	18	$32.58
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	10	$2,135.90
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	2	$194.38
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	3	$112.56
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	40	$4,397.60
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	41	$946.28
Materials						
GeoCell, 4"	1054	Polymer 3-D cellular grid 4" deep that is filled with stone or earth. Includes materials, labor and equipment for the geocell only, does not include backfill.	Square Yard	$28.90	50	$1,445.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	18	$701.46
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	6	$230.70

Practice: 580 - Streambank and Shoreline Protection

Scenario: #1 - Vegetative

Scenario Description:

Protection of streambanks consisting of conventional plantings of vegetation including grasses, shrubs and trees to stabilize and protect against scour and erosion. Logs or rootwads for habitat features or as needed for permitting should be contracted under 395 - Stream Habitat Improvement and Management. If logs or rootwads will be incorporated as stability features, consider using a different scenario. The purpose of this practice is to maintain, improve, or restore physical, chemical, and biological functions of a stream to provide diverse aquatic communities to improve habitat for desired aquatic species. Payment cost include shaping bank and critical area vegetation. If erosion control fabric is needed, use associated practice 484-Mulching.
Resource Concerns: Soil Erosion - Excessive Bank Erosion from Streams, Shoreline and Water Conveyance Channels; Water Quality Degradation - Excessive Sediment in Surface Waters; Water Quality Degradation - Elevated Water Temperature; Excess/Insufficient Water - Excessive Sediment in Surface Waters; Inadequate Habitat for Fish and Wildlife- Habitat Degradation.
Associated Practices include: 560 - Access Road; 342 - Critical Area Planting; 382 - Fence; 391 - Riparian Forest Buffer; 390 - Riparian Herbaceous Cover; 395 - Stream Habitat Improvement and Management; 614 - Watering Facility; 484-Mulching.

Before Situation:

A stream bisects the agricultural property and has had all of the woody vegetation removed due to overgrazing or human manipulation; the stream has marginally degraded streambanks that are unstable and show signs of active erosion.
Soil Erosion: The streambank is unstable.
Water Quality Degradation: The sediment load has increased in the stream resulting in elevated water temperatures.
Excess/Insufficient Water: The excessive sediment load has reduced the water conveyance capacity, storage capacity and flow within the stream.
Inadequate Habitat for Fish and Wildlife: The deficiencies in the stream's habitat limit survival, growth, reproduction, and/or diversity of aquatic organisms within the stream.

After Situation:

The streambank is stable against further erosion and encourages natural sediment transport and deposition. Loss of riparian areas and sediment load is reduced in the stream. The typical scenairo is for regrading of vertical banks to a 3:1 slope and planting of grasses, shrubs and trees. The tree/shrub plantings are planted at a rate of 500 plants/acre with 30% conifers, 35% woody cuttings and 35% willows. The treated area is 1000 ft long by 20' wide or 0.5 acres.
For Soil Erosion: The streambank is stable.
For Water Quality Degradation: The sediment load has decreased in the stream resulting in improved aquatic habitat.
For Excess/Insufficient Water: The water conveyance capacity, storage capacity and flow within the stream has been stabilized.
For Inadequate Habitat for Fish and Wildlife: The reduction in the sediment load promotes survival, growth, reproduction, and/or diversity of aquatic organisms within the stream's habitat.

Scenario Feature Measure: Linear Feet of Streambank/Shoreline Protected

Scenario Unit: Linear Foot

Scenario Typical Size: 1,000

Scenario Cost: $14,723.76 **Scenario Cost/Unit:** $14.72

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	20	$1,349.00
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.99	0.5	$6.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	1000	$4,400.00
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	1000	$2,370.00
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	21	$787.92

Labor

Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	20	$824.60
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	90	$2,077.20

Materials

One Species, Cool Season, Annual Grass or Legume	2311	Cool season annual grass or legume. Includes material and shipping only.	Acre	$39.29	2	$78.58
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.17	251	$544.67
Tree, conifer, seedling or transplant, potted or B&B, 2-3 gal.	1537	Potted or balled and burlapped conifer tree, 2-3 gal. Includes materials and shipping only.	Each	$7.13	75	$534.75
Shrub, seedling or transplant, bare root, 36-60"	1508	Bare root shrubs 3 to 5 foot tall. Includes materials and shipping only.	Each	$1.73	88	$152.24
Tree, willow	1426	Willow tree for planting, 18" to 36" seedling. Includes materials and shipping only.	Each	$0.67	88	$58.96

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	6	$1,539.84

Practice: 580 - Streambank and Shoreline Protection

Scenario: #2 - Rock Rip Rap, Small

Scenario Description:

Protection of streambanks using structural measures such as riprap, concrete block, gabions, etc. to stabilize and protect banks of streams or excavated channels against scour and erosion in areas requireing a 2' thick layer of rock. Logs or rootwads for habitat features or as needed for permitting should be contracted under 395 - Stream Habitat Improvement and Management.
The purpose of this practice is to maintain, improve, or restore physical, chemical, and biological functions of a stream to provide diverse aquatic communities to improve habitat for desired aquatic species. Payment cost include shaping bank, critical area vegetation, and rock rip rap placed with geotextile. Use associated practice, 484-Mulching, for about 9000 sqft of erosion control blanket (ECB) that is typically needed to stabilize area above the rock toe (or 18sqft of ECB per 1 LnFt of Rip Rap).
Resource Concerns: Soil Erosion - Excessive Bank Erosion from Streams, Shoreline and Water Conveyance Channels; Water Quality Degradation - Excessive Sediment in Surface Waters; Water Quality Degradation - Elevated Water Temperature; Excess/Insufficient Water - Excessive Sediment in Surface Waters; Inadequate Habitat for Fish and Wildlife- Habitat Degradation.
Associated Practices include: 560 - Access Road; 342 - Critical Area Planting; 382 - Fence; 391 - Riparian Forest Buffer; 390 - Riparian Herbaceous Cover; 395 - Stream Habitat Improvement and Management; 614 - Watering Facility; 484-Mulching.

Before Situation:

A stream bisects the agricultural property and has had all of the woody vegetation removed due to overgrazing or human manipulation; the stream has severely degraded streambanks that are unstable and show signs of active erosion.
Soil Erosion: The streambank is unstable.
Water Quality Degradation: The sediment load has increased in the stream resulting in elevated water temperatures.
Excess/Insufficient Water: The excessive sediment load has reduced the water conveyance capacity, storage capacity and flow within the stream.
Inadequate Habitat for Fish and Wildlife: The deficiencies in the stream's habitat limit survival, growth, reproduction, and/or diversity of aquatic organisms within the stream.

After Situation:

The streambank is stable against further erosion and encourages natural sediment transport and deposition. Loss of riparian areas and sediment load is reduced in the stream. Typical scenario is for a 6-foot high vertical bank regraded to 3(H):1(V) slope for 500 linear feet. The rock toe will be 2' thick and 5' high. The bank above the riprap will be graded to a stable slope and revegetated. The entire area is planted with a mix of conifers, woody cuttings and shrubs. Cuttings are planted at a 2' grid spacing in the rip rap area, above this section 500 plants per acre, 30% conifer, 35% willow, 35% shrubs are planted tree protectors are used for all plants
For Soil Erosion: The streambank is stable.
For Water Quality Degradation: The sediment load has decreased in the stream resulting in improved aquatic habitat.
For Excess/Insufficient Water: The water conveyance capacity, storage capacity and flow within the stream has been stabilized.
For Inadequate Habitat for Fish and Wildlife: The reduction in the sediment load promotes survival, growth, reproduction, and/or diversity of aquatic organisms within the stream's habitat.

Scenario Feature Measure: Linear Feet of Streambank/Shoreline Protected

Scenario Unit: Linear Foot

Scenario Typical Size: 500

Scenario Cost: $33,201.30 **Scenario Cost/Unit:** $66.40

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	1000	$4,400.00
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	20	$1,349.00
Excavation, common earth, wet, side cast, large equipment	1228	Bulk excavation and side casting of wet common earth with hydraulic excavator or dragline with greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$4.22	1000	$4,220.00
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.99	0.2	$2.40
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	34	$1,401.82

Labor

Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	84	$3,203.76
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	105	$2,423.40
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	23	$862.96

Materials

Tree, conifer, seedling or transplant, potted or B&B, 2-3 gal.	1537	Potted or balled and burlapped conifer tree, 2-3 gal. Includes materials and shipping only.	Each	$7.13	26	$185.38
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.17	836	$1,814.12
One Species, Cool Season, Annual Grass or Legume	2311	Cool season annual grass or legume. Includes material and shipping only.	Acre	$39.29	1	$39.29
Tree, willow	1426	Willow tree for planting, 18" to 36" seedling. Includes materials and shipping only.	Each	$0.67	30	$20.10
Cuttings, woody, medium size	1308	Woody cuttings, live stakes or whips typically 1/4" to 1" diameter and 24" to 48" long. Includes materials and shipping only.	Each	$0.49	750	$367.50
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	185	$12,089.75
Shrub, seedling or transplant, bare root, 36-60"	1508	Bare root shrubs 3 to 5 foot tall. Includes materials and shipping only.	Each	$1.73	30	$51.90

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 580 - Streambank and Shoreline Protection

Scenario: #3 - Rock Rip Rap, Large

Scenario Description:

Protection of streambanks using structural measures such as riprap, concrete block, gabions, etc. to stabilize and protect banks of streams or excavated channels against scour and erosion requireing a 3' thick layer of rock. Logs or rootwads for habitat features or as needed for permitting should be contracted under 395 - Stream Habitat Improvement and Management. .

The purpose of this practice is to maintain, improve, or restore physical, chemical, and biological functions of a stream to provide diverse aquatic communities to improve habitat for desired aquatic species. Payment cost include shaping bank, critical area vegetation, and rock rip rap placed with geotextile. Use associated practice, 484-Mulching, for about 9000 sqft of erosion control blanket (ECB) that is typically needed to stabilize area above the rock toe (or 18sqft of ECB per 1 LnFt of Rip Rap).

Resource Concerns: Soil Erosion - Excessive Bank Erosion from Streams, Shoreline and Water Conveyance Channels; Water Quality Degradation - Excessive Sediment in Surface Waters; Water Quality Degradation - Elevated Water Temperature; Excess/Insufficient Water - Excessive Sediment in Surface Waters; Inadequate Habitat for Fish and Wildlife- Habitat Degradation.

Associated Practices include: 560 - Access Road; 342 - Critical Area Planting; 382 - Fence; 391 - Riparian Forest Buffer; 390 - Riparian Herbaceous Cover; 395 - Stream Habitat Improvement and Management; 614 - Watering Facility; 484-Mulching.

Before Situation:

A stream bisects the agricultural property and has had all of the woody vegetation removed due to overgrazing or human manipulation; the stream has severely degraded streambanks that are unstable and show signs of active erosion.

Soil Erosion: The streambank is unstable.

Water Quality Degradation: The sediment load has increased in the stream resulting in elevated water temperatures.

Excess/Insufficient Water: The excessive sediment load has reduced the water conveyance capacity, storage capacity and flow within the stream.

Inadequate Habitat for Fish and Wildlife: The deficiencies in the stream's habitat limit survival, growth, reproduction, and/or diversity of aquatic organisms within the stream.

After Situation:

The streambank is stable against further erosion and encourages natural sediment transport and deposition. Loss of riparian areas and sediment load is reduced in the stream. Typical scenario is for a 6-foot high vertical bank regraded to 3(H):1(V) slope for 500 linear feet. The rock toe will be 3' thick and 5' high. The bank above the riprap will be graded to a stable slope and revegetated. The entire area is planted with a mix of conifers, woody cuttings and shrubs. Cuttings are planted at a 2' grid spacing in the rip rap area, above this section 500 plants per acre, 30% conifer, 35% willow, 35% shrubs are planted tree protectors are used for all plants.

For Soil Erosion: The streambank is stable.

For Water Quality Degradation: The sediment load has decreased in the stream resulting in improved aquatic habitat.

For Excess/Insufficient Water: The water conveyance capacity, storage capacity and flow within the stream has been stabilized.

For Inadequate Habitat for Fish and Wildlife: The reduction in the sediment load promotes survival, growth, reproduction, and/or diversity of aquatic organisms within the stream's habitat.

Scenario Feature Measure: Linear Feet of Streambank/Shoreline Protected

Scenario Unit: Linear Foot

Scenario Typical Size: 500

Scenario Cost: $39,278.85 **Scenario Cost/Unit:** $78.56

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	1000	$4,400.00
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	20	$1,349.00
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.99	0.2	$2.40
Excavation, common earth, wet, side cast, large equipment	1228	Bulk excavation and side casting of wet common earth with hydraulic excavator or dragline with greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$4.22	1000	$4,220.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	34	$1,401.82

Labor

Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	84	$3,203.76
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	105	$2,423.40
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	23	$862.96

Materials

Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.17	836	$1,814.12
Cuttings, woody, medium size	1308	Woody cuttings, live stakes or whips typically 1/4" to 1" diameter and 24" to 48" long. Includes materials and shipping only.	Each	$0.49	750	$367.50
Tree, willow	1426	Willow tree for planting, 18" to 36" seedling. Includes materials and shipping only.	Each	$0.67	30	$20.10
Tree, conifer, seedling or transplant, potted or B&B, 2-3 gal.	1537	Potted or balled and burlapped conifer tree, 2-3 gal. Includes materials and shipping only.	Each	$7.13	26	$185.38
One Species, Cool Season, Annual Grass or Legume	2311	Cool season annual grass or legume. Includes material and shipping only.	Acre	$39.29	1	$39.29
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	278	$18,167.30
Shrub, seedling or transplant, bare root, 36-60"	1508	Bare root shrubs 3 to 5 foot tall. Includes materials and shipping only.	Each	$1.73	30	$51.90

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 580 - Streambank and Shoreline Protection

Scenario: #4 - Bioengineered

Scenario Description:

Protection of streambanks consisting of a bioengineered technique comprised of non-structural measures such as soil lifts wrapped in degradable geotextile materials with live stakes and other vegetative measures to stabilize and protect the streambank against scour and erosion. 484-Mulching is paired with this scenario to install the geotextile materials. This typical size assumes 3 soil lifts, 500' long, 1.5 ft high each; 2 types of erosion control blankets per lift (inner and outer); 11.5 ft width of blanket per lift = 34,500 SqFt of erosion control blanket (or 69 SqFt of ECB / LnFt of streambank protection installed).

The purpose of this practice is to maintain, improve, or restore physical, chemical, and biological functions of a stream to provide diverse aquatic communities to improve habitat for desired aquatic species. Payment cost include shaping bank, critical area vegetation, livestake, and revetments.

Resource Concerns: Soil Erosion - Excessive Bank Erosion from Streams, Shoreline and Water Conveyance Channels; Water Quality Degradation - Excessive Sediment in Surface Waters; Water Quality Degradation - Elevated Water Temperature; Excess/Insufficient Water - Excessive Sediment in Surface Waters; Inadequate Habitat for Fish and Wildlife- Habitat Degradation.

Associated Practices include: 560 - Access Road; 342 - Critical Area Planting; 382 - Fence; 391 - Riparian Forest Buffer; 390 - Riparian Herbaceous Cover; 395 - Stream Habitat Improvement and Management; 614 - Watering Facility; 484-Mulching.

Before Situation:

A stream bisects the agricultural property and has had all of the woody vegetation removed due to overgrazing or human manipulation; the stream has moderately degraded streambanks that are unstable and show signs of active erosion.

Soil Erosion: The streambank is unstable.

Water Quality Degradation: The sediment load has increased in the stream resulting in elevated water temperatures.

Excess/Insufficient Water: The excessive sediment load has reduced the water conveyance capacity, storage capacity and flow within the stream.

Inadequate Habitat for Fish and Wildlife: The deficiencies in the stream's habitat limit survival, growth, reproduction, and/or diversity of aquatic organisms within the stream.

After Situation:

The streambank is stable against further erosion and encourages natural sediment transport and deposition. Loss of riparian areas and sediment load is reduced in the stream. Typical scenario is for a 6-foot high bank with three soil lifts for 500 linear feet. Area planted is 500' long by 20' wide ~0.25 acres. Cuttings are planted at a 2' grid spacing in the 'treated' area, above this section 500 plants per acre, 30% conifer, 35% willow, 35% shrubs are planted tree protectors are used for all plants

For Soil Erosion: The streambank is stable.

For Water Quality Degradation: The sediment load has decreased in the stream resulting in improved aquatic habitat.

For Excess/Insufficient Water: The water conveyance capacity, storage capacity and flow within the stream has been stabilized.

For Inadequate Habitat for Fish and Wildlife: The reduction in the sediment load promotes survival, growth, reproduction, and/or diversity of aquatic organisms within the stream's habitat.

Scenario Feature Measure: Linear Feet of Streambank/Shoreline Protected

Scenario Unit: Linear Foot

Scenario Typical Size: 500

Scenario Cost: $19,928.70 **Scenario Cost/Unit:** $39.86

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.99	0.25	$3.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	1250	$5,500.00
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	1250	$2,962.50
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	20	$1,349.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	22	$907.06

Labor

Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	84	$3,203.76
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	84	$1,938.72
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	24	$900.48

Materials

Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.17	836	$1,814.12
One Species, Cool Season, Annual Grass or Legume	2311	Cool season annual grass or legume. Includes material and shipping only.	Acre	$39.29	1	$39.29
Tree, conifer, seedling or transplant, potted or B&B, 2-3 gal.	1537	Potted or balled and burlapped conifer tree, 2-3 gal. Includes materials and shipping only.	Each	$7.13	26	$185.38
Shrub, seedling or transplant, bare root, 36-60"	1508	Bare root shrubs 3 to 5 foot tall. Includes materials and shipping only.	Each	$1.73	30	$51.90
Tree, willow	1426	Willow tree for planting, 18" to 36" seedling. Includes materials and shipping only.	Each	$0.67	30	$20.10
Cuttings, woody, medium size	1308	Woody cuttings, live stakes or whips typically 1/4" to 1" diameter and 24" to 48" long. Includes materials and shipping only.	Each	$0.49	750	$367.50

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 580 - Streambank and Shoreline Protection

Scenario: #5 - Bioengineered w/ Logs

Scenario Description:

Protection of streambanks consisting of a bioengineered technique comprised of non-structural measures such as soil lifts wrapped in degradable geotextile materials with large wood structures, live stakes and other vegetative measures to stabilize and protect the streambank against scour and erosion. 484-Mulching is paired with this scenario to install the geotextile materials. This typical size assumes 2 soil lifts, 500' long, 1.5 ft high each; 2 types of erosion control blankets (ECB) per lift (inner and outer); 11.5 ft width of blanket per lift = 23,000 SqFt of erosion control blanket (or 46 SqFt of ECB / LnFt of streambank protection installed).
The purpose of this practice is to maintain, improve, or restore physical, chemical, and biological functions of a stream to provide diverse aquatic communities to improve habitat for desired aquatic species. Payment cost include shaping bank, critical area vegetation, livestake, rootwads and revetments. Where geotextile materials are needed (to stabilize soil lifts) use 484-Mulching.
Resource Concerns: Soil Erosion - Excessive Bank Erosion from Streams, Shoreline and Water Conveyance Channels; Water Quality Degradation - Excessive Sediment in Surface Waters; Water Quality Degradation - Elevated Water Temperature; Excess/Insufficient Water - Excessive Sediment in Surface Waters; Inadequate Habitat for Fish and Wildlife- Habitat Degradation.
Associated Practices include: 560 - Access Road; 342 - Critical Area Planting; 382 - Fence; 391 - Riparian Forest Buffer; 390 - Riparian Herbaceous Cover; 395 - Stream Habitat Improvement and Management; 614 - Watering Facility; 484-Mulching.

Before Situation:

A stream bisects the agricultural property and has had all of the woody vegetation removed due to overgrazing or human manipulation; the stream has moderately degraded streambanks that are unstable and show signs of active erosion.
Soil Erosion: The streambank is unstable.
Water Quality Degradation: The sediment load has increased in the stream resulting in elevated water temperatures.
Excess/Insufficient Water: The excessive sediment load has reduced the water conveyance capacity, storage capacity and flow within the stream.
Inadequate Habitat for Fish and Wildlife: The deficiencies in the stream's habitat limit survival, growth, reproduction, and/or diversity of aquatic organisms within the stream.

After Situation:

The streambank is stable against further erosion and encourages natural sediment transport and deposition. Loss of riparian areas and sediment load is reduced in the stream. Typical scenario is for a 6-foot high bank with two soil lifts for 500 linear feet with log structures. Assumes log vanes will be used for bank treatment with habitat logs/rootwads inbetween structures. 10 Bank protection structures, each made up of 3 logs (one is 30'L X 24"W; 2 are 15'L X 24"W). Habitat structures: 13 logs (25'L X 24"W) to be used as footers for 3/4 of the treated area (375'). 50 logs with rootwads (logs: 20'L X 24"W; rootwad bole: 6-8'W), spaced 8' apart. Log w/rootwad is placed on top of footer log. Cuttings are planted at a 2' grid spacing in the 'treated' area, above this section 500 plants per acre, 30% conifer, 35% willow, 35% shrubs are planted tree protectors are used for all plants
For Soil Erosion: The streambank is stable.
For Water Quality Degradation: The sediment load has decreased in the stream resulting in improved aquatic habitat.
For Excess/Insufficient Water: The water conveyance capacity, storage capacity and flow within the stream has been stabilized.
For Inadequate Habitat for Fish and Wildlife: The reduction in the sediment load promotes survival, growth, reproduction, and/or diversity of aquatic organisms within the stream's habitat.

Scenario Feature Measure: Linear Feet of Streambank/Shoreline Protected

Scenario Unit: Linear Foot

Scenario Typical Size: 500

Scenario Cost: $47,157.50 **Scenario Cost/Unit:** $94.31

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	73	$13,970.01
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	1250	$2,962.50
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	20	$1,349.00
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.99	0.25	$3.00

Equipment/Installation

Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	1250	$5,500.00

Labor

General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	84	$1,938.72
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	101	$3,789.52
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	42	$1,731.66
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	84	$3,203.76

Materials

One Species, Cool Season, Annual Grass or Legume	2311	Cool season annual grass or legume. Includes material and shipping only.	Acre	$39.29	1	$39.29
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.17	836	$1,814.12
Log, un-anchored	2035	Price of log picked up at the Mill. Includes material only.	Ton	$40.21	231	$9,288.51
Cuttings, woody, medium size	1308	Woody cuttings, live stakes or whips typically 1/4" to 1" diameter and 24" to 48" long. Includes materials and shipping only.	Each	$0.49	750	$367.50
Tree, willow	1426	Willow tree for planting, 18" to 36" seedling. Includes materials and shipping only.	Each	$0.67	30	$20.10
Shrub, seedling or transplant, bare root, 36-60"	1508	Bare root shrubs 3 to 5 foot tall. Includes materials and shipping only.	Each	$1.73	30	$51.90
Tree, conifer, seedling or transplant, potted or B&B, 2-3 gal.	1537	Potted or balled and burlapped conifer tree, 2-3 gal. Includes materials and shipping only.	Each	$7.13	26	$185.38

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 580 - Streambank and Shoreline Protection

Scenario: #6 - Boiengineered, rock toe

Scenario Description:

Protection of streambanks consisting of a bioengineered technique comprised of non-structural measures such as soil lifts wrapped in degradable geotextile materials, live stakes, and structural measures such as riprap to stabilize and protect the streambank against scour and erosion. 484-Mulching is paired with this scenario to install the geotextile materials. This typical size assumes 2 soil lifts, 500' long, 1.5 ft high each; 2 types of erosion control blankets (ECB) per lift (inner and outer); 11.5 ft width of blanket per lift = 23,000 SqFt of erosion control blanket (or 46 SqFt of ECB / LnFt of streambank protection installed). Payment cost include shaping bank, critical area vegetation, and rock rip rap.

Resource Concerns: Soil Erosion - Excessive Bank Erosion from Streams, Shoreline and Water Conveyance Channels; Water Quality Degradation - Excessive Sediment in Surface Waters; Water Quality Degradation - Elevated Water Temperature; Excess/Insufficient Water - Excessive Sediment in Surface Waters; Inadequate Habitat for Fish and Wildlife- Habitat Degradation.

Associated Practices include: 560 - Access Road; 342 - Critical Area Planting; 382 - Fence; 391 - Riparian Forest Buffer; 390 - Riparian Herbaceous Cover; 395 - Stream Habitat Improvement and Management; 614 - Watering Facility; 484-Mulching.

Before Situation:

A stream bisects the agricultural property and has had all of the woody vegetation removed due to overgrazing or human manipulation; the stream has severely degraded streambanks that are unstable and show signs of active erosion.

Soil Erosion: The streambank is unstable.

Water Quality Degradation: The sediment load has increased in the stream resulting in elevated water temperatures.

Excess/Insufficient Water: The excessive sediment load has reduced the water conveyance capacity, storage capacity and flow within the stream.

Inadequate Habitat for Fish and Wildlife: The deficiencies in the stream's habitat limit survival, growth, reproduction, and/or diversity of aquatic organisms within the stream.

After Situation:

The streambank is stable against further erosion and encourages natural sediment transport and deposition. Loss of riparian areas and sediment load is reduced in the stream. Typical scenario is for a 6-foot high bank with two soil lifts for 500 linear feet. The rock toe will be 2' thick and 5' high, extending below the anticipated scour depth of the streambed. Cuttings are planted at a 2' grid spacing in the rip rap area, above this section 500 plants per acre, 30% conifer, 35% willow, 35% shrubs are planted tree protectors are used for all plants

For Soil Erosion: The streambank is stable.

For Water Quality Degradation: The sediment load has decreased in the stream resulting in improved aquatic habitat.

For Excess/Insufficient Water: The water conveyance capacity, storage capacity and flow within the stream has been stabilized.

For Inadequate Habitat for Fish and Wildlife: The reduction in the sediment load promotes survival, growth, reproduction, and/or diversity of aquatic organisms within the stream's habitat.

Scenario Feature Measure: Linear Feet of Streambank/Shoreline Protected

Scenario Unit: Linear Foot

Scenario Typical Size: 500

Scenario Cost: $44,045.50 **Scenario Cost/Unit:** $88.09

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	20	$1,349.00
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	40	$7,654.80
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	1351	$5,944.40
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	1351	$3,201.87
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.99	0.25	$3.00

Labor

Labor

Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	34	$1,275.68
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	34	$1,401.82
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	84	$3,203.76
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	195	$4,500.60

Materials

Shrub, seedling or transplant, bare root, 36-60"	1508	Bare root shrubs 3 to 5 foot tall. Includes materials and shipping only.	Each	$1.73	30	$51.90
Tree, conifer, seedling or transplant, potted or B&B, 2-3 gal.	1537	Potted or balled and burlapped conifer tree, 2-3 gal. Includes materials and shipping only.	Each	$7.13	26	$185.38
Tree, willow	1426	Willow tree for planting, 18" to 36" seedling. Includes materials and shipping only.	Each	$0.67	30	$20.10
Cuttings, woody, medium size	1308	Woody cuttings, live stakes or whips typically 1/4" to 1" diameter and 24" to 48" long. Includes materials and shipping only.	Each	$0.49	750	$367.50
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	185	$12,089.75
One Species, Cool Season, Annual Grass or Legume	2311	Cool season annual grass or legume. Includes material and shipping only.	Acre	$39.29	1	$39.29
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.17	836	$1,814.12

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 580 - Streambank and Shoreline Protection

Scenario: #7 - Large Wood Structures

Scenario Description:

Protection of streambanks using discrete structural large wood placement. Large wood structures promote habitat complexity for Endangered Species Act listed aquatic organisms while acting as stream barbs to deflect flow away from eroding streambanks. Large wood also provides increased roughness along banks that are hydraulically efficient; increased roughness reduces near-bank velocities and shear stress. Logs with and without rootwads are embedded in the streambank and stream bed along the eroding stream bank in a variety of configurations; all members are pinned together using rebar and ballasted with large rock. Associated practice, 484-Mulching, is added to install Erosion Control Blanket (ECB) to stabilize bank above wood structure; typically 6 SqFt of ECB per LnFt of treatment.
The purpose of this practice is to maintain, improve, or restore physical, chemical, and biological functions of a stream to provide diverse aquatic communities to improve habitat for desired aquatic species while provide bank stabilization. Payment cost include shaping bank, critical area vegetation, live stakes, rootwads, logs, ballast rock and hauling:
Resource Concerns: Soil Erosion - Excessive Bank Erosion from Streams, Shoreline and Water Conveyance Channels; Water Quality Degradation - Excessive Sediment in Surface Waters; Water Quality Degradation - Elevated Water Temperature; Excess/Insufficient Water - Excessive Sediment in Surface Waters; Inadequate Habitat for Fish and Wildlife- Habitat Degradation.
Associated Practices include: 342 - Critical Area Planting; 382 - Fence; 391 - Riparian Forest Buffer; 390 - Riparian Herbaceous Cover; 395 - Stream Habitat Improvement and Management; 500-Obstruction Removal; 584-Channel Bed Stabilization; 484-Mulching.

Before Situation:

A stream has moderately degraded streambanks that are unstable and show signs of active erosion.
Soil Erosion: The streambank is unstable.
Water Quality Degradation: The sediment load has increased in the stream resulting in elevated water temperatures.
Excess/Insufficient Water: The excessive sediment load has reduced the water conveyance capacity, storage capacity and flow within the stream.
Inadequate Habitat for Fish and Wildlife: The deficiencies in the stream's habitat limit survival, growth, reproduction, and/or diversity of aquatic organisms within the stream.

After Situation:

The streambank is stable against further erosion and encourages natural sediment transport and deposition. Loss of riparian areas and sediment load is reduced in the stream. Typical scenario is for a 6-foot high bank at 3(H):1(V) slope for 100 linear feet with wood structues spaced 50 ft apart is used for estimation purposes. Tree and shrub plantings are also included at a rate of 500 plants per acre, 30% conifer, 35% willow, 35% shrubs plus tree protectors. Area planted is 100' long by 20' wide ~0.05 acres Cuttings are planted at a 2' grid spacing in the lower 5', above this section 500 plants per acre, 30% conifer, 35% willow, 35% shrubs are planted tree protectors are used for all plants
For Soil Erosion: The streambank is stable.
For Water Quality Degradation: The sediment load has decreased in the stream resulting in improved aquatic habitat.
For Excess/Insufficient Water: The water conveyance capacity, storage capacity and flow within the stream has been stabilized.
For Inadequate Habitat for Fish and Wildlife: The reduction in the sediment load promotes survival, growth, reproduction, and/or diversity of aquatic organisms within the stream's habitat. Installation of large wood structures provides improved habitat complexity for target fish species.

Scenario Feature Measure: Linear Feet of Streambank/Shoreline Protected

Scenario Unit: Linear Foot

Scenario Typical Size: 100

Scenario Cost: $16,152.44 **Scenario Cost/Unit:** $161.52

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	80	$462.40
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	32	$3,663.36
Excavation, common earth, wet, side cast, large equipment	1228	Bulk excavation and side casting of wet common earth with hydraulic excavator or dragline with greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$4.22	320	$1,350.40
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.32	3750	$1,200.00

Labor

Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	98	$3,737.72
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	38	$1,425.76

Materials

Log, un-anchored	2035	Price of log picked up at the Mill. Includes material only.	Ton	$40.21	50	$2,010.50
Cuttings, woody, medium size	1308	Woody cuttings, live stakes or whips typically 1/4" to 1" diameter and 24" to 48" long. Includes materials and shipping only.	Each	$0.49	150	$73.50
Tree, willow	1426	Willow tree for planting, 18" to 36" seedling. Includes materials and shipping only.	Each	$0.67	7	$4.69
Shrub, seedling or transplant, bare root, 36-60"	1508	Bare root shrubs 3 to 5 foot tall. Includes materials and shipping only.	Each	$1.73	7	$12.11
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.17	170	$368.90
Tree, conifer, seedling or transplant, potted or B&B, 2-3 gal.	1537	Potted or balled and burlapped conifer tree, 2-3 gal. Includes materials and shipping only.	Each	$7.13	6	$42.78
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$25.76	40	$1,030.40

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 580 - Streambank and Shoreline Protection

Scenario: #8 - Large Wood Structure with rock toe

Scenario Description:

Protection of streambanks using discrete structural large wood placement on a constructed rock toe. This scenario is appropriate for larger stream systems where the bankfull height is greater than 12 ft. Construction of a rock toe requires working closely with permitting agencies during the planning and design phases. Large wood structures promote habitat complexity for ESA listed aquatic organisms while acting as stream barbs to deflect flow away from eroding streambanks. Large wood also provides increased roughness along banks that are hydraulically efficient; increased roughness reduces near-bank velocities and shear stress. Logs with and without rootwads are embedded in the streambank and stream bed along the eroding stream bank in a variety of configurations; all members are pinned together using rebar and ballasted with large rock. Environmental benefits derived from large wood structures include diverse, complex, and productive aquatic habitats, shade, thermal and velocity refugia, organic additions to the stream, cover for fish, and improvements in aesthetic value and water quality. Installation of plantings along the riparian corridor, and installation clump plantings and live stakes within and around the wood structures are all important componets of large term success of wood structures. Associated practice, 484-Mulching, is added to install Erosion Control Blanket (ECB) to stabilize bank above wood structure; typically 6 SqFt of ECB per LnFt of treatment.
The purpose of this practice is to maintain, improve, or restore physical, chemical, and biological functions of a stream to provide diverse aquatic communities to improve habitat for desired aquatic species while provide bank stabilization. Payment cost include shaping bank, critical area vegetation, live stakes, angular rock, geotextile fabric, rootwads, logs, ballast rock and hauling: a 12-foot high bank at 1.5(H):1(V) slope for 100 linear feet with wood structures spaced 50 ft apart with 100 ft of rock toe is used for estimation purposes.
Resource Concerns: Soil Erosion - Excessive Bank Erosion from Streams, Shoreline and Water Conveyance Channels; Water Quality Degradation - Excessive Sediment in Surface Waters; Water Quality Degradation - Elevated Water Temperature; Excess/Insufficient Water - Excessive Sediment in Surface Waters; Inadequate Habitat for Fish and Wildlife- Habitat Degradation.
Associated Practices include: 342 - Critical Area Planting; 382 - Fence; 391 - Riparian Forest Buffer; 390 - Riparian Herbaceous Cover; 395 - Stream Habitat Improvement and Management; 500 Obstruction Removal; 584-Channel Bed Stabilization; 484-Mulching.

Before Situation:

A stream has moderately degraded streambanks that are unstable and show signs of active erosion.
Soil Erosion: The streambank is unstable.
Water Quality Degradation: The sediment load has increased in the stream resulting in elevated water temperatures.
Excess/Insufficient Water: The excessive sediment load has reduced the water conveyance capacity, storage capacity and flow within the stream.
Inadequate Habitat for Fish and Wildlife: The deficiencies in the stream's habitat limit survival, growth, reproduction, and/or diversity of aquatic organisms within the stream.

After Situation:

The streambank is stable against further erosion and encourages natural sediment transport and deposition. Loss of riparian areas and sediment load is reduced in the stream.
For Soil Erosion: The streambank is stable.
For Water Quality Degradation: The sediment load has decreased in the stream resulting in improved aquatic habitat.
For Excess/Insufficient Water: The water conveyance capacity, storage capacity and flow within the stream has been stabilized.
For Inadequate Habitat for Fish and Wildlife: The reduction in the sediment load promotes survival, growth, reproduction, and/or diversity of aquatic organisms within the stream's habitat. Installation of large wood structures provides improved habitat complexity for target fish species.

Scenario Feature Measure: Linear Feet of Streambank/Shoreline Protected

Scenario Unit: Linear Foot

Scenario Typical Size: 100

Scenario Cost: $28,612.18 **Scenario Cost/Unit:** $286.12

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, wet, side cast, large equipment	1228	Bulk excavation and side casting of wet common earth with hydraulic excavator or dragline with greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$4.22	320	$1,350.40
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.32	3750	$1,200.00

Equipment/Installation

Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	40	$4,579.20
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	80	$462.40

Labor

Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	46	$1,725.92
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	99	$3,775.86

Materials

Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.17	170	$368.90
Log, un-anchored	2035	Price of log picked up at the Mill. Includes material only.	Ton	$40.21	50	$2,010.50
Shrub, seedling or transplant, bare root, 36-60"	1508	Bare root shrubs 3 to 5 foot tall. Includes materials and shipping only.	Each	$1.73	7	$12.11
Tree, willow	1426	Willow tree for planting, 18" to 36" seedling. Includes materials and shipping only.	Each	$0.67	7	$4.69
Cuttings, woody, medium size	1308	Woody cuttings, live stakes or whips typically 1/4" to 1" diameter and 24" to 48" long. Includes materials and shipping only.	Each	$0.49	150	$73.50
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$25.76	475	$12,236.00
Tree, conifer, seedling or transplant, potted or B&B, 2-3 gal.	1537	Potted or balled and burlapped conifer tree, 2-3 gal. Includes materials and shipping only.	Each	$7.13	6	$42.78

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 580 - Streambank and Shoreline Protection

Scenario: #9 - Log Matrix

Scenario Description:

Protection of streambanks using a vegetated log matrix, which is comprised of pinned large wood base members, deflector rootwads, and a well-graded mix of logs, sticks, slash and woody debris. Structure is ballasted with large boulders and backfilled using material excavated from stream bed and banks and imported angular rock 6" minus. Large wood structures promote habitat complexity for ESA listed aquatic organisms while acting as stream barbs to deflect flow away from eroding streambanks. Large wood also provides increased roughness along banks that are hydraulically efficient; increased roughness reduces near-bank velocities and shear stress. Logs with and without rootwads are embedded in the streambank and stream bed along the eroding stream bank in a variety of configurations; all members are pinned together using rebar and ballasted with large rock. Environmental benefits derived from large wood structures include diverse, complex, and productive aquatic habitats, shade, thermal and velocity refugia, organic additions to the stream, cover for fish, and improvements in aesthetic value and water quality. Installation of plantings along the riparian corridor, and installation clump plantings and live stakes within and around the log matrix are all important componets of large term success. Associated practice, 484-Mulching, is added to install Erosion Control Blanket (ECB) to stabilize bank above wood structure; typically 6 SqFt of ECB per LnFt of treatment.
The purpose of this practice is to maintain, improve, or restore physical, chemical, and biological functions of a stream to provide diverse aquatic communities to improve habitat for desired aquatic species while provide bank stabilization. Payment cost include shaping bank, critical area vegetation, live stakes, rootwads, logs, ballast rock and hauling: a 6-foot high bank at 3(H):1(V) slope for 100 linear feet with wood installed over the entire 100 ft section.
Resource Concerns: Soil Erosion - Excessive Bank Erosion from Streams, Shoreline and Water Conveyance Channels; Water Quality Degradation - Excessive Sediment in Surface Waters; Water Quality Degradation - Elevated Water Temperature; Excess/Insufficient Water - Excessive Sediment in Surface Waters; Inadequate Habitat for Fish and Wildlife- Habitat Degradation.
Associated Practices include: 342 - Critical Area Planting; 382 - Fence; 391 - Riparian Forest Buffer; 390 - Riparian Herbaceous Cover; 395 - Stream Habitat Improvement and Management; 500-Obstruction Removal; 584-Channel Bed Stabilization; 484-Mulching.

Before Situation:

A stream has moderately degraded streambanks that are unstable and show signs of active erosion.
Soil Erosion: The streambank is unstable.
Water Quality Degradation: The sediment load has increased in the stream resulting in elevated water temperatures.
Excess/Insufficient Water: The excessive sediment load has reduced the water conveyance capacity, storage capacity and flow within the stream.
Inadequate Habitat for Fish and Wildlife: The deficiencies in the stream's habitat limit survival, growth, reproduction, and/or diversity of aquatic organisms within the stream.

After Situation:

The streambank is stable against further erosion and encourages natural sediment transport and deposition. Loss of riparian areas and sediment load is reduced in the stream.
For Soil Erosion: The streambank is stable.
For Water Quality Degradation: The sediment load has decreased in the stream resulting in improved aquatic habitat.
For Excess/Insufficient Water: The water conveyance capacity, storage capacity and flow within the stream has been stabilized.
For Inadequate Habitat for Fish and Wildlife: The reduction in the sediment load promotes survival, growth, reproduction, and/or diversity of aquatic organisms within the stream's habitat. Installation of large wood structures provides improved habitat complexity for target fish species.

Scenario Feature Measure: Linear Feet of Streambank/Shoreline Protected

Scenario Unit: Linear Foot

Scenario Typical Size: 100

Scenario Cost: $33,093.14 **Scenario Cost/Unit:** $330.93

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	80	$462.40
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.32	6250	$2,000.00
Excavation, common earth, wet, side cast, large equipment	1228	Bulk excavation and side casting of wet common earth with hydraulic excavator or dragline with greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$4.22	500	$2,110.00

Equipment/Installation

Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	80	$9,158.40

Labor

Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	114	$4,347.96
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	86	$3,226.72

Materials

Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	70	$1,880.90
Log, un-anchored	2035	Price of log picked up at the Mill. Includes material only.	Ton	$40.21	100	$4,021.00
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.17	906	$1,966.02
Tree, willow	1426	Willow tree for planting, 18" to 36" seedling. Includes materials and shipping only.	Each	$0.67	6	$4.02
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$25.76	105	$2,704.80
Cuttings, woody, medium size	1308	Woody cuttings, live stakes or whips typically 1/4" to 1" diameter and 24" to 48" long. Includes materials and shipping only.	Each	$0.49	900	$441.00

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 582 - Open Channel

Scenario: #1 - Excavation, Normal conditions

Scenario Description:

This scenario is the construction or improvement of a channel in which water flows with a free surface. Typical construction dimensions are 6' deep x 15' wide bottom x 100' length with a side slope of 2.5:1. The practice is used for the restoration of a natural or artificial channel to improve the process and ecological function in a degraded and eroding stream. Conditions are normal. Normal conditions include: a location easily accessible from a main road, soils without large rock or difficult clay to excavate, and/or other aspects that are average compared to excavation work in the area.This scenario assists in addressing the resource concerns: streambank erosion, sediment deposition, excessive flooding or ponding. Conservation practices that may be associated are: 356-Dike, 587-Structure For Water Control, 533-Pumping Plant, 580 Streambank and Shoreline Protection, 584 Channel Stabilization, 578 Stream Crossing.

Before Situation:

A stream or channel with active streambank erosion or headcuts and inadequate capacity to handle the flow needed for flood prevention, drainage or erosion prevention.

After Situation:

An earthen channel was excavated to allow unrestricted flow of water and to stabilize the bottom and side slopes. Flooding and erosion is no longer a resource concern.

Scenario Feature Measure: Volume of earth excavated in CY's

Scenario Unit: Cubic Yard

Scenario Typical Size: 500

Scenario Cost: $1,441.64 **Scenario Cost/Unit:** $2.88

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	500	$1,185.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 582 - Open Channel

Scenario: #2 - Excavation, Difficult conditions

Scenario Description:

This scenario is the construction or improvement of a channel in which water flows with a free surface. Typical construction dimensions are 6' deep x 15' wide bottom x 100' length with a side slope of 2.5:1. The practice is used for the restoration of a natural or artificial channel to improve the process and ecological function in a degraded and eroding stream. Conditions are difficult. Difficult conditions include: a location that requires a significant drive off the main road, soils with large rock or difficult clay to excavate, and/or other aspects that create difficulty in excavation compared to similar work in the area. Construction may include vegetation and/or a lightly armored bank toe. This scenario assists in addressing the resource concerns: streambank erosion, sediment deposition, excessive flooding or ponding. Conservation practices that may be associated are: 356-Dike, 587-Structure For Water Control, 533-Pumping Plant, 580 Streambank and Shoreline Protection, 584 Channel Stabilization, 578 Stream Crossing.

Before Situation:

A stream or channel with active streambank erosion or headcuts and inadequate capacity to handle the flow needed for flood prevention, drainage or erosion prevention.

After Situation:

An earthen channel was excavated to allow unrestricted flow of water and to stabilize the bottom and side slopes. Flooding and erosion is no longer a resource concern.

Scenario Feature Measure: Volume of earth excavated in CY's

Scenario Unit: Cubic Yard

Scenario Typical Size: 500

Scenario Cost: $1,956.12 **Scenario Cost/Unit:** $3.91

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	500	$1,185.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	8	$329.84
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 582 - Open Channel

Scenario: #3 - Excavation and Fill, Normal conditions

Scenario Description:

This scenario is the construction or improvement of a channel in which water flows with a free surface. Typical construction dimensions are 6' deep x 15' wide bottom x 100' length with a side slope of 2.5:1. Excavation and earth fill is required. The practice is used for the restoration of a natural or artificial channel to improve the process and ecological function in a degraded and eroding stream. Conditions are normal. Normal conditions include: a location easily accessible from a main road, soils without large rock or difficult clay to excavate, and/or other aspects that are average compared to excavation work in the area. This scenario assists in addressing the resource concerns: streambank erosion, sediment deposition, excessive flooding or ponding. Conservation practices that may be associated are: 356-Dike, 587-Structure For Water Control, 533-Pumping Plant, 580 Streambank and Shoreline Protection, 584 Channel Stabilization, 578 Stream Crossing.

Before Situation:

A stream or channel with active streambank erosion or headcuts and inadequate capacity to handle the flow needed for flood prevention, drainage or erosion prevention.

After Situation:

An earthen channel was excavated to allow unrestricted flow of water and to stabilize the bottom and side slopes. Some fill was used to complete the channel shape. Flooding and erosion is no longer a resource concern.

Scenario Feature Measure: Volume of earth excavated in CY's

Scenario Unit: Cubic Yard

Scenario Typical Size: 500

Scenario Cost: $3,641.64 **Scenario Cost/Unit:** $7.28

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	500	$2,200.00
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	500	$1,185.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 582 - Open Channel

Scenario: #4 - Excavation and Fill, Difficult conditions

Scenario Description:

This scenario is the construction or improvement of a channel in which water flows with a free surface. Typical construction dimensions are 6' deep x 15' wide bottom x 100' length with a side slope of 2.5:1. The practice is used for the restoration of a natural or artificial channel to improve the process and ecological function in a degraded and eroding stream. Excavation and earth fill is required. Conditions are difficult. Difficult conditions include: a location that requires a significant drive off the main road, soils with large rock or difficult clay to excavate, and/or other aspects that create difficulty in excavation compared to similar work in the area. Construction may include vegetation and/or a lightly armored bank toe. This scenario assists in addressing the resource concerns: streambank erosion, sediment deposition, excessive flooding or ponding. Conservation practices that may be associated are: 356-Dike, 587-Structure For Water Control, 533-Pumping Plant, 580 Streambank and Shoreline Protection, 584 Channel Stabilization, 578 Stream Crossing.

Before Situation:

A stream or channel with active streambank erosion or headcuts and inadequate capacity to handle the flow needed for flood prevention, drainage or erosion prevention.

After Situation:

An earthen channel was excavated to allow unrestricted flow of water and to stabilize the bottom and side slopes. Some fill was used to complete the channel shape. Flooding and erosion is no longer a resource concern.

Scenario Feature Measure: Volume of earth excavated in CY's

Scenario Unit: Cubic Yard

Scenario Typical Size: 500

Scenario Cost: $4,156.12 **Scenario Cost/Unit:** $8.31

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	500	$2,200.00
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	500	$1,185.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	8	$329.84
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 582 - Open Channel

Scenario: #5 - Excavation, Fill removal

Scenario Description:

This scenario is the construction or improvement of a channel in which water flows with a free surface on a site requiring that all fill be removed and disposed of off site. The practice is used for the restoration of a natural or artificial channel to improve the process and ecological function in a degraded and eroding stream. Conditions are normal. Normal conditions include: a location easily accessible from a main road, soils without large rock or difficult clay to excavate, and/or other aspects that are average compared to excavation work in the area.This scenario assists in addressing the resource concerns: streambank erosion, sediment deposition, excessive flooding or ponding. Conservation practices that may be associated are: 356-Dike, 587-Structure For Water Control, 533-Pumping Plant, 580 Streambank and Shoreline Protection, 584 Channel Stabilization, 578 Stream Crossing.

Before Situation:

A stream or channel with active streambank erosion or headcuts and inadequate capacity to handle the flow needed for flood prevention, drainage or erosion prevention.

After Situation:

An earthen channel was excavated to allow unrestricted flow of water and to stabilize the bottom and side slopes. Flooding and erosion is no longer a resource concern.Typical construction dimensions are 6' deep x 15' wide bottom x 100' length with a side slope of 2.5:1. Fill is hauled 8 miles to a disposal site, dumped, spread and compacted.

Scenario Feature Measure: Volume of earth excavated in CY's

Scenario Unit: Cubic Yard

Scenario Typical Size: 500

Scenario Cost: $6,714.92 **Scenario Cost/Unit:** $13.43

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	500	$1,185.00
Excavation, clay, large equipment, 50 ft	1218	Bulk excavation of clay with dozer >100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.56	500	$1,280.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	500	$2,200.00
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.32	4000	$1,280.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 582 - Open Channel

Scenario: #6 - Wetland channel construction

Scenario Description:

This scenario is the construction or improvement of a channel in which water flows with a free surface in marshy or wetland sites.The practice is used for the restoration of a natural or artificial channel to improve the process and ecological function in a degraded and eroding stream. Excavation and earth fill is required. Construction may include vegetation and/or a lightly armored bank toe. This scenario assists in addressing the resource concerns: streambank erosion, sediment deposition, excessive flooding or ponding. Conservation practices that may be associated are: 356-Dike, 587-Structure For Water Control, 533-Pumping Plant, 580 Streambank and Shoreline Protection, 584 Channel Stabilization, 578 Stream Crossing.

Before Situation:

A stream or channel with active streambank erosion or headcuts and inadequate capacity to handle the flow needed for flood prevention, drainage or erosion prevention.

After Situation:

An earthen channel was excavated to allow unrestricted flow of water and to stabilize the bottom and side slopes. Some fill was used to complete the channel shape. Flooding and erosion is no longer a resource concern. Typical construction dimensions are 6' deep x 15' wide bottom x 100' length with a side slope of 2.5:1.

Scenario Feature Measure: Volume of earth excavated in CY's

Scenario Unit: Cubic Yard

Scenario Typical Size: 500

Scenario Cost: $5,783.70 **Scenario Cost/Unit:** $11.57

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	500	$1,185.00
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	30	$2,023.50
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	32	$1,200.64
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	12	$494.76
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	27	$623.16
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 582 - Open Channel

Scenario: #7 - Extreme Road Fill

Scenario Description:

This scenario is the construction or improvement of a channel in which water flows with a free surface in sites with a large amount of fill that will need to be removed. The practice is used for the restoration of a natural or artificial channel to improve the process and ecological function in a degraded and eroding stream. Excavation and earth fill is required.Construction may include vegetation and/or a lightly armored bank toe. This scenario assists in addressing the resource concerns: streambank erosion, sediment deposition, excessive flooding or ponding. Conservation practices that may be associated are: 356-Dike, 587-Structure For Water Control, 533-Pumping Plant, 580 Streambank and Shoreline Protection, 584 Channel Stabilization, 578 Stream Crossing.

Before Situation:

A stream or channel with a large fill blocking the channel making the channel unstable.

After Situation:

An earthen channel was excavated to allow unrestricted flow of water and to stabilize the bottom and side slopes. Some fill was used to complete the channel shape. Flooding and erosion is no longer a resource concern. Typical construction dimensions are 15' deep with a 6' bottom width and 60' length with an average side slope of 2.5:1 (note, slopes may be steeper in sections, however benches will need to be cut for equipment access, so 2.5:1 is used for the average). 60% of the material is hauled 2 miles off site, 40% is regraded on the site

Scenario Feature Measure: Volume of earth excavated in CY's

Scenario Unit: Cubic Yard

Scenario Typical Size: 500

Scenario Cost: $15,121.50 **Scenario Cost/Unit:** $30.24

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	40	$7,654.80
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	540	$2,376.00
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	1350	$3,199.50
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	20	$461.60
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	16	$659.68
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 584 - Channel Bed Stabilization

Scenario: #1 - Spawning Riffles

Scenario Description:

Stabilize the bottom and slope of a stream channel using gravel and boulders to create hard point riffles with a floodplain and low flow channel. Re-vegetation of exposed surfaces will be completed using 342 - Critical Area Planting.

Before Situation:

Bed of an existing or newly constructed alluvial or threshold channel is undergoing damaging aggradation or degradation. Stream cannot be feasibly controlled with clearing and snagging, vegetation, bank protection or upstream water control. Associated practices could include (326) Clearing and Snagging, (396) Aquatic Organism Passage, (395) Stream Habitat Improvement and Management, (580) Streambank and Shoreline Protection, or (587) Structure for Water Control.
Soil Erosion: The stream is unstable.
Water Quality Degradation: The sediment load has increased in the stream resulting in elevated water temperatures.
Excess/Insufficient Water: The excessive sediment load has reduced the water conveyance capacity, storage capacity and flow within the stream.
Inadequate Habitat for Fish and Wildlife: The deficiencies in the stream's habitat limit survival, growth, reproduction, and/or diversity of aquatic organisms within the stream.

After Situation:

A stable channel with spaced spawning riffles is created. Scour is stabilized. Typical scenario is for a 24x31' section of channel.

Scenario Feature Measure: Area of riffels

Scenario Unit: Square Foot

Scenario Typical Size: 744

Scenario Cost: $19,406.13 **Scenario Cost/Unit:** $26.08

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	69	$398.82
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	5	$337.25
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	25	$5,339.75
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	82	$9,015.08
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	7	$266.98
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	8	$300.16
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	6	$247.38
Materials						
Boulder	1761	Rock boulders (approximately 5 ft dia. 6.67 Tons) Inlcudes materials and delivery (up to 100 miles) only.	Ton	$34.32	1	$34.32
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$32.69	69	$2,255.61

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 584 - Channel Bed Stabilization

Scenario: #2 - Channel Spanning log jams

Scenario Description:

Stabilize the bottom and slope of a stream channel using channel spanning log jams at the base of the channel to stabalize the channel bed.

Before Situation:

Bed of an existing or newly constructed alluvial or threshold channel is undergoing damaging aggradation or degradation. Changes cannot be controlled feasibly with clearing and snagging, vegetation, bank protection or upstream water control.
Soil Erosion: The stream is unstable.
Water Quality Degradation: The sediment load has increased in the stream resulting in elevated water temperatures.
Excess/Insufficient Water: The excessive sediment load has reduced the water conveyance capacity, storage capacity and flow within the stream.
Inadequate Habitat for Fish and Wildlife: The deficiencies in the stream's habitat limit survival, growth, reproduction, and/or diversity of aquatic organisms within the stream.

After Situation:

Stream channel is stable. A series of channel spanning log jams are installed. Re-vegetation of exposed surfaces will be completed using 342 - Critical Area Planting. Other associated practices could be (326) Clearing and Snagging, (396) Aquatic Organism Passage, (395) Stream Habitat Improvement and Management, (580) Streambank and Shoreline Protection, or (587) Structure for Water Control.
For Soil Erosion: The streambank is stable.
For Water Quality Degradation: The sediment load has decreased in the stream resulting in improved aquatic habitat.
For Excess/Insufficient Water: The water conveyance capacity, storage capacity and flow within the stream has been stabilized.
For Inadequate Habitat for Fish and Wildlife: The reduction in the sediment load promotes survival, growth, reproduction, and/or diversity of aquatic organisms within the stream's habitat.

Scenario Feature Measure: Area to be stabilized.

Scenario Unit: Cubic Yard

Scenario Typical Size: 575

Scenario Cost: $22,599.43 **Scenario Cost/Unit:** $39.30

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	80	$462.40
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	25	$5,339.75
Excavation, common earth, wet, side cast, large equipment	1228	Bulk excavation and side casting of wet common earth with hydraulic excavator or dragline with greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$4.22	320	$1,350.40
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	32	$1,200.64
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	86	$9,454.84
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	18	$686.52
Materials						
Erosion Control Blanket, biodegradable	1213	Biodegradable erosion control blanket, typically a composite of natural fibers with reinforcing polymer netting. Materials and shipping only.	Square Yard	$1.20	70	$84.00
Log, un-anchored	2035	Price of log picked up at the Mill. Includes material only.	Ton	$40.21	50	$2,010.50
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$25.76	40	$1,030.40

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 584 - Channel Bed Stabilization

Scenario: #3 - Log Weirs

Scenario Description:

Stabilize the bottom and slope of a stream channel using engineered log weir structures. This includes but not limited to toe wood, log weirs, log vanes, root wads, log step pools, etc. Re-vegetation of exposed surfaces will be completed using 342 - Critical Area Planting.

Before Situation:

Bed of an existing or newly constructed alluvial or threshold channel is undergoing damaging aggradation or degradation. Changes cannot be controlled feasibly with clearing and snagging, vegetation, bank protection or upstream water control. Existing channel banks are verticak or near vertical.
Soil Erosion: The stream is unstable.
Water Quality Degradation: The sediment load has increased in the stream resulting in elevated water temperatures.
Excess/Insufficient Water: The excessive sediment load has reduced the water conveyance capacity, storage capacity and flow within the stream.
Inadequate Habitat for Fish and Wildlife: The deficiencies in the stream's habitat limit survival, growth, reproduction, and/or diversity of aquatic organisms within the stream.

After Situation:

Stream channel is stable. Typical stream has 8 foot bottom width and 5 foot banks. Length of area 100 feet. Structures spaced at 50 foot intervals. Structure uses 2 layers of logs, 2.5' diameter each spanning the channel and placed into the bank 3' on each side at a 45 degree angle upstream. A 3' rock riprap layer is placed on the banks for stability and ballast. Logs are pinned together with rebar, geotextile is placed upstream of the structure for 10' and wrapped around the base log layer with 5' of channel rock placed on top of it. Re-vegetation of exposed surfaces will be completed using 342 - Critical Area Planting. Other associated practices could be (326) Clearing and Snagging, (396) Aquatic Organism Passage, (395) Stream Habitat Improvement and Management, (580) Streambank and Shoreline Protection, or (587) Structure for Water Control.
For Soil Erosion: The streambank is stable.
For Water Quality Degradation: The sediment load has decreased in the stream resulting in improved aquatic habitat.
For Excess/Insufficient Water: The water conveyance capacity, storage capacity and flow within the stream has been stabilized.
For Inadequate Habitat for Fish and Wildlife: The reduction in the sediment load promotes survival, growth, reproduction, and/or diversity of aquatic organisms within the stream's habitat.

Scenario Feature Measure: Number of structures

Scenario Unit: Each

Scenario Typical Size: 3

Scenario Cost: $17,463.26 **Scenario Cost/Unit:** $5,821.09

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$187.13	10	$1,871.30
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	25	$5,339.75
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	27	$66.15
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	376	$680.56
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	11	$1,209.34
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	6	$247.38
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	11	$412.72

Labor

General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	11	$253.88
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	7	$266.98

Materials

Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$32.69	67	$2,190.23
Steel, rebar	1832	Steel rebar, grade 60. Materials only.	Pound	$0.57	245	$139.65
Log, un-anchored	2035	Price of log picked up at the Mill. Includes material only.	Ton	$40.21	8.5	$341.79
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	53	$3,463.55

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 584 - Channel Bed Stabilization

Scenario: #4 - Rock Structure

Scenario Description:

Stabilize the bottom and slope of a stream channel using engineered rock structures. This includes but not limited to rock drop structures, J hook vanes and other rock structures in channels. Re-vegetation of exposed surfaces will be completed using 342 - Critical Area Planting.

Before Situation:

Bed of an existing or newly constructed alluvial or threshold channel is undergoing damaging aggradation or degradation. Changes cannot be controlled feasibly with clearing and snagging, vegetation, bank protection or upstream water control.
Soil Erosion: The stream is unstable.
Water Quality Degradation: The sediment load has increased in the stream resulting in elevated water temperatures.
Excess/Insufficient Water: The excessive sediment load has reduced the water conveyance capacity, storage capacity and flow within the stream.
Inadequate Habitat for Fish and Wildlife: The deficiencies in the stream's habitat limit survival, growth, reproduction, and/or diversity of aquatic organisms within the stream.

After Situation:

Stream channel is stable. Typical stream has 50 foot bottom width and 6 foot banks. Length of area 100 feet. Structures spaced at 50 foot intervals. Re-vegetation of exposed surfaces will be completed using 342 - Critical Area Planting. Other associated practices could be (326) Clearing and Snagging, (396) Aquatic Organism Passage, (395) Stream Habitat Improvement and Management, (580) Streambank and Shoreline Protection, or (587) Structure for Water Control.
For Soil Erosion: The streambank is stable.
For Water Quality Degradation: The sediment load has decreased in the stream resulting in improved aquatic habitat.
For Excess/Insufficient Water: The water conveyance capacity, storage capacity and flow within the stream has been stabilized.
For Inadequate Habitat for Fish and Wildlife: The reduction in the sediment load promotes survival, growth, reproduction, and/or diversity of aquatic organisms within the stream's habitat.

Scenario Feature Measure: Number of structures

Scenario Unit: Each

Scenario Typical Size: 3

Scenario Cost: $27,514.80 **Scenario Cost/Unit:** $9,171.60

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	27	$66.15
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$187.13	10	$1,871.30
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	25	$5,339.75
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	10	$971.90
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	376	$680.56
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	12	$1,319.28
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	9	$371.07
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	22	$825.44

Labor

General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	12	$276.96
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	7	$266.98

Materials

Boulder	1761	Rock boulders (approximately 5 ft dia. 6.67 Tons) Inlcudes materials and delivery (up to 100 miles) only.	Ton	$34.32	360	$12,355.20
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$32.69	67	$2,190.23

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 584 - Channel Bed Stabilization

Scenario: #5 - Roughened Channel

Scenario Description:

Roughened channels, rock ramps, or bypass channels, are constructed features that provide passage around an instream barrier or in place of a removed barrier. Roughened Channels are constructed with an assortment of equipment used for excavation, placing material, and delivering and removing material. Removed materials are trucked away and disposed or recycled off-site, unless excavated native streambed material can be used in fishway construction. Scenario does not include additional measures needed in the active channel and floodplain or at an existing dam necessary to control flow associated with nature-like fishway.

RESOURCE CONCERNS: INADEQUATE HABITAT FOR FISH AND WILDLIFE –Habitat degradation; EXCESS WATER – Ponding, flooding, seasonal high water table, seeps, and drifted snow; WATER QUALITY DEGRADATION – Elevated water temperature; EROSION– Excessive bank erosion from streams shorelines or water conveyance channels
Assoicated Practices (326) Clearing and Snagging, (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment, 580 Streambank and Shoreline Protection, (395) Stream Habitat Improvement and Management, (410) Grade Stabilization Structure, (582) Open Channel, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection, (587) Structure for Water Control580 Streambank and Shoreline Protection

Before Situation:

An instream structure or natural feature has caused channel scour and a channel drop or unstable channel section.

After Situation:

A roughened channel is constructed in place to stabilize the channel and restore channel function. Resource Concerns are addressed within the context of the site. Typical scenario is for a 20' wide by 200' long roughened channel.

Scenario Feature Measure: Square feet of constructed fishway (bankfull width X total length)

Scenario Unit: Square Foot

Scenario Typical Size: 4,000

Scenario Cost: $93,757.79 **Scenario Cost/Unit:** $23.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	40	$7,654.80
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	80	$7,775.20
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	80	$4,496.80
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	25	$5,339.75
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	100	$4,332.00
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$308.64	3	$925.92
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	52	$5,716.88
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	72	$2,968.56
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	91	$3,414.32

Labor

Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	92	$3,508.88
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	72	$1,661.76

Materials

Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$25.76	400	$10,304.00
Boulder	1761	Rock boulders (approximately 5 ft dia. 6.67 Tons) Inlcudes materials and delivery (up to 100 miles) only.	Ton	$34.32	60	$2,059.20
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$32.69	990	$32,363.10

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 585 - Stripcropping

Scenario: #1 - Water erosion

Scenario Description:

This scenario describes the implementation of a stripcropping system that is designed specifically for the control of water erosion or minimizing the transport of sediments or other water borne contaminants originating from runoff on cropland. The planned stripcropping system will meet the current 585 standard. Implementation will result in alternating strips of erosion susceptible crops with erosion resistant crops that are oriented as close to perpendicular to water flows as possible. The designed system will reduce erosion/sediment/contaminants to desired objectives. Payment for implementation is to defray the costs of designing the system, installing the strips on the landscape appropriately, and integrating a crop rotation that includes water erosion resistant species.

Before Situation:

In this geographic area, excessive water erosion is caused by raising crops in a manner that allows water flows to travel unimpeded down the slope due to lack of residue or other conservation measures causing sheet and rill erosion or concentrated flow conditions, degradation of soil health through loss of topsoil and organic matter, along with offsite negative impacts to water quality and aquatic wildlife habitat.

After Situation:

A stripcropping system that includes at least two or more strips within the planning slope will be designed to include parallel strips of approximately equal widths of water erosion resistant crop species with non-water erosion resistant crop species. Widths will be determined using current water erosion prediction technology to meet objectives. The design and implementation of a stripcropping system will minimize sheet and rill erosion, protect soil quality, reduce offsite sedimentation, and benefit offsite aquatic wildlife habitat.
Erosion prediction before and after practice application will be recorded showing the design and benefits of the practice. Erosion -resistant strips in rotation must be managed to maintain the planned vegetative cover and surface roughness.

Scenario Feature Measure: area of strips

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $401.05 **Scenario Cost/Unit:** $5.01

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	3	$111.93
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	3	$69.24
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	2	$219.88

Practice: 585 - Stripcropping

Scenario: #2 - Wind erosion

Scenario Description:

This scenario describes the implementation of a stripcropping system that is designed specifically for the control of wind erosion or minimizing the transport of airborne particulate matter originating from cropland. The planned stripcropping system will meet the current 585 standard. Implementation will result in alternating strips of erosion susceptible crops crop vegetation with erosion resistant crops or crop vegetation that are oriented as close to perpendicular to the critical wind erosion direction as possible. The designed system will reduce erosion/particulate matter emissions to desired objectives. Payment for implementation is to defray the costs of designing the system, installing the strips on the landscape appropriately, and integrating a crop rotation that includes wind erosion resistant species and vegetation.

Before Situation:

In this geographic area, excessive wind erosion is caused by raising crops in a manner that allows wind velocities to travel unimpeded down the length of a field due to lack of growing green vegetation, crop residue, or other conservation measures causing wind erosion, airborne particulate matter emissions, degradation of soil health through loss of topsoil and organic matter, and offsite negative impacts to air quality.

After Situation:

A stripcropping system that includes at least two or more strips within the fields(s) will be designed to include parallel strips of approximately equal widths of wind erosion resistant crop species with non-wind erosion resistant crop species. Widths of strips will be determined using current wind erosion prediction technology to meet planned objectives. The design and implementation of a stripcropping system will minimize wind erosion, protect soil quality, reduce offsite deposition, and benefit air quality by reducing airborne particulate matter emissions. Erosion prediction before and after practice application will be recorded showing the design and benefits of the practice. Erosion -resistant strips or vegetation in rotation must be managed to maintain the planned vegetative cover and surface roughness.

Scenario Feature Measure: area of strips

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $244.95 **Scenario Cost/Unit:** $3.06

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	3	$111.93
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	1	$23.08
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	1	$109.94

Practice: 587 - Structure for Water Control

Scenario: #1 - Flashboard Riser, Metal

Scenario Description:

A Flashboard Riser fabricated of metal and used in a water management system that maintains a desired water surface elevation, controls the direction or rate of flow, or conveys water to address the resource concerns: Inadequate Water - Inefficient use of Irrigation Water and Inadequate habitat for Fish and Wildlife. The water surface elevation is controlled by addition or removal of slats or "stoplogs". This scenario is applicable to variable crest weir structures where the elevation is controlled at the embankment. They are often fabricated from vertical pipes with the stoplogs are located in the middle (i.e. Full-Rounds) or sheet steel in a box shape. Payment rate is based upon the Flashboard Weir Length in inches multiplied by the outlet length in feet (Inch-Foot). Cost estimate is based on a "Half-Round" flashboard riser shop fabricated using a longitudinal cut 36" smooth steel pipe, a 50' long - 30" outlet pipe passing through an embankment.

Before Situation:

The operator presently flood irrigates his field and has no means to accurately maintain a constant water level at varying elevations resulting in a lack of flexibility, and inefficient use of water and energy during pumping. The operator also desires to maintain a permanent pool for water fowl during the winter.

After Situation:

The operator has the capability to more efficiently control and maintain a range of water surface elevations thereby reducing the flow rate needed. Less water is wasted and both water and energy is conserved. The operator is now able to maintain adequate water during the winter as a benefit to waterfowl. Any needed re-vegetation of disturbed areas use Critical Area Planting (342). Other associated practices such as; Irrigation Water Management (449), Irrigation Land Leveling (464), Irrigation Canal or Lateral (320), Irrigation System, Tailwater Recovery (447), Dike (356), and Grade Stabilization Structure (410) will use the corresponding Standard(s) as appropriate.

Scenario Feature Measure: Diameter Inch Foot

Scenario Unit: Diameter Inch Foot

Scenario Typical Size: 1,800

Scenario Cost: $14,266.98 **Scenario Cost/Unit:** $7.93

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	16	$3,417.44
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	190	$836.00
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	8	$915.84
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	32	$3,518.08
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	8	$300.16
Materials						
Pipe, Steel, 30", Std Wt, USED	1361	Materials: - USED - 30" - Steel Std Wt	Foot	$82.66	50	$4,133.00
Pipe, Steel, 36", Std Wt, USED	1362	Materials: - USED - 36" - Steel Std Wt	Foot	$105.53	6	$633.18
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 587 - Structure for Water Control

Scenario: #2 - Commercial Inline Flashboard Riser

Scenario Description:

An Inline Water Control Structure (WCS) composed of plastic that maintains a desired water surface elevation, controls the direction or rate of flow, or conveys water to address the resource concern: Inadequate habitat for Fish and Wildlife. The water surface elevation is controlled by addition or removal of slats or "stoplogs". This scenario is applicable to variable crest weir structures where the elevation is controlled at point along a pipe extending through an embankment, providing ease of access to the structure and provide better protection against beaver activity. There are commercially available models composed of plastic that are commonly used when the width of the is 24" or less. Payment rate is based upon the Flashboard Weir Length in inches multiplied by the outlet length in feet (Inch-Foot). Cost estimate is based on a using a such a commercial product. The typical scenario is an inline structure with a width of 20", height of six feet, The pipe is 50' of 15" SCH 40 PVC (inlet and outlet combined).

Before Situation:

The landowner wishes to provide for a way to control the water surface elevation in a wetland area. The landowner wishes to enhance and enlarge the area to provide habitat for fish and wildlife.

After Situation:

A WCS is installed in a flow line allowing shallow water impoundments. A wetland area is enhanced and water levels can be varied to better accommodate wildlife needs. Any needed re-vegetation of disturbed areas use Critical Area Planting (342). Other associated practices such as; Wetland Creation (658), Wetland Enhancement (659) Wetland Wildlife Habitat Management (644), Dike (356), and Grade Stabilization Structure (410) will use the corresponding Standard(s) as appropriate.

Scenario Feature Measure: Diameter Inch Foot

Scenario Unit: Diameter Inch Foot

Scenario Typical Size: 1,000

Scenario Cost: $10,777.92 **Scenario Cost/Unit:** $10.78

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	8	$1,708.72
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	185	$814.00
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$56.21	4	$224.84
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	8	$305.12
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	40	$4,397.60
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	4	$150.08
Materials						
Pipe, PVC, 16", SCH 80	1353	Materials: - 16" - PVC - SCH 80 - ASTM D1785	Foot	$43.02	50	$2,151.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	4	$1,026.56

Practice: 587 - Structure for Water Control

Scenario: #3 - Culvert, <30 inches, HDPE

Scenario Description:

Install a new HDPE culvert under 30 inches in diameter to convey water under roads or other barriers. A typical scenario would be an 24 inch diameter pipe, 40 feet in length. Work includes site preparation, acquiring and installing culvert pipe with gravel bedding and fill (compacted), and riprap protection of side slopes. Use (396) Aquatic Organism Passage when the primary intent is biological concerns, not hydrologic. Use (578) Stream Crossing for culverts ≥ 30 inches or perennial flow.

Before Situation:

Water flow needs to be conveyed under an access road, ditch or other barrier. Water must be conveyed in a controlled fashion.

After Situation:

Water is conveyed in a controlled manner. Associated practices could be Access Road (560), Animal Trails and Walkways (575), Critical Area Planting (342), Drainage Water Management (554), Irrigation Canal or Lateral (320), Irrigation Pipeline (430), Irrigation Reservoir (436), Irrigation System, Surface and Subsurface (443), Irrigation System, Tailwater Recovery (447), Irrigation Water Management (449), Lined Waterway or Outlet (468), Obstruction Removal (500), Pond (378), Stormwater Runoff Control (570), Surface Drain, Field Ditch (607), Surface Drain, Main or Lateral (608), and Trails and Walkways (568).

Scenario Feature Measure: Diameter Inch Foot

Scenario Unit: Diameter Inch Foot

Scenario Typical Size: 960

Scenario Cost: $8,703.40 **Scenario Cost/Unit:** $9.07

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	10	$2,135.90
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	45	$260.10
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	5	$11.85
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	40	$4,397.60
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	14	$323.12
Materials						
Pipe, HDPE, CPT, Double Wall, Soil Tight, 24"	1246	Pipe, Corrugated HDPE Double Wall, 24" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$18.40	40	$736.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	5	$194.85
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	2	$130.70
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 587 - Structure for Water Control

Scenario: #4 - Culvert, ≥ 30 inches, HDPE

Scenario Description:

Install a new HDPE culvert over 30 inches in diameter to convey water under roads or other barriers. A typical scenario would be an 48 inch diameter pipe, 40 feet in length. Work includes site preparation, acquiring and installing culvert pipe with gravel bedding and fill (compacted), and riprap protection of side slopes. Use (396) Aquatic Organism Passage when the primary intent is biological concerns, not hydrologic. Check to see if (578) Stream Crossing applies for perennial flow.

Before Situation:

Water flow needs to be conveyed under an access road, ditch or other barrier. Water must be conveyed in a controlled fashion.

After Situation:

Water is conveyed in a controlled manner. Associated practices could be Access Road (560), Animal Trails and Walkways (575), Critical Area Planting (342), Drainage Water Management (554), Irrigation Canal or Lateral (320), Irrigation Pipeline (430), Irrigation Reservoir (436), Irrigation System, Surface and Subsurface (443), Irrigation System, Tailwater Recovery (447), Irrigation Water Management (449), Lined Waterway or Outlet (468), Obstruction Removal (500), Pond (378), Stormwater Runoff Control (570), Surface Drain, Field Ditch (607), Surface Drain, Main or Lateral (608), and Trails and Walkways (568).

Scenario Feature Measure: Diameter Inch Foot

Scenario Unit: Diameter Inch Foot

Scenario Typical Size: 1,920

Scenario Cost: $15,796.31 **Scenario Cost/Unit:** $8.23

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	16	$3,417.44
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	24	$2,747.52
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	45	$260.10
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	40	$4,397.60
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	32	$738.56
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	24	$900.48
Materials						
Pipe, HDPE, CPT, Double Wall, Soil Tight, 48"	1249	Pipe, Corrugated HDPE Double Wall, 48" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$55.23	40	$2,209.20
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	9	$350.73
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	4	$261.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 587 - Structure for Water Control

Scenario: #5 - Culvert, <30 inches, CMP

Scenario Description:

Install a new Corrugated Metal Pipe (CMP) culvert under 30 inches in diameter to convey water under roads or other barriers. A typical scenario would be an 24 inch diameter pipe, 40 feet in length. Work includes site preparation, acquiring and installing culvert pipe with gravel bedding and fill (compacted), and riprap protection of side slopes. Use (396) Aquatic Organism Passage when the primary intent is biological concerns, not hydrologic. Use (578) Stream Crossing instead for culverts ≥ 30 inches or perennial flow.

Before Situation:

Water flow needs to be conveyed under an access road, ditch or other barrier. Water must be conveyed in a controlled fashion.

After Situation:

Water is conveyed in a controlled manner. Associated practices could be Access Road (560), Animal Trails and Walkways (575), Critical Area Planting (342), Drainage Water Management (554), Irrigation Canal or Lateral (320), Irrigation Pipeline (430), Irrigation Reservoir (436), Irrigation System, Surface and Subsurface (443), Irrigation System, Tailwater Recovery (447), Irrigation Water Management (449), Lined Waterway or Outlet (468), Obstruction Removal (500), Pond (378), Stormwater Runoff Control (570), Surface Drain, Field Ditch (607), Surface Drain, Main or Lateral (608), and Trails and Walkways (568).

Scenario Feature Measure: Diameter Inch Foot

Scenario Unit: Diameter Inch Foot

Scenario Typical Size: 960

Scenario Cost: $9,032.60 **Scenario Cost/Unit:** $9.41

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	5	$11.85
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	10	$2,135.90
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	45	$260.10
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	40	$4,397.60
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	14	$323.12
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	5	$194.85
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	2	$130.70
Pipe, CMP, 24", 12 Gauge	1417	24" Corrugated Metal Pipe, Galvanized, Uncoated, 12 gage. Material cost only.	Foot	$26.63	40	$1,065.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 587 - Structure for Water Control

Scenario: #6 - Culvert, ≥ 30 inches, CMP

Scenario Description:

Install a new Corrugated Metal Pipe (CMP) culvert 30 inches or more in diameter to convey water under roads or other barriers. A typical scenario would be an 48 inch diameter pipe, 40 feet in length. Work includes site preparation, acquiring and installing culvert pipe with gravel bedding and fill (compacted), and riprap protection of side slopes. Use (396) Aquatic Organism Passage when the primary intent is biological concerns, not hydrologic. Check to see if (578) Stream Crossing applies for perennial flow.

Before Situation:

Water flow needs to be conveyed under an access road, ditch or other barrier. Water must be conveyed in a controlled fashion. This could be through other pipes or pumping plants.

After Situation:

Water is conveyed in a controlled manner. Associated practices could be Access Road (560), Animal Trails and Walkways (575), Critical Area Planting (342), Drainage Water Management (554), Irrigation Canal or Lateral (320), Irrigation Pipeline (430), Irrigation Reservoir (436), Irrigation System, Surface and Subsurface (443), Irrigation System, Tailwater Recovery (447), Irrigation Water Management (449), Lined Waterway or Outlet (468), Obstruction Removal (500), Pond (378), Pumping Plant (533), Stormwater Runoff Control (570), Surface Drain, Field Ditch (607), Surface Drain, Main or Lateral (608), and Trails and Walkways (568).

Scenario Feature Measure: Diameter Inch Foot

Scenario Unit: Diameter Inch Foot

Scenario Typical Size: 1,920

Scenario Cost: $13,887.17 **Scenario Cost/Unit:** $7.23

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	45	$260.10
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	24	$2,747.52
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	10	$2,135.90
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	24	$900.48
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	40	$4,397.60
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	32	$738.56
Materials						
Pipe, CMP, 36", 12 Gauge	1825	36" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$39.54	40	$1,581.60
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	4	$261.40
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	9	$350.73
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 587 - Structure for Water Control

Scenario: #7 - V-Notch Gate Valve

Scenario Description:

This scenario is the installation of a V-notch gate valve to control the conveyance of liquid manure. The typical size is up to 12" diameter opening. The gate valve is installed in a pipeline. This scenario assists in addressing the resource concerns: manure and nutrient management.

Before Situation:

A pipeline is in need of a gate valve to control the flow of liquid manure

After Situation:

A 12" V-notch gate valve gate is installed.

Scenario Feature Measure: Each Gate Valve

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $3,650.65 **Scenario Cost/Unit:** $3,650.65

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	2	$76.28
Materials						
Valve, V-notch Gate Valve	1955	V-notch Gate Valve used to throttle low liquid manure flows without plugging typical diameter of 12". Materials only.	Each	$3,574.37	1	$3,574.37

Practice: 587 - Structure for Water Control

Scenario: #8 - Slide Gate

Scenario Description:

This scenario is the installation of a permanent slide gate structure to control the conveyance of water. The typical size is a 4' diameter opening. The slide gate may be installed on an open channel or pipeline. The slide gate is made of steel and has a hand operated mechanical lifting system, i.e. screw. This scenario assists in addressing the resource concerns: water management. Conservation practices that may be associated are: 533-Pumping Plant.

Before Situation:

A channel or pipeline is in need of a head gate to control the flow of water.

After Situation:

A 4' slide gate is installed and operated by hand is installed.

Scenario Feature Measure: diameter

Scenario Unit: Foot

Scenario Typical Size: 4

Scenario Cost: $16,868.37 **Scenario Cost/Unit:** $4,217.09

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	24	$5,126.16
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	8	$449.68
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	40	$4,397.60
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	8	$300.16
Materials						
Screw gate, cast iron, 4' diameter, 10/0 head	1746	4' diameter cast iron screw (canal) gate rated at 10 seating head 0 feet unseating head. Includes materials only.	Each	$6,594.77	1	$6,594.77

Practice: 587 - Structure for Water Control

Scenario: #9 - Flap Gate

Scenario Description:

This scenario is the installation of a permanent flap (tide) gate structure to control the direction of flow resulting from tides or high water or back-flow from flooding. The typical size is a 4' diameter opening. The gate may be installed on an open channel or pipeline. It is made of steel and operates automatically. This scenario assists in addressing the resource concerns: water management. Conservation practices that may be associated are:

Before Situation:

A wetland or other area is in need of a flap gate to control the direction of the water.

After Situation:

A flap gate 4' wide is installed.

Scenario Feature Measure: Feet Diameter (of Gate)

Scenario Unit: Foot

Scenario Typical Size: 4

Scenario Cost: $13,845.70 **Scenario Cost/Unit:** $3,461.43

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	20	$4,271.80
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	6	$337.26
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	40	$4,397.60
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	6	$225.12
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	16	$610.24
Materials						
Flap gate, aluminum, 4' diameter	2120	4' diamerter flap gate constructed from aluminum, materials only	Each	$4,003.68	1	$4,003.68

Practice: 587 - Structure for Water Control

Scenario: #10 - Flap Gate w/ Concrete Wall

Scenario Description:

Install a concrete cut off wall with tide gate at the outlet of a channel. A typical scenario would be installed in a 25 foot channel, 6 foot deep, with 2:1 side slopes. A concrete wall will extend 10 feet on each side, and include a 4' flap gate structure to control flooding. Work includes site preparation, forming and pouring concrete, backfilling and acquiring and installing the tide gate.

Before Situation:

Tides or flooding inundate and affect water quality of wetlands or other managed systems.

After Situation:

Tide or flood inundation is controlled. Associated practices could be Aquaculture Ponds (397), Aquatic Organism Passage (396), Bivalve Aquaculture Gear and Biofouling Control (400), Constructed Wetland (656), Drainage Water Management (554), Irrigation Canal or Lateral (320), Irrigation Field Ditch (388), Irrigation System, Surface and Subsurface (443), Irrigation Water Management (449), Salinity and Sodic Soil Management (610), Subsurface Drain (606), Surface Drain, Field Ditch (607), Surface Drain, Main or Lateral (608), Wetland Creation (658), Wetland Enhancement (659), Wetland Restoration (657), and Wetland Wildlife Habitat Management (644).

Scenario Feature Measure: Cubic Yards of Concrete

Scenario Unit: Cubic Yard

Scenario Typical Size: 10

Scenario Cost: $19,777.86 **Scenario Cost/Unit:** $1,977.79

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	10	$5,083.70
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	200	$880.00
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	200	$474.00
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	20	$4,271.80
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	40	$4,397.60
Materials						
Flap gate, aluminum, 4' diameter	2120	4' diamerter flap gate constructed from aluminum, materials only	Each	$4,003.68	1	$4,003.68
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	4	$153.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 587 - Structure for Water Control

Scenario: #11 - Self Regulaing Tidegate

Scenario Description:

This scenario is the installation of a self regulating tide/flood gate (SRT) structure to control the direction of flow resulting from tides or high water or back-flow from flooding while providing access to fish across a wider range of flow conditions. This is for the gate and SRT controller only, not the pipe or any assoicated work. This scenario assists in addressing the resource concerns: water management. Conservation practices that may be associated are: Open Channel, Access Road, Aquatic Organism Passage

Before Situation:

A wetland or other area is in need of a flap gate to control the direction of the water.

After Situation:

A SRT flap gate 4' wide is installed.The gate may be installed on an open channel or pipeline. It is made of steel and operates automatically.

Scenario Feature Measure: Feet Diameter (of Gate)

Scenario Unit: Foot

Scenario Typical Size: 4

Scenario Cost: $56,793.87 **Scenario Cost/Unit:** $14,198.47

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	50	$10,679.50
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	40	$7,654.80
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	80	$8,795.20
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	100	$2,308.00
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	40	$1,500.80
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	40	$1,649.20
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	80	$3,051.20
Materials						
Self Regulating Tide gate and controller	2194	A 4' diameter stainless steel self regulating tide/flood gate with a controller/ dual float system. Includes materials and shipping only.	Each	$20,641.89	1	$20,641.89
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 587 - Structure for Water Control

Scenario: #12 - Rock Checks for Water Surface Profile

Scenario Description:

Typical setting is in a stream that has become incised and is therefore disconnected from the floodplain. Typical installation consists of installing a "Vee" shaped rock structures with points facing upstream for the purpose of raising the water surface profile. Cost estimate is for three check dams with a top width of 3', max height of 6', min height of 3', and 28' length; containing an average of 58 cubic yards or 29 tons of rock for a total of 87 tons. The check dams are underlain with geotextile fabric. Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as water quality degradation and soil erosion-concentrated flow erosion.

Before Situation:

The stream presently is incised with near vertical banks caused by bank toe erosion and sloughing. This condition has caused the floodplains to be disconnected from the stream, with only floods well above normal high-water escaping the high banks of the stream.

After Situation:

Banks are stabilized, and pools are created raising the Water Surface Profile elevation and effectively reducing the slope. Riffle pool scheme is restored and banks are protected. Water quality is protected downstream due to erosion protection, and wetland features are restored in the floodplain. Any needed re-vegetation of disturbed areas use Critical Area Planting (342). Other associated practices such as; Streambank and Shoreline Protection (580), Channel Bed Stabilization (584), Stream Habitat Improvement and Management (395), and Wetland Wildlife Habitat Management (644) will use the corresponding Standard(s) as appropriate.

Scenario Feature Measure: Tons of rock installed

Scenario Unit: Ton

Scenario Typical Size: 87

Scenario Cost: $16,038.41 **Scenario Cost/Unit:** $184.35

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	32	$6,834.88
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	32	$3,518.08
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	87	$5,685.45

Practice: 587 - Structure for Water Control

Scenario: #13 - CMP Turnout

Scenario Description:

A corrugated metal pipe (CMP) equipped with a slide gate diverts water from a ditch or canal into a field or field ditch. This scenario is for a 15 inch diameter gate and pipe that will transmit approximately 4 cfs of flow.

Before Situation:

A ditch or canal exists, but a means to move water from the ditch into a smaller ditch or field does not exist. A water supply of sufficient quantity and quality is available for irrigation.

After Situation:

Water is diverted from a canal or ditch to meet irrigation requirements. A 15 inch diameter CMP is installed through the canal containment dike,. A 15 inch diameter slide gate is attached to the upstream end of the pipe. The top of the pipe inlet is below canal water surface elevation.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $826.83 **Scenario Cost/Unit:** $826.83

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	1	$56.21
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	1	$22.33
Materials						
Slide gate, steel, 1' diameter, low head	1830	1' diameter steel slide gate for low head installations	Each	$118.21	1	$118.21
Pipe, CMP, 12", 16 Gauge	1269	12" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$11.68	10	$116.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 587 - Structure for Water Control

Scenario: #14 - Concrete Turnout Structure, Small

Scenario Description:

A reinforced concrete turnout structure equipped with slide boards or panels diverts irrigation water from a ditch or canal into a field or field ditch. This scenario is for a four ft tall, two foot wide, and five foot long turnout structure.

Before Situation:

A ditch or canal exists, but a means to move water from the ditch into a smaller ditch or field does not exist. A water supply of sufficient quantity and quality is available for irrigation.

After Situation:

Water is diverted from a canal or ditch to meet irrigation requirements. A two foot wide and four foot tall turnout structure equipped with slots for slide boards and panels conducts water through the canal berm into a field. The concrete structure is five feet long and has an end sill. All footings, floors. and walls have a minimum thickness of six inches. The structure delivers water to field elevation or ditch bottom elevation. The top of the pipe inlet is below canal water surface elevation.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $1,687.10 **Scenario Cost/Unit:** $1,687.10

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	2	$1,016.74
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	2	$112.42
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	2	$44.66
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 587 - Structure for Water Control

Scenario: #15 - Concrete Turnout Structure, Large

Scenario Description:

A reinforced concrete turnout structure equipped with a 48 inch slide gate diverts irrigation water from a canal into a field or field ditch. This scenario is for a six ft tall, eight foot wide, and ten foot long turnout structure. A sloping trash rack fabricated from rebar is installed on the inlet. If needed fish screens may be installed at the inlet..

Before Situation:

A delivery canal exists, but a means to move water from the canal into a smaller ditch or field does not exist. A water supply of sufficient quantity and quality is available for irrigation.

After Situation:

Water is diverted from a canal to meet irrigation requirements. A eight foot wide and six foot tall turnout structure equipped with a 48 inch slide gate conducts water through the canal berm. The concrete structure is ten feet long and has an end sill. All footings, floors. and walls have a minimum thickness of six inches. The structure delivers water to field or ditch bottom elevation.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $3,895.56 **Scenario Cost/Unit:** $3,895.56

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	1760				1	
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	8	$449.68
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	4	$2,033.48
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	8	$178.64
Materials						
Welded Bar Grate, metal	1980	Heavy duty vertical bar welded grating, typically 1-1/4"x 3/16" bars on 1" spacing with cross rod on 4" spacing. Materials only.	Square Foot	$15.01	48	$720.48
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 587 - Structure for Water Control

Scenario: #16 - Reinforced Concrete Structure

Scenario Description:

A reinforced concrete structure to control the intake and delivery of water. This scenario is for a six ft tall, eight foot wide, and ten foot long structure. If needed fish screens may be installed at the inlet

Before Situation:

A water delivery mechanism exists, but a means to move water from the intake into a smaller ditch, field or pipeline does not exist. A water supply of sufficient quantity and quality is available.

After Situation:

Water is diverted from a canal to meet irrigation requirements. A eight foot wide and six foot tall turnout structure equipped with a slide gate or valve conducts water through the canal berm to the water delivery intake.

Scenario Feature Measure: Cubic Yard

Scenario Unit: Cubic Yard

Scenario Typical Size: 10

Scenario Cost: $6,621.92 **Scenario Cost/Unit:** $662.19

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	10	$5,083.70
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	2	$76.90
Screw gate, cast iron, 1' diameter, 10/0 head	1861	1' diameter cast iron screw (canal) gate rated at 10 seating head 0 feet unseating head. Materials only.	Each	$730.66	2	$1,461.32

Practice: 587 - Structure for Water Control

Scenario: #17 - Flow Meter with Mechanical Index

Scenario Description:

Permanently installed water flow meter with mechanical, cumulative volume and rate index. Meters can be any flow measurement device that meets CPS 433, (i.e. meters: turbine, propeller, acoustic, magnetic, venturi, orifice, etc.) with or without straightening vanes.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, and Degraded Plant Condition - Undesirable plant productivity and health, and Inefficient Energy Use - Equipment and facilities

Associated Practices: 533-Pumping Plant, 449-Irrigation Water Management, 441-Irrigation System, Microirrigation, 443-Irrigation System Surface and Subsurface, 442-Irrigation System, Sprinkler, 328-Conservation Crop Rotation, 634-Waste Transfer, and 590-Nutrient Management.

Before Situation:

Producer estimates seasonal and individual irrigation application flow rate and volumes based on energy costs, system operating pressure, or other means.

After Situation:

Producer is able to access instantaneous rate and cumulative flow volume data at the meter location. The information gained will enable the irrigator to improve irrigation water management, recognize system performance issues before they become critical, and reduce energy use.

Scenario Feature Measure: Nominal Diameter of Meter

Scenario Unit: Inch

Scenario Typical Size: 10

Scenario Cost: $1,789.40 **Scenario Cost/Unit:** $178.94

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Flow Meter, with mechanical Index	1450	10 inch, Turbine Type Flow Meter with Mechanical Index, permanently installed. Includes material, labor and installation.	Each	$1,789.40	1	$1,789.40

Practice: 587 - Structure for Water Control

Scenario: #18 - Flow Meter with Electronic Index

Scenario Description:

Permanently installed water flow meter with an electronic index . Meters can be any flow measurement device that meets CPS 433, (i.e., meters: turbine, propeller, acoustic, magnetic, venturi, orifice, etc.) with or without straightening vanes or data logging capability. Meter nominal diameter for insert type turbine meters will be installation pipe size. Typical installation would include installation of a 10 inch turbine flow meter, with electronic index output.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, and Degraded Plant Condition - Undesirable plant productivity and health, and Inefficient Energy Use - Equipment and facilities

Associated Practices: 533-Pumping Plant, 449-Irrigation Water Management, 441-Irrigation System, Microirrigation, 443-Irrigation System Surface and Subsurface, 442-Irrigation System, Sprinkler, 328-Conservation Crop Rotation, 634-Waster Transfer, and 590-Nutrient Management.

Before Situation:

Producer estimates seasonal and individual irrigation application flow rate and volumes based on energy costs, system operating pressure, or other means.

After Situation:

Producer is able to access instantaneous rate and cumulative flow volume data at the meter location. The information gained will enable the irrigator to improve irrigation water management, recognize system performance issues before they become critical, and reduce energy use.

Scenario Feature Measure: Nominal Diameter of Meter

Scenario Unit: Inch

Scenario Typical Size: 10

Scenario Cost: $3,525.07 **Scenario Cost/Unit:** $352.51

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	$3,525.07	1	$3,525.07

Practice: 587 - Structure for Water Control

Scenario: #19 - Flow Meter with Electronic Index & Telemetry

Scenario Description:

Permanently installed water flow meter with an electronic flow rate and volume index and data telemetry transmission system. Meters can be any flow measurement device that meets CPS 433, (i.e. meters: turbine, propeller, acoustic, magnetic, venturi, orifice, etc.) with or without straightening vanes. Meter nominal diameter for insert type turbine meters will be installation pipe size. Typical installation would include installation of a 10 inch magnetic flow meter, with electronic index output and telemetry data transfer system for monitoring irrigation system flow rate.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, and Degraded Plant Condition - Undesirable plant productivity and health, and Inefficient Energy Use - Equipment and facilities

Associated Practices: 533-Pumping Plant, 449-Irrigation Water Management, 441-Irrigation System, Microirrigation, 443-Irrigation System Surface and Subsurface, 442-Irrigation System, Sprinkler, 328-Conservation Crop Rotation, 634-Waste Transfer, and 590-Nutrient Management.

Before Situation:

Producer estimates seasonal and individual irrigation application flow rate and volumes based on energy costs, system operating pressure, or other means.

After Situation:

Producer is able to access instantaneous rate and cumulative flow volume data from a personal computer or cell phone at any time. The information gained will enable the irrigator to improve irrigation water management, recognize system performance issues before they become critical, and reduce energy use.

Scenario Feature Measure: Nominal Diameter of Meter

Scenario Unit: Inch

Scenario Typical Size: 10

Scenario Cost: $4,531.26 **Scenario Cost/Unit:** $453.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Flow Meter, with electronic Index and telemetry	1451	10 inch Magnetic Irrigation Flow Meter, with electronic index and equipped for telemetry, permanently installed. Includes material, meter appurtenances, and installation.	Each	$4,531.26	1	$4,531.26

Practice: 587 - Structure for Water Control

Scenario: #20 - Paddlewheel Screen

Scenario Description:

A fish screen used at surface (gravity) diversions intended to prevent juvenile or small-bodied adult fish from entering ditches, canals, laterals or other pathways that lead to migration dead-ends or sources of mortality. Paddlewheel screens are active by design, meaning that they are outfitted with mechanisms that automatically cycle to keep the screen free of debris that will restrict the screen area, impede flow through the screen, and may cause the screen to fail. These screens are powered by a paddlewheel driven by flowing water and are thus suitable for remote locations without electrical services. Paddlewheel screens can be installed in the active channel along a streambank, but are most commonly built in a canal below a diversion structure. Aquatic organisms that encounter a screen installed in a canal are diverted back into the adjacent stream through a buried pipe.

Screens installed in the active channel are built at the point of diversion with the screen face aligned parallel to the flow of the river. Bankline modifications can be necessary to achieve proper alignment. Screens installed in a canal can be aligned differently and are best sited at a canal location that minimizes the straight-line bypass/return path distance. Again, canal installation is the most common.

A fully functional screen is designed to meet criteria intended to protect target organisms from being swept into and pinned against or along the screen face (impingement). When this occurs, animals can be physically harmed or, in the case of a rotating drum screen, introduced into the diversion works behind the screen. Active screens are designed to ensure that the approach velocity will not exceed .4 feet per second (fps). Approach velocity is calculating by dividing the maximum screened flow volume by the vertical projection of the effective screen area at maximum submergence. For a rotating drum screen the design submergence should not be more than 85% or less than 65% of the screen diameter. Screen design should strive to provide nearly uniform flow distribution across the screen surface. Screens longer than 6 feet must be angled to the direction of incoming flow and have sweeping velocities (along the face of the screen) greater than the approach velocity, and sweeping velocities should not decrease along the face of the screen. Screen face openings must not exceed 3/32 inch in diameter, and perforated plate must be smooth to the touch with openings punched through in the direction of approaching flow. Material used for the screen face should be corrosion resistant and sufficiently durable to maintain a smooth uniform surface with long term use. Bypass design flow should be about 5% of the diverted amount, include an easily accessible entrance, and flow velocity in the bypass pipe or channel should not exceed 0.2fps. Minimum design depth in a bypass pipe should be at least 40% of the pipe diameter. Bypass entrances should be installed with independent flow control capability. The face of all screen surfaces must be placed flush (to the extent possible) with any adjacent screen bay, pier noses, and walls to allow fish unimpeded movement parallel to the screen face and ready access to bypass routes.

Paddlewheel screens are generally fabricated at a machine shop and delivered to the project site. Site conditions may require the construction of a small concrete headwall that will anchor the screen and may be outfitted with flow control that to adjust hydraulic conditions and optimize screen function. In addition, concrete training walls to conduct flow into, through, and below the screen may be required at some sites. Paddlewheel screens are installed with an assortment of equipment used for excavation, placing material, and delivering and removing material. A crane or boom truck may be needed to place the screen assembly. Other actions include construction staking and signage, soil erosion and pollution control, access control and fencing, and topsoil conservation for site reclamation. Disturbed areas are revegetated with a mix of site-adapted species. Scenario does not include additional measures needed to address channel incision, bank stability, or factors associated with channel improvements at the bypass pipe outfall. Final contracts stipulate entities and schedules for operation and maintenance.

RESOURCE CONCERNS: INADEQUATE HABITAT FOR FISH AND WILDLIFE –Habitat degradation

Payments for these associated practices are made separately and are covered by other typical scenarios and payment schedules. See relevant CPS for additional information.

---Site Preparation and Reclamation associated with project footprint: (326) Clearing and Snagging, (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment

---Reach Planning/Habitat Enhancement: (395) Stream Habitat Improvement and Management,

---Structural Measures Associated with Scenario but outside of project footprint: (410) Grade Stabilization Structure, (582) Open Channel, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection, (587) Structure for Water Control

Before Situation:

An unscreened gravity diversion removes water and fish from a small stream. The ditch under the 5 cfs diversion serves a number of pumps and turnouts used to irrigate alfalfa and flood irrigate hay. The diversion is run from late winter into fall, although the flood irrigated crops are shut off in mid-summer to allow growth and prepare the fields for mowing and haying. Although the diversion is owned by a nth-generation landowner with proven, long-standing rights to the diverted water, recent fish listings under the Endangered Species Act present liability risks in the face of a third party lawsuit. Diverted listed fish are killed in residual depressions in the irrigated meadow, and often become entrained and killed in pumps used to drive wheel lines used to irrigate alfalfa.

After Situation:

A modular rotating drum paddlewheel screen is installed in the ditch about 100 feet downstream of the diversion dam. The screen is

outfitted with a screw-gated 10-inch smooth HDPE pipe buried below the floodplain that connects the bypass entrance to a deep pool in the adjacent stream. The screen is placed on an excavated bed backfilled with compacted sand and gravel, and bolted to a small reinforced poured-in-place concrete headwall. Inspection during the first operational season following construction confirms that the screen is within hydraulic criteria and providing adequate protection to listed fish. The screen structure is fenced from livestock, and inspected and maintained according to contractual agreements. Resource Concerns are addressed within the context of the site.

Scenario Feature Measure: CFS

Scenario Unit: Cubic Foot per Second

Scenario Typical Size: 5

Scenario Cost: $69,912.95 **Scenario Cost/Unit:** $13,982.59

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Concrete Pump	1211	Concrete pump, normally truck mounted. Use this item in association with other concrete components when job requires placement by other than normal chutes. Include drive and setup time in quantity; therefore, do not include mobilization. Includes equi	Hour	$181.53	32	$5,808.96
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	25	$5,339.75
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	40	$1,732.80
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	40	$7,654.80
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$308.64	1	$308.64
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	15	$7,625.55
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	32	$3,110.08
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	40	$1,500.80
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	50	$2,061.50
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	70	$1,615.60
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	70	$2,669.80
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	40	$893.20
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	200	$21,988.00

Materials

Materials

Irrigation, Filtration Unit	329	Filtration Unit	Gallons per Minute	$3.17	2244	$7,113.48

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 587 - Structure for Water Control

Scenario: #21 - Rotating Drum Screen

Scenario Description:

A fish screen used at surface (gravity) diversions intended to prevent juvenile or small-bodied adult fish from entering ditches, canals, laterals or other pathways that lead to migration dead-ends or sources of mortality. Rotating drum screens are active by design, meaning that they are outfitted with mechanisms that automatically cycle to keep the screen free of debris that will restrict the screen area, impede flow through the screen, and may cause the screen to fail. These screens are powered electric motors that rotate a drum covered in fine stainless steel mesh. The drum rotates in the direction of the incoming flow, and is designed to protect fish from entrainment into the diversion while at the same time rolling fine debris attached to the screen face into the ditch or canal below. Rotating drum screens can be installed in the active channel along a streambank, but are most commonly built in a canal below a diversion structure. . Aquatic organisms that encounter a screen installed in a canal are diverted back into the adjacent stream through a buried pipe.

Screens installed in the active channel are built at the point of diversion with the screen face aligned parallel to the flow of the river. Bankline modifications can be necessary to achieve proper alignment. Screens installed in a canal can be aligned differently and are best sited at a canal location that minimizes the straight-line bypass/return path distance. Again, canal installation is the most common.

A fully functional screen is designed to meet criteria intended to protect target organisms from being swept into and pinned against or along the screen face (impingement). When this occurs, animals can be physically harmed or, in the case of a rotating drum screen, introduced into the diversion works behind the screen. Active screens are designed to ensure that the approach velocity will not exceed .4 feet per second (fps). Approach velocity is calculating by dividing the maximum screened flow volume by the vertical projection of the effective screen area at maximum submergence. For a rotating drum screen the design submergence should not be more than 85% or less than 65% of the screen diameter. Screen design should strive to provide nearly uniform flow distribution across the screen surface.
Screens longer than 6 feet must be angled to the direction of incoming flow and have sweeping velocities (along the face of the screen) greater than the approach velocity, and sweeping velocities should not decrease along the face of the screen. Screen face openings must not exceed 3/32 inch in diameter, and perforated plate must be smooth to the touch with openings punched through in the direction of approaching flow. Material used for the screen face should be corrosion resistant and sufficiently durable to maintain a smooth uniform surface with long term use. Bypass design flow should be about 5% of the diverted amount, include an easily accessible entrance, and flow velocity in the bypass pipe or channel should not exceed 0.2fps. Minimum design depth in a bypass pipe should be at least 40% of the pipe diameter. Bypass entrances should be installed with independent flow control capability. The face of all screen surfaces must be placed flush (to the extent possible) with any adjacent screen bay, pier noses, and walls to allow fish unimpeded movement parallel to the screen face and ready access to bypass routes.

Rotating drum screens are composed of elements fabricated at a machine shop and delivered to the project site, or built onsite. They are generally part of a reinforced, poured-in-place mass of concrete that forms a three-sided section above, around, and below the screen. Onsite derricks or metal framework can be required above screen bays to facilitate lifting drums for maintenance and inspection of side and bottom seals. Rotating drum screens may need to be fitted with flow control devices that to adjust hydraulic conditions and optimize screen function. Rotating drum screens are installed with an assortment of equipment used for excavation, placing material, and delivering and removing material. A crane or boom truck may be needed to place elements of larger screen installations, including gates, drums, and overhead metal framework. Other actions include construction staking and signage, soil erosion and pollution control, access control and fencing, and topsoil conservation for site reclamation. Disturbed areas are revegetated with a mix of site-adapted species. Scenario does not include additional measures needed to address channel incision, bank stability, or factors associated with channel improvements at the bypass pipe outfall.

RESOURCE CONCERNS: INADEQUATE HABITAT FOR FISH AND WILDLIFE –Habitat degradation

Payments for these associated practices are made separately and are covered by other typical scenarios and payment schedules. See relevant CPS for additional information.

---Site Preparation and Reclamation associated with project footprint: (326) Clearing and Snagging, (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment

---Reach Planning/Habitat Enhancement: (395) Stream Habitat Improvement and Management,

---Structural Measures Associated with Scenario but outside of project footprint: (410) Grade Stabilization Structure, (582) Open Channel, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection, (587) Structure for Water Control

Before Situation:

An unscreened gravity diversion removes water and fish from a medium-sized stream. The ditch under the 75 cfs diversion serves a number of pumps and turnouts used to irrigate alfalfa and flood irrigate hay. The diversion is run from late winter into fall, although the flood irrigated crops are shut off in mid-summer to allow growth and prepare the fields for mowing and haying. Although the diversion is owned by a nth-generation landowner with proven, long-standing rights to the diverted water, recent fish listings under the Endangered Species Act present liability risks in the face of a third party lawsuit. Diverted listed fish are killed in residual depressions in the irrigated meadow, and often become entrained and killed in pumps used to drive wheel lines used to irrigate alfalfa.

After Situation:

A rotating drum screen consisting of three 8-foot wide, 4-foot diameter drums each driven by a 5hp electric motor is installed in the ditch about 200 feet downstream of the diversion dam. The screen is outfitted with a screw-gated 20-inch smooth HDPE pipe buried below the floodplain that connects the bypass entrance to a deep pool in the adjacent stream. The screen is placed in a concrete section extending above, underneath and below the drum location that forms the structure holding the drums, side and bottom seals, bypass entrance, and screen fore and afterbay. A steel I-beam structure is erected to form continuous overhead cover above the screen bays, and outfitted with a traveling electric winch used to raise each drum for periodic maintenance and seal inspection. Inspection during the first operational season following construction confirms that the screen is within hydraulic criteria and providing adequate protection to listed fish. The screen structure is fenced from livestock, and inspected and maintained according to contractual agreements. Resource Concerns are addressed within the context of the site.

Scenario Feature Measure: CFS

Scenario Unit: Cubic Foot per Second

Scenario Typical Size: 75

Scenario Cost: $212,902.49 **Scenario Cost/Unit:** $2,838.70

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	100	$50,837.00
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$308.64	1	$308.64
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	50	$289.00
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	40	$7,654.80
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	40	$1,732.80
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	25	$5,339.75
Truck, Concrete Pump	1211	Concrete pump, normally truck mounted. Use this item in association with other concrete components when job requires placement by other than normal chutes. Include drive and setup time in quantity; therefore, do not include mobilization. Includes equi	Hour	$181.53	32	$5,808.96
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.19	32	$3,110.08
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	67	$2,555.38
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	67	$1,546.36
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	40	$893.20
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	40	$1,649.20

Labor

Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	200	$21,988.00
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	40	$1,500.80

Materials

Irrigation, Filtration Unit	329	Filtration Unit	Gallons per Minute	$3.17	33662	$106,708.54

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 587 - Structure for Water Control

Scenario: #22 - Fish screen, irrigation type, <1 cfs

Scenario Description:

A <1cfs fish screen used to keep fish out of irrigation intake pipelines.
Assoicated practices may include: (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment, (395) Stream Habitat Improvement and Management, (582) Open Channel, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection, (430) Irrigation Pipeline

Before Situation:

An unscreened pipeline removes water and fish from a small stream.

After Situation:

A fish screen is in place and keeps fish from entering the pipeline intake. The screen structure is fenced from livestock, and inspected and maintained according to contractual agreements. Resource Concerns are addressed within the context of the site.

Scenario Feature Measure: CFS

Scenario Unit: Cubic Foot per Second

Scenario Typical Size: 1

Scenario Cost: $1,251.66 **Scenario Cost/Unit:** $1,251.66

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Irrigation, Filtration Unit	329	Filtration Unit	Gallons per Minute	$3.17	336.6	$1,067.02

Practice: 587 - Structure for Water Control

Scenario: #23 - Fish screen, irrigation type, 1-3 cfs

Scenario Description:

A 1-3 cfs fish screen used to keep fish out of irrigation intake pipelines.
Assoicated practices may include: (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment, (395) Stream Habitat Improvement and Management, (582) Open Channel, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection, (430) Irrigation Pipeline

Before Situation:

An unscreened pipeline removes water and fish from a small stream.

After Situation:

A fish screen is in place and keeps fish from entering the pipeline intake. The screen structure is fenced from livestock, and inspected and maintained according to contractual agreements. Resource Concerns are addressed within the context of the site.

Scenario Feature Measure: CFS

Scenario Unit: Cubic Foot per Second

Scenario Typical Size: 2

Scenario Cost: $2,318.05 **Scenario Cost/Unit:** $1,159.03

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Irrigation, Filtration Unit	329	Filtration Unit	Gallons per Minute	$3.17	673	$2,133.41

Practice: 587 - Structure for Water Control

Scenario: #24 - Fish screen, irrigation type, 3-6 cfs

Scenario Description:

A 3-6 cfs fish screen used to keep fish out of irrigation intake pipelines.
Assoicated practices may include: (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment, (395) Stream Habitat Improvement and Management, (582) Open Channel, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection, (430) Irrigation Pipeline

Before Situation:

An unscreened pipeline removes water and fish from a small stream.

After Situation:

A fish screen is in place and keeps fish from entering the pipeline intake. The screen structure is fenced from livestock, and inspected and maintained according to contractual agreements. Resource Concerns are addressed within the context of the site.

Scenario Feature Measure: CFS

Scenario Unit: Cubic Foot per Second

Scenario Typical Size: 4

Scenario Cost: $6,588.04 **Scenario Cost/Unit:** $1,647.01

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Irrigation, Filtration Unit	329	Filtration Unit	Gallons per Minute	$3.17	2020	$6,403.40

Practice: 587 - Structure for Water Control

Scenario: #25 - Fish screen, irrigation type, >6 cfs

Scenario Description:

A >6 cfs fish screen used to keep fish out of irrigation intake pipelines.
Assoicated practices may include: (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment, (395) Stream Habitat Improvement and Management, (582) Open Channel, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection, (430) Irrigation Pipeline

Before Situation:

An unscreened pipeline removes water and fish from a small stream.

After Situation:

A fish screen is in place and keeps fish from entering the pipeline intake. The screen structure is fenced from livestock, and inspected and maintained according to contractual agreements. Resource Concerns are addressed within the context of the site.

Scenario Feature Measure: CFS

Scenario Unit: Cubic Foot per Second

Scenario Typical Size: 8

Scenario Cost: $11,568.11 **Scenario Cost/Unit:** $1,446.01

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Irrigation, Filtration Unit	329	Filtration Unit	Gallons per Minute	$3.17	3591	$11,383.47

Practice: 587 - Structure for Water Control

Scenario: #26 - Fish screen, Horizontal Flat Plate

Scenario Description:

Installation of a horizontal flat plate fish screen. Horizontal flat plate fish screens allow an irrigator to withdraw water from a river or stream without taking fish or debris into their irrigation system. While active screens use mechanical cleaning mechanisms to keep the screen surface free of debris, passive horizontal flat plate fish screens use hydraulics (the movement of water) to keep the screen surface clean.

Horizontal flat plate fish screens are typically installed in off-stream locations, behind a functioning head gate that can regulate flow. This type of screen requires by-pass flow to operate. The by-pass flow is what flows off the end of the fish screen and returns fish and debris to the source river or stream. Horizontal flat plate fish screens also require some head (or elevation differential) to operate. This type of fish screen is only appropriate where there is adequate flow to allow by-pass flow at all times and sufficient head available.

Horizontal flat plate fish screens can come in different formats. For smaller diversions (1 to 16 CFS), pre-fabricated steel units can be utilized to reduce installation costs. For larger diversions, a concrete structure is typically constructed. A power source is not necessary for a horizontal flat plate fish screen.

Assoicated practices may include: (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment, (395) Stream Habitat Improvement and Management, (582) Open Channel, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection, (430) Irrigation Pipeline

Before Situation:

An unscreened pipeline removes water and fish from a small stream.

After Situation:

A fish screen is in place and keeps fish from entering the pipeline intake. The screen structure is fenced from livestock, and inspected and maintained according to contractual agreements. Resource Concerns are addressed within the context of the site. Typical sceanrio is for an 8 cfs screen

Scenario Feature Measure: CFS

Scenario Unit: Cubic Foot per Second

Scenario Typical Size: 8

Scenario Cost: $42,481.25 **Scenario Cost/Unit:** $5,310.16

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	40	$8,543.60
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	40	$7,654.80
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	80	$8,795.20
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	40	$1,649.20
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	40	$1,500.80
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	16	$610.24

Labor

General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	55	$1,269.40

Materials

Irrigation, Filtration Unit	329	Filtration Unit	Gallons per Minute	$3.17	3591	$11,383.47
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	15	$584.55

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 590 - Nutrient Management

Scenario: #1 - Basic System, >160 ac

Scenario Description:

This scenario describes the implementation of a basic nutrient management system on lands where there is no manure application. The planned Nutrient Management system will meet the current 590 standard. Implementation will result in the proper rate, source, method of placement, and timing of nutrient application. Payment for implementation is to defray the costs of soil testing, analysis, consultant services that provide nutrient recommendations based on Land Grant University recommendations or crop removal rates and an associated nutrient budget, and recordkeeping. Records demonstrating implementation of the 4 R's of the Nutrient Management criteria (Right fertilizer source, Right rate, Right time and Right place) will be required. This scenario is based on farms larger than 160 acres.

Before Situation:

In this geographic area, a fertility program is either non existent or does not meet the 590 nutrient management standard. Soil testing is not completed per land grant university recommendations and applications of fertilizers are not based on land grant university recommendations or a nutrient budget. An environmental evaluation or risk assessment is not completed. Nutrients are transported to surface waters through runoff or soil erosion or to ground water from leaching in quantities that degrade water quality and limit use of intended purposes. Soil quality may be degraded by excess or inadequate nutrients.

After Situation:

Plan Development

• A nutrient management system will be developed to meet the NRCS 590 standard.

• The development and implementation of a nutrient management plan (NMP) will benefit plant productivity and reduce off-site degradation.

• A nutrient management budget will be developed for each field(s) based on soil test analysis and land grant university recommendations or crop removal rates.

Testing/Nutrient Data Collection

• Soil testing is completed according to Land Grant University recommendations. The use of pre-plant soil tests will assist with the proper development of the annual nutrient budget.

• The use post-harvest of soil tests (results interpreted by crop consultant) can help establish the adequacy of the plan in meeting crop needs while minimizing P application rate and residual N, thus reducing the potential for off-site impacts.

Producer Activities/Equipment Needed

• Records are maintained annually documenting current soil test, analysis, amount of application, forms and rates of nutrients for each field, including any post harvest analysis.

• Applications will be completed in a manner that minimizes nutrient runoff and leaching or build up of excess nutrient concentrations.

Scenario Feature Measure: acres in field(s)

Scenario Unit: Acre

Scenario Typical Size: 160

Scenario Cost: $771.72 **Scenario Cost/Unit:** $4.82

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	3	$69.24
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	5	$549.70
Materials						
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	8	$78.16

Practice: 590 - Nutrient Management

Scenario: #2 - Basic System, 160 ac or less

Scenario Description:

This scenario describes the implementation of a basic nutrient management system on 160 acres or less of land where there is no manure application. The planned NM system will meet the current 590 standard. Implementation will result in the proper rate, source, method of placement, and timing of nutrients. Payment for implementation is to defray the costs of soil testing, analysis, consultant services that provide nutrient recommendations based on Land Grant University recommendations or crop removal rates and an associated nutrient budget, and recordkeeping. Records demonstrating implementation of the 4 R's of the Nutrient Management criteria (Right fertilizer source, Right rate, Right time and Right place) will be required. This scenario is based on typical farms 40 acres and smaller.

Before Situation:

In this geographic area, a fertility program is either non existent or does not meet the 590 nutrient management standard. Soil testing is not completed per land grant university recommendations and applications of fertilizers are not based on land grant university recommendations or a nutrient budget. An environmental evaluation or risk assessment is not completed. Nutrients are transported to surface waters through runoff or soil erosion or to ground water from leaching in quantities that degrade water quality and limit use of intended purposes. Soil quality may be degraded by excess or inadequate nutrients.

After Situation:

Plan Development

• A nutrient management system will be developed to meet the NRCS 590 standard.

• The development and implementation of a nutrient management plan (NMP) will benefit plant productivity and reduce off-site degradation.

• A nutrient management budget will be developed for each field(s) based on soil test analysis and land grant university recommendations or crop removal rates.

Testing/Nutrient Data Collection

• Soil testing is completed according to Land Grant University recommendations. The use of pre-plant soil tests will assist with the proper development of the annual nutrient budget.

• The use post-harvest of soil tests (results interpreted by crop consultant) can help establish the adequacy of the plan in meeting crop needs while minimizing P application rate and residual N, thus reducing the potential for off-site impacts.

Producer Activities/Equipment Needed

• Records are maintained annually documenting current soil test, analysis, amount of application, forms and rates of nutrients for each field, including any post harvest analysis.

• Applications will be completed in a manner that minimizes nutrient runoff and leaching or build up of excess nutrient concentrations.

Scenario Feature Measure: Set of Fields managed the same

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $603.16 **Scenario Cost/Unit:** $603.16

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	3	$69.24
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	4	$439.76
Materials						
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	2	$19.54

Practice: 590 - Nutrient Management

Scenario: #3 - Small Diversified OR Adaptive

Scenario Description:

Small farm/diversified systems include CSA's (community supported agriculture), truck farms, market gardens, etc., where numerous variable crops are grown on small acreages. This scenario attempts to capture the higher cost/acre of nutrient management planning and implementation on smaller, intensive production areas (usually between .25-10 acres) with a large number of crops, often times with multiple harvests per year, that require intense and diversified nutrient management. Planning unit acres calculation based on one farm or set of fields managed the same. The planned Nutrient Management system for this organic or conventional production system will meet current 590 Nutrient Management criteria. Payment for implementation is of this scenario is to defray the costs of soil testing, manure and/or compost analysis, and consultant services that provide nutrient management recommendations, associated nutrient budgets, and recordkeeping. Records demonstrating implementation of the 4 R's of Nutrient Management (Right fertilizer source, Right rate, Right time and Right place) will be required. This Scenario may ALSO be used for implementation of Adaptive Nutrient Management trials on small plots, as specified in NRCS National Agronomy Technical Note 7. [TN_190_AGR_7, Adaptive Nutrient Management Process http://directives.sc.egov.usda.gov/].

Before Situation:

In this geographic area, a fertility program does not meet the 590 nutrient management standard. Soil testing is not completed on a regular basis and applications of fertilizers, amendments, manure, and/or compost are not based on land grant university recommendations or a nutrient budget. Nutrients are transported to surface waters through runoff or erosion or to groundwater by leaching in quantities that degrade water quality and limit use of intended purposes. Soil quality may be degraded by excess or inadequate nutrients. Fields have little or no erosion protection during critical periods.

After Situation:

A nutrient management system will be developed to meet the 590 nutrient management standard and NOP regulations where applicable. A nutrient management budget will be developed annually for each "crop block" or each crop rotation pertaining to a block of ground based on soil test analysis and land grant university recommendations or crop removal rates. Plan Development:

• The development and implementation of a Nutrient Management Plan (NMP) will benefit plant productivity and reduce off-site movement of nutrients.

• The NMP will stress the use of the four R's (Right Source of Nutrients, Right Time of Application, Right Rate, and Right Method of Application).

• These include practices such as use of split applications, slow release nutrients, proper timing of application, more appropriate formulations, banding, etc.

• A nutrient budget is developed for each field or crop block of field annually.

Testing/Nutrient data collection:

• The use of pre-plant soil tests and/or plant tissue tests will assist with the development of the annual nutrient budget in accordance with Land Grant University fertilizer guides.

• Soil testing is completed according to Land Grant University recommendations.

Producer Activities/Equipment Needed:

- Records will be provided annually of the current soil and/or tissue tests, analyses, amount of application, forms and rates of nutrients for each crop block

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For the purpose of Adaptive Management, installation of this scenario will result in adopting the four R's of nutrient management (right source, right rate, right timing and right placement) by following the procedures outlined in Agronomy Technical Note 7 - Adaptive Nutrient Managemen Processt. Implementation involves establishing replicated plots to evaluate one or more of the 4 R's. The plot will consist of 4 replicated plots designed, laid out, managed and evaluated with the assistance of a technical service provider certified in nutrient management planning and implementation. Results are used to make nutrient application decisions to address water quality degradation issues and nutrient use efficiencies. Yields will be measured and statistically summarized following the procedures in National Agronomy Technical Note 7 - Adaptive Nutrient Management Process. The yields for each plot will be adjusted to the appropriate moisture content.

Scenario Feature Measure: Farm

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $952.07 **Scenario Cost/Unit:** $952.07

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						

Labor

General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	5	$549.70

Materials

Test, Manure Analysis	306	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$45.49	2	$90.98
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	1	$26.14
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	1	$9.77
Test, Compost Analysis	307	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$45.42	2	$90.84

Practice: 590 - Nutrient Management

Scenario: #4 - Basic Manure or Biosolids

Scenario Description:

This scenario describes the implementation of a basic nutrient management system on planning units where there is manure or compost application, often in addition to commercial fertilizer applications. The planned Nutrient Management system will meet the current 590 standard. Implementation will result in the proper rate, source, method of placement, and timing of nutrients while minimizing off-site degradation or the excessive built up of N and P. Payment for implementation is to defray the costs of soil testing, manure testing, analysis, proper implementation, consultant services that provide nutrient recommendations based on Land Grant University recommendations or crop removal rates and an associated nutrient budget, and recordkeeping. Risk assessments as required in the current 590 Nutrient Management standard will be completed, with applications of manure completed based on risk results. Records demonstrating implementation of the 4 R's of the NM plan (Right fertilizer source, Right rate, Right time and Right place) will be required along with copies of risk assessments.

Before Situation:

In this geographic area, a fertility program is either non existent or does not meet the 590 nutrient management standard. Soil testing and manure testing is not completed on a regular basis and applications of nutrients are not based on land grant university recommendations or a nutrient budget. Nutrients and manure solids are transported to surface waters through runoff or erosion or to groundwater through leaching in quantities that degrade water quality and limit use of intended purposes. Soil quality may be degraded by excess or inadequate nutrients. Fields have little or no erosion protection often times resulting in wind, sheet, rill, and ephemeral erosion.

After Situation:

Plan Development

• A nutrient management system that includes manure as a source will be developed to meet the NRCS 590 standard.

• The development and implementation of a nutrient management plan (NMP) will benefit plant productivity and reduce off-site degradation.

• A nutrient management budget will be developed for each field(s) based on soil tests and manure test analysis along with land grant university recommendations or crop removal rates.

Testing/Nutrient Data Collection

• Soil testing is completed according to Land Grant University recommendations.

• The use of soil tests will assist with the proper development of the annual nutrient budget. Applications of manure are based on risk assessments such as (PI - phosphorus index and Nitrogen index).

• The use of post-harvest soil tests will help establish the adequacy of the plan in meeting crop needs while minimizing P application rate and residual N.

• As applicable, the use of Pre side-dress soil nitrogen test (PSNT) or a Pre Top Dress Tissue test (PTDTT) prior to the rapid biomass growth of the plant will assist the producer in evaluating the mineralization of Nitrogen from manures / cover crops in providing adequate nitrogen to meet the crop requirements, thus reducing the potential for off-site impacts.

Producer Activities/Equipment Needed

• Records are maintained annually documenting current soil tests, manure tests, analyses, amount and timing of nutrient application(s), forms and rates of nutrients for each field, including post harvest analysis.

• Applications will be completed in a manner that minimizes nutrient runoff and leaching or build up of excess nutrient concentrations.

Scenario Feature Measure: field size

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $1,877.97 **Scenario Cost/Unit:** $46.95

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	8	$298.48
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	11	$253.88
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	10	$1,099.40

Materials

Materials

Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	2	$19.54
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	2	$52.28
Test, Manure Analysis	306	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$45.49	2	$90.98
Test, Standard Water Test, Irrigation Suitability	310	Irrigation water suitability lab analysis. Includes pH, alkalinity, carbonates/bicarbonates, EC, dissolved solids, B, Cl, Ca, Mg, Na, SAR, and hardness.	Each	$40.05	1	$40.05
Test, Soil Nitrogen Testing	311	Pre-Side Dress/Deep Soil Testing. Includes materials and shipping only.	Each	$11.68	2	$23.36

Practice: 590 - Nutrient Management

Scenario: #5 - Basic manure, Small farm

Scenario Description:

This scenario describes the implementation of a basic nutrient management system on planning units 20 ac or less where there is manure or compost application, often in addition to commercial fertilizer applications. Planning unit acres calculation based on a set of fields managed the same. The planned Nutrient Management system will meet the current 590 standard. Implementation will result in the proper rate, source, method of placement, and timing of nutrients while minimizing off-site degradation or the excessive built up of N and P. Payment for implementation is to defray the costs of soil testing, manure testing, analysis, proper implementation, any consultant services that provide nutrient recommendations based on Land Grant University recommendations or crop removal rates and an associated nutrient budget, and recordkeeping. Risk assessments as required in the current 590 standard will be completed with applications of manure completed based on risk results. Records demonstrating implementation of the 4 R's of the Nutrient Management plan (Right fertilizer source, Right rate, Right time and Right place) will be required along with copies of risk assessments.

Before Situation:

In this geographic area, a fertility program is either non existent or does not meet the 590 nutrient management standard. Soil testing and manure testing is not completed on a regular basis and applications of nutrients are not based on land grant university recommendations or a nutrient budget. Nutrients and manure solids are transported to surface waters through runoff or erosion or to groundwater through leaching in quantities that degrade water quality and limit use of intended purposes. Soil quality may be degraded by excess or inadequate nutrients. Fields may have little or no erosion protection often times resulting in wind, sheet, rill, and ephemeral erosion.

After Situation:

Plan Development

• A nutrient management system that includes manure as a source will be developed to meet the NRCS 590 standard.

• The development and implementation of a nutrient management plan (NMP) will benefit plant productivity and reduce off-site degradation.

• A nutrient management budget will be developed for each field(s) based on soil tests and manure test analysis along with land grant university recommendations or crop removal rates.

Testing/Nutrient Data Collection

• Soil testing is completed according to Land Grant University recommendations.

• The use of pre-plant soil tests will assist with the proper development of the annual nutrient budget. Applications of manure are based on risk assessments such as (PI - phosphorus index and Nitrogen index).

• The use of post-harvest soil tests (results often interpreted by crop consultant) will help establish the adequacy of the plan in meeting crop needs while minimizing P application rate and residual N.

• As applicable, the use of Pre side-dress soil nitrogen test (PSNT) or a Pre Top Dress Tissue test (PTDTT) prior to the rapid biomass growth of the plant will assist the producer in evaluating the mineralization of Nitrogen from manures / cover crops in providing adequate nitrogen to meet the crop requirements, thus reducing the potential for off-site impacts.

Producer Activities/Equipment Needed

• Records are maintained annually documenting current soil tests, manure tests, other applicable tests, analyses, amount and timing of application, forms and rates of nutrients for each field, including post harvest analysis.

• Applications will be completed in a manner that minimizes nutrient runoff and leaching or build up of excess nutrient concentrations.

- Producer attends local workshops to improve knowledge and skills

Scenario Feature Measure: Set of field acres that are managed the same.

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $805.34 **Scenario Cost/Unit:** $805.34

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	4	$439.76
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	6	$138.48

Materials

Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	1	$9.77
Test, Manure Analysis	306	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$45.49	2	$90.98
Test, Standard Water Test, Irrigation Suitability	310	Irrigation water suitability lab analysis. Includes pH, alkalinity, carbonates/bicarbonates, EC, dissolved solids, B, Cl, Ca, Mg, Na, SAR, and hardness.	Each	$40.05	1	$40.05
Test, Soil Nitrogen Testing	311	Pre-Side Dress/Deep Soil Testing. Includes materials and shipping only.	Each	$11.68	1	$11.68

Practice: 590 - Nutrient Management

Scenario: #6 - Enhanced Nutrient Mgt

Scenario Description:

This scenario takes a conventional cropping system where either no nutrient management or only a basic nutrient management is being practiced.The planned Nutirent Management system will meet the current 590 standard. An enhanced nutrient management system includes activities such as tissue tests, split applications, slow release nutrients, nitrogen inhibitors, proper timing of application, more appropriate formulations, banding, use of PSNT (pre-sidedress nitrogen test), CSNT (corn stalk nitrate test), or PPSN (pre-plant soil nitrate test), chlorophyll meters, spectral analysis, etc) in addition to zonal soil tests and methods that more concisely enable scheduling of appropriate fertilizer applications. Nutrients are transported to surface waters through runoff or wind erosion in quantities that degrade water quality and limit use of intended purposes. Inefficient energy utilization occurs due to traditional methods and forms of fertilizer applications.

Before Situation:

In this geographic area, conventional fertility programs involve very little or no soil or manure testing. Application of fertilizers, including manures and amendments, are completed annually based upon tradition that does not specifically consider the detrimental affects of improper timing or rates of nutrients, or excess nutrient build-up in the soil. Fields are overwintered with little or no erosion protection often times resulting in sheet, rill, and ephemeral erosion by spring. Runoff flows into adjacent streams, water courses, tile drains, field surface drains, or other water courses causing degradation to receiving waters or leaching of nutrients to shallow ground water sources. There is typically no environmental evaluation of the potential for off-site movement. Soil quality may also be detrimentally affected. The current system is also typically inefficient energy user due to traditional methods, forms, and amounts of nutrient applications.

After Situation:

The development and implementation of a Nutrient Management Plan (NMP) will benefit plant productivity and reduce off-site movement of nutrients. The use of pre-plant soil tests will assist with the development of the annual nutrient budget in accordance with Land Grant University fertilizer guides. The NMP will stress the use of the four R's (Right Source of Nutrients, Right Time of Application, Right Rate, and Right Method of Application). These include practices such as use of split applications, slow release nutrients, nitrogen inhibitors, proper timing of application, more appropriate formulations, banding, etc. Additional nutrient tests including PSNT (pre-sidedress nitrogen test), CSNT (corn stalk nitrate test), and PPSN (pre-plant soil nitrate test), chlorophyll meters, spectral analysis, etc., may be used to further refine nutrient applications. Record keeping will document application of nutrients based on the 4 R's. Use of a post-harvest soil test or tissue tests (interpreted by a crop consultant) will help establish the adequacy of the plan in meeting crop needs while minimizing P application rate and residual N, thus reducing the potential for off-site impacts. Further minimization of risk is accomplished by identifying the variability across the field(s) by using soil survey maps or other simple techniques to establish zones, along with zonal soil testing. Nutrients are applied at rates based on soil test zone analyses. The producer will attend training of "crop school or nutrient management workshop" or similar activity annually to stay current on crop-specific nutrient management. Typical treatment area is 40 acres. Soil testing is completed according to LGU recommendations. Analysis are completed annually for N-P-K. A nutrient budget is developed for each field or section of field annually. Application of nutrients via fertilizers, and/or manures applied in a manner that minimizes nutrient runoff and leaching. Application rates of all sources of nutrients are based upon soil tests and either LGU recommendations, crop removal rates, or industry standard.

Scenario Feature Measure: Acre

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $2,411.66 **Scenario Cost/Unit:** $60.29

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	2	$61.50
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Chlorophyll Reader	1125	Applicator and chlorophyll sensor includes labor. No materials	Acre	$13.11	40	$524.40
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	2	$46.16
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	10	$1,099.40

Materials

Test, Soil Nitrogen Testing	311	Pre-Side Dress/Deep Soil Testing. Includes materials and shipping only.	Each	$11.68	2	$23.36
Nitrogen-Urease inhibitor	260	Nitrogen-Urease inhibitor	Acre	$12.76	40	$510.40
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	2	$52.28
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	2	$19.54

Practice: 590 - Nutrient Management

Scenario: #7 - Advanced Precision System

Scenario Description:

This scenario describes the implementation of an advanced precision nutrient management system on cropland. The planned Nutirent Management system will meet the current 590 standard. Payment for implementation is to defray the costs such as soil testing, analysis, consultant services, skilled labor and specialized nutrient application that provide nutrient proper recommendations based on Land Grant University recommendations or crop removal rates and an associated nutrient budget, recordkeeping, and monitoring on a precision level that includes split applications, yield monitors with associated GPS maps, NDVI sensing, and/or aerial imaging. Records demonstrating implementation of the 4 R's of the NM plan (Right fertilizer source, Right rate, Right time and Right place) will be required. This system uses technologies that improve efficiency and effectiveness of nutrient management by utilizing specialized precision techniques and tools (variable rate applicators, NDVI, aerial photography, yield monitoring). Precision nutrient mgmt techniques ensure that the right rate, proper timing, and proper placement of nutrients minimize non-point source pollution and provide proper amounts of nutrients to the crop where it is needed and not applying where it is not needed.

Before Situation:

In this geographic area, a fertility program is already in place, however, application of nutrients across large acreages is based on a lack of representative soil samples or analyses. The current NM system may or may not meet 590 standards, however, could be improved by reducing energy inputs and utilizing precise mapping and diagnostic equipment. Because whole fields are often fertilized with the same rate, excess nutrients may be applied in some areas while inadequate amounts of nutrients are applied in other areas. Excess nutrients are transported to surface waters through runoff or erosion or to ground water from leaching in quantities that degrade water quality and limit use of intended purposes. Soil quality may be degraded by excess or inadequate nutrients. Fertilizer applications are made in their entirety more than 30 days prior to planting. Applications do not consider the detrimental affects of improper timing or improper rates. Whole fields with like crops and rotation are fertilized the same.

After Situation:

Soil testing is completed in a fashion that provides a representative assessment of nutrient concentrations in each field or planning unit including zone directed sampling, real time NDVI (normalized differenced vegetative index) sensing, EC Index type sampling, or via high definition aerial photography that allows for the identification of numerous variations (zones) in a planning unit. Zone maps are created and a nutrient budget developed for each zone. An application rate (prescription) is developed for each zone based on representative soil analysis and a zone nutrient budget. Soil testing is completed annually for N and at least once every three years for P-K. A nutrient budget is developed for each field annually. Application of nutrients is completed so that non-point source pollution is minimized. Nutrients are applied based on realistic yield expectations. The average field size is >=40acres. Applications of nutrients are completed using a GPS guided variable rate fertilizer applicator. Applications of nutrients will be completed in split applications where a majority of the N needs are applied based on the needs of the crop based on growing season requirements. Advanced training may be needed to effectively implement the practice. Producer will attend training courses and use specialized labor where needed in the annual maintenance of the NM plan. Record keeping will include all soil tests, analysis, zone maps, nutrient prescriptions and budgets, and as-applied applications. Yield monitoring maps will be collected and utilized (where technology allows) to develop the following year nutrient applications.

Scenario Feature Measure: Acre

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $1,541.50 **Scenario Cost/Unit:** $38.54

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	3	$111.93
Satellite imagery, aerial photography, infrared	966	Infrared imagery	Acre	$0.16	40	$6.40
Fertilizer, precision application	952	Fertilizer application performed by light bar/GPS navigation system. Includes equipment, power unit and labor costs.	Acre	$10.90	40	$436.00
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	4	$123.00
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	4	$439.76

Labor

General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	3	$69.24
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	2	$76.28

Materials

Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	2	$52.28
Test, Soil Test, Precision, Grid or Zone	300	Includes materials, shipping, labor, and equipment costs.	Each	$13.55	15	$203.25
Test, Soil Nitrogen Testing	311	Pre-Side Dress/Deep Soil Testing. Includes materials and shipping only.	Each	$11.68	2	$23.36

Practice: 590 - Nutrient Management

Scenario: #8 - High Density Livestock

Scenario Description:

Typically, this scenario is used when working with CAFOs (Confined Animal Feeding Operation) or other agricultural or forest lands on which biosolids or organic processing wastes are applied, which have intensive testing requirements of soils, plant tissues and/or water. Typically there are multiple nutrient applications per acre per year.

Before Situation:

A nutrient management program does not meet one or more of: EPA, state requirements or the 590 nutrient management standard. Intensive soil testing and manure testing is not completed on a regular basis and applications of nutrients are not based on land grant university recommendations or a nutrient budget. Nutrients and manure solids are transported to surface waters through runoff or erosion or to groundwater through leaching in quantities that degrade water quality and limit use of intended purposes. Soil quality may be degraded by excess or inadequate nutrients. Fields have little or no erosion protection often times resulting in wind, sheet, rill, and ephemeral erosion.

After Situation:

Plan Development

• A nutrient management system that includes manure as a source will be developed to meet the NRCS 590 standard.

• The development and implementation of a nutrient management plan (NMP) will benefit plant productivity and reduce off-site degradation.

• A nutrient management budget will be developed for each field(s) based on soil tests and manure test analysis along with land grant university recommendations or crop removal rates.

Testing/Nutrient Data Collection

• Soil testing is completed according to Land Grant University recommendations and federal or state requirements.

• The use of pre-plant soil tests will assist with the proper development of the annual nutrient budget. Applications of manure are based on risk assessments (PI - phosphorus index and Nitrogen index).

• The use of post-harvest soil tests (results interpreted by crop consultant) will help establish the adequacy of the plan in meeting crop needs while minimizing P application rate and residual N.

• The use of Pre side-dress soil nitrogen test (PSNT) or a Pre Top Dress Tissue test (PTDTT) prior to the rapid biomass growth of the plant will assist the producer in evaluating the mineralization of Nitrogen from manures / cover crops in providing adequate nitrogen to meet the crop requirements, thus reducing the potential for off-site impacts.

Water testing is used in application areas to monitor the pre- and post- levels of nutrients in surface and/or groundwater.

Manure or other organic materials are tested. Producer

Activities/Equipment Needed

• Records are maintained annually documenting current soil tests, manure tests, tissue and/or water analyses, amount of application, timing, forms and rates of nutrients for each field, including post harvest analysis.

• Applications will be completed in a manner that minimizes nutrient runoff and leaching or build up of excess nutrient concentrations.

- Producer attends workshops and seminars to improve knowledge and skills

Scenario Feature Measure: Acre

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $1,957.97 **Scenario Cost/Unit:** $48.95

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	12	$447.72
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	10	$1,099.40
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	2	$19.54

Materials

Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	2	$52.28
Test, Manure Analysis	306	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$45.49	2	$90.98
Test, Standard Water Test, Irrigation Suitability	310	Irrigation water suitability lab analysis. Includes pH, alkalinity, carbonates/bicarbonates, EC, dissolved solids, B, Cl, Ca, Mg, Na, SAR, and hardness.	Each	$40.05	1	$40.05
Test, Soil Nitrogen Testing	311	Pre-Side Dress/Deep Soil Testing. Includes materials and shipping only.	Each	$11.68	2	$23.36

Practice: 591 - Amend. for Treat. of Ag. Waste

Scenario: #1 - Litter Amendments, Air Quality

Scenario Description:

This practice scenario includes the application of a litter treatment amendment such as sodium bisulfate that is approved by NRCS to a poultry house to reduce ammonia emissions from the house and facilitate manure management. The amendment used is proven to reduce ammonia levels in the house by transforming nitrogen into a form of ammonium. The purpose of the practice is to address resource concerns from existing nutrient levels that may contribute to air quality impacts such as objectionable odors, ammonia emissions, PM and PM precursors, and impacts on bird health due to excess nutrients and pathogens. Associated practices: Nutrient Management (590).

Example formula to calculate required amendment of sodium bisulfate at the prescribed rate of 5% by weight of the litter in tons per year is:
(Number of birds) X (Finish weight of birds (lbs)) X (Pounds of litter)/bird) X (Number of houses) X (application rate) X (Number of applications per year) / 2000 pounds/ton

Before Situation:

Integrator does not currently apply waste treatment amendments to the litter that reduce ammonia emissions.

After Situation:

This scenario is based on a typical poultry operation with a desired application rate is 5% by weight of the litter (5%w/w) of Sodium Bisulfate, or equivalent, amendment.

Typical operation consists of 2 houses, 40' x 400' house (16,000 SF), 20,000 birds (4 pound finished bird weight), 0.5 lb litter/bird, raise 5 flocks per year.

Formula to calculate required amendment at the prescribed rate in tons per year is:
(Number of birds) X (Finish weight of birds (lbs)) X (Pounds of litter)/bird) X (Number of houses) X (application rate) X (Number of applications per year) / 2000 pounds/ton
20,000 birds X 4 lb bird X 0.50 lb litter/bird X 2 houses X 0.05 lb amendment/lb litter X 5 app/year / 2000 lb/ton = 10 tons/year.

An NRCS approved amendment is applied between each flock, 5 applications, at rate required for treatment to address air quality resource concerns. The amendment is proven to control the odor, and to reduce ammonia emissions. The selected amendment is applied in conformance with the manufacturer's recommendations and the rates required. The resulting litter contains higher levels of nutrients and nutrient management plans must account for this. Nutrient level testing of the litter and nutrient planning shall be in conformance with CPS Nutrient Management, Code 590. The amendment successfully addresses the air quality impacts of objectionable odors, ammonia emissions, PM and PM precursors and bird health resource concerns.

Scenario Feature Measure: Tons of amendment per year.

Scenario Unit: Ton

Scenario Typical Size: 10

Scenario Cost: $6,836.80 **Scenario Cost/Unit:** $683.68

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Application of ag waste amendment for poultry litter	2020	Litter amendment application performed in house. Includes equipment, power unit and labor costs.	Ton	$56.15	10	$561.50
Materials						
Ag Waste Amendment, sodium bisulfate	1686	Sodium bisulfate poultry litter amendment. NRCS approved for air quality concerns to reduce ammonia emissions from the litter. Includes materials only.	Ton	$627.53	10	$6,275.30

Practice: **591 - Amend. for Treat. of Ag. Waste**

Scenario: **#2 - Litter Amendments, Water Quality**

Scenario Description:

This practice scenario includes the application of a litter treatment amendment such as aluminum sulfate that is approved by NRCS to the entire poultry house to reduce water-soluble phosphorous in the poultry litter by a specified percentage. The amendment used is proven to and transform nitrogen into a form of ammonium and reduce the concentration of water-soluble phosphorous in the litter and reduces ammonia levels in the house. Resource concerns from existing nutrient levels may contribute to water quality degradation from nutrient runoff and leaching from fields fertilized with poultry litter and air quality impacts such as objectionable odors and ammonia emissions.
Associated practices: Nutrient Management (590).
Example formula to calculate required amendment of aluminum sulfate at the prescribed rate of 10% by weight of the litter in tons per year is:
(Number of birds) X (Finish weight of birds (lbs)) X (Pounds of litter)/bird) X (Number of houses) X (application rate) X (Number of applications per year) / 2000 pounds/ton
20,000 birds X 4 lb bird X 0.50 lb litter/bird X 2 houses X 0.10 lb amendment/lb litter X 5 app/year / 2000 lb/ton = 20 tons/year.

Before Situation:

Integrator does not currently apply waste treatment amendments to the litter that reduce ammonia emissions and soluble phosphorus.

After Situation:

This scenario is based on a typical poultry operation with a desired application rate is 10% by weight of the litter (10%w/w) of a phosphorus binding amendment. Typical operation consists of 2 houses, 40' x 400' house (16,000 SF), 20,000 birds (4 pound finished bird weight), 0.5 lb litter/bird (assume 54 pounds P205/Ton of litter). The operation raises 5 flocks per year.
Formula to calculate required amendment at the prescribed rate in tons per year is:
(Number of birds) X (Finish weight of birds (lbs)) X (Pounds of litter)/bird) X (Number of houses) X (application rate) X (Number of applications per year) / 2000 pounds/ton
20,000 birds X 4 lb bird X 0.50 lb litter/bird X 2 houses X 0.10 lb amendment/lb litter X 5 app/year / 2000 lb/ton = 20 tons/year.
An NRCS approved amendment is applied between each flock at the prescribed rate. The selected amendment is applied in conformance with the manufacturer's recommendations and the rates required. The amendment is proven to reduce soluble phosphorus in the litter, to control the odor, and to reduce ammonia emissions. The resulting litter contains higher levels of nutrients and nutrient management plans must account for this. Nutrient level testing of the litter and nutrient planning shall be in conformance with CPS Nutrient Management, Code 590. The amendment successfully addresses water quality degradation due to nutrients in surface and ground water and air quality impacts from objectionable odors, ammonia emissions, PM and PM precursors and bird health resource concerns.

Scenario Feature Measure: Tons of amendment per year.

Scenario Unit: Ton

Scenario Typical Size: 20

Scenario Cost: $12,978.20 **Scenario Cost/Unit:** $648.91

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Application of ag waste amendment for poultry litter	2020	Litter amendment application performed in house. Includes equipment, power unit and labor costs.	Ton	$56.15	20	$1,123.00
Materials						
Ag Waste Amendment, aluminum sulfate, alum	1684	Aluminum sulfate, alum, poultry Litter amendment. NRCS approved for air and water quality concerns to reduce ammonia emissions and soluble phosphorus in the litter. Materials only.	Ton	$592.76	20	$11,855.20

Practice: 591 - Amend. for Treat. of Ag. Waste

Scenario: #3 - Liquid Animal Waste, Odor

Scenario Description:

This practice scenario includes the treatment of liquid animal waste for odor control using an amendment such as digestive enzymes. The purpose of the practice is to address resource concerns related to air quality impacts from objectionable odors caused by manure storage in a facility close to a small town. Payment is calculated in CuYds of manure storage per year.
Associated practices: Nutrient Management (590), Waste Storage Facility (313).

Before Situation:

Before application of the waste amendment, the liquid manure in the storage facility is creating significant odor problems. The producer is receiving complaints from neighbors.

After Situation:

This practice scenario is applicable for all types of liquid animal waste. A swine operation has been chosen for this scenario example. Typical implementation scenario is a pit under a swine production building for 1180 head of lactating sows, 400 lb each. The pit is 100' x 140' x 8' deep; 1' freeboard and 1' unpumpable sludge reduces working depth to 6'. This scenario is based on the working volume of manure stored and treated per year. The working volume in the manure storage facility is 84,000 cubic feet, and the facility is emptied every 6 months. The resulting total annual working volume of manure to be treated with the amendment is 168,000 cubic feet or 6,222 cubic yards. An NRCS approved amendment is applied periodically according to manufacturer's instructions, typically on a monthly basis. The manufacturer's recommended dosage is based on the volume of manure added to the waste storage facility between amendment doses. The resulting waste contains higher levels of nutrients, which is accounted for in the nutrient management plan. Nutrient level testing of the liquid manure and nutrient planning is done in conformance with CPS Nutrient Management, Code 590. The amendment is proven to reduce odor by up to 83%, and successfully reduces the objectionable odors on the site. Complaints from neighbors are no longer received.

Scenario Feature Measure: CubicYds of required manure storage per year

Scenario Unit: Cubic Yard

Scenario Typical Size: 6,222

Scenario Cost: $3,170.26 **Scenario Cost/Unit:** $0.51

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	6	$138.48
Materials						
Ag Waste Amendment, digestive enzymes, 10 liter container	1688	10 liter container of an organic manure amendment. Liquefied lignite coal. Materials only.	Each	$89.17	34	$3,031.78

Practice: 592 - Feed Management

Scenario: #1 - Cow Dairy, Large

Scenario Description:

Feed ration management on a large dairy operation that does not have access to enough acres to spread all of its manure nutrients at an agronomic rate. The resource concerns are water quality degradation, excessive manure nutrients particularly phosphorus and nitrogen. The goal of the practice is to reduce the amount of nutrients in the raw manure so that it is easier for "landlocked" farmers to apply the manure at agronomic rates, thereby reducing or eliminating water quality degradation concerns.
Associated practices: Nutrient management (590), Prescribed Grazing (528), Forage and Biomass Planting (512), Forage Harvest Management (511)

Before Situation:

Producer is feeding a higher level of protein (17%) and phosphorus (0.45%) than is needed to meet National Research Council (NRC) recommendations for a herd of this type and at this stage of production. The operation does not have all of the available acres that it needs to use the nutrients in the manure when spread at agronomic rates causing over application of nutrients on land affecting soil quality, which may lead to water quality degradation.

After Situation:

The scenario assumes the operation milks 500 holstein cows at average weight of 1,400 pounds, or 700 animal units. A baseline analysis of manure, feed, and milk will be completed to determine the current nutrient inputs and outputs. The Producer will reduce feed protein and phosphorus levels to that of NRC recommendations for a herd of this type and at this stage of production (12% protein and 0.35% phosphorus). Producer will explore alternative feedstuffs and alternative feeding strategies to bring manure nitrogen and phosphorus levels down without hurting production of the animals or profitability of the operation. Alternative feeding strategies can include things like grouping animals per similar age or stage of production, or feeding based on individual rolling average production.

Scenario Feature Measure: Number of 1000 pound animal units

Scenario Unit: Animal Unit

Scenario Typical Size: 700

Scenario Cost: $2,890.72 **Scenario Cost/Unit:** $4.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	12	$1,319.28
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	20	$461.60
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	10	$381.40
Materials						
Test, MUN Testing	1990	Testing nitrogen level in milk as a measure of nitrogen that will be exhibited in manure. Includes materials and shipping only.	Each	$0.42	4	$1.68
Test, Feed Analysis	1989	Representative sample of feed. Includes materials and shipping only.	Each	$34.05	16	$544.80
Test, Manure Analysis	306	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$45.49	4	$181.96

Practice: 592 - Feed Management

Scenario: #2 - Dairy, Small

Scenario Description:

Feed ration management on a small dairy operation that does not have access to enough acres to spread all of its manure nutrients at an agronomic rate. The resource concerns are water quality degradation, excessive manure nutrients particularly phosphorus and nitrogen. The goal of the practice is to reduce the amount of nutrients in the raw manure so that it is easier for "landlocked" farmers to apply the manure at agronomic rates, thereby reducing or eliminating water quality degradation concerns.
Associated practices: Nutrient management (590), Prescribed Grazing (528), Forage and Biomass Planting (512), Forage Harvest Management (511)

Before Situation:

Producer is feeding a higher level of protein (17%) and phosphorus (0.45%) than is needed to meet National Research Council (NRC) recommendations for a herd of this type and at this stage of production. The operation does not have all of the available acres that it needs to use the nutrients in the manure when spread at agronomic rates causing over application of nutrients on land affecting soil quality, which may lead to water quality degradation.

After Situation:

The scenario assumes the operation milks 50 Jersey and Guernsey cows at average weight of 1,000 pounds, or 50 animal units. A baseline analysis of manure, feed, and milk will be completed to determine the current nutrient inputs and outputs. The Producer will reduce feed protein and phosphorus levels to that of NRC recommendations for a herd of this type and at this stage of production (12% protein and 0.35% phosphorus). The producer will also implement pasturing of his herd part to the time where the animals will obtain some of their diet by grazing pastures as well as explore alternative feedstuffs and alternative feeding strategies to bring manure nitrogen and phosphorus levels down without hurting production of the animals or profitability of the operation.

Scenario Feature Measure: Number of 1000 pound animal units

Scenario Unit: Animal Unit

Scenario Typical Size: 50

Scenario Cost: $1,774.04 **Scenario Cost/Unit:** $35.48

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	6	$659.64
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	12	$276.96
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	10	$381.40
Materials						
Test, MUN Testing	1990	Testing nitrogen level in milk as a measure of nitrogen that will be exhibited in manure. Includes materials and shipping only.	Each	$0.42	4	$1.68
Test, Feed Analysis	1989	Representative sample of feed. Includes materials and shipping only.	Each	$34.05	8	$272.40
Test, Manure Analysis	306	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$45.49	4	$181.96

Practice: 595 - Integrated Pest Management

Scenario: #1 - Basic, Field, 1RC

Scenario Description:

A basic IPM plan with LGU-approved pest monitoring techniques and pest thresholds (where available) is applied in Large Scale Field/Forage Crops to address one identified resource concern (e.g. Water Quality - Impacts to Human Drinking Water) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concern) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Before Situation:

Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to an identified resource concern (e.g. Water Quality – Impacts to Human Drinking Water).

After Situation:

After implementing the 595 practice, a basic IPM system has been implemented with Land Grant University approved pest monitoring techniques and pest thresholds (where available) to help meet the minimum criteria for one identified rresource concern (e.g. Water Quality - Impacts to Human Drinking Water) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concern) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $735.92 **Scenario Cost/Unit:** $18.40

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	6	$659.64
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	2	$76.28

Practice: 595 - Integrated Pest Management

Scenario: #2 - Basic, Field, >1RC

Scenario Description:

A basic IPM plan with LGU-approved pest monitoring techniques and pest thresholds (where available) is applied in Large Scale Field/Forage Crops to address multiple identified resource concerns (e.g. Water Quality – Impacts to Human Drinking Water and Pollinator Impacts) with either risk prevention (e.g. planned pesticides have no risks to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Before Situation:

Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to two or more identified resource concerns (e.g. Water Quality – Impacts to Human Drinking Water and Impacts on Pollinators).

After Situation:

After implementing the 595 practice, a basic IPM system has been implemented with Land Grant University approved pest monitoring techniques and pest thresholds (where available) to help meet the minimum criteria for two or more identified resource concerns (e.g. Water Quality - Impacts to Human Drinking Water and Impacts on Pollinators) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $993.94 **Scenario Cost/Unit:** $24.85

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	3	$114.42
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	8	$879.52

Practice: 595 - Integrated Pest Management

Scenario: #3 - Advanced, Field, All RCs

Scenario Description:

A comprehensive IPM plan with LGU-approved pest prevention, avoidance and monitoring techniques and pest thresholds (where available) is applied in Large Scale Field/Forage Crops to address all identified resource concerns with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Before Situation:

Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to an identified resource concern (e.g. Water Quality – Impacts to Human Drinking Water).

After Situation:

After implementing the 595 practice, a comprehensive IPM plan with Land Grant University approved pest prevention, avoidance and monitoring techniques and pest thresholds (where available) is applied to help meet the minimum criteria for all identified resource concerns with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $1,471.84 **Scenario Cost/Unit:** $36.80

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	4	$152.56
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	12	$1,319.28

Practice: 595 - Integrated Pest Management

Scenario: #4 - Basic, Fruit/Veg, 1RC

Scenario Description:

A basic IPM plan with LGU-approved pest monitoring techniques and pest thresholds (where available) is applied in Large Scale Small Fruit/Vegetable Crops to address one identified resource concern (e.g. Water Quality - Impacts to Human Drinking Water) with either risk prevention (e.g. planned pesticides no risk to the identified resource concern) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Before Situation:

Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to an identified resource concern (e.g. Water Quality – Impacts to Human Drinking Water).

After Situation:

After implementing the 595 practice, a basic IPM system has been implemented with Land Grant University approved pest monitoring techniques and pest thresholds (where available) to help meet the minimum criteria for at least one identified resource concern (e.g. Water Quality - Impacts to Human Drinking Water) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concern) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $1,032.08 **Scenario Cost/Unit:** $103.21

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	4	$152.56
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	8	$879.52

Practice: 595 - Integrated Pest Management

Scenario: #5 - Basic, Fruit/Veg, >1RC

Scenario Description:

A basic IPM plan with LGU-approved pest monitoring techniques and pest thresholds (where available) is applied in Large Scale Small Fruit/Vegetable Crops to address multiple identified resource concerns (e.g. Water Quality - Impacts to Human Drinking Water and Pollinator Impacts) with either risk prevention (e.g. planned pesticides have no risk to identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Before Situation:

Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to two or more identified resource concerns (e.g. Water Quality – Impacts to Human Drinking Water and Impacts on Pollinators).

After Situation:

After implementing the 595 practice, a basic IPM system has been implemented with Land Grant University approved pest monitoring techniques and pest thresholds (where available) to help meet the minimum criteria for two or more identified resource concerns (e.g. Water Quality - Impacts to Human Drinking Water and Impacts on Pollinators) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $1,328.24 **Scenario Cost/Unit:** $132.82

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	6	$228.84
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	10	$1,099.40

Practice: 595 - Integrated Pest Management

Scenario: #6 - Advanced, Fruit/Veg, All RCs

Scenario Description:

A comprehensive IPM plan with LGU-approved pest prevention, avoidance and monitoring techniques and pest thresholds (where available) is applied in Large Scale Small Fruit/Vegetable Crops to address all identified resource concerns with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Before Situation:

Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to an identified resource concern (e.g. Water Quality – Impacts to Human Drinking Water).

After Situation:

After implementing the 595 practice, a comprehensive IPM plan with Land Grant University approved pest prevention, avoidance and monitoring techniques and pest thresholds (where available) is applied to help meet the minimum criteria for all identified resource concerns with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $2,030.50 **Scenario Cost/Unit:** $203.05

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	15	$1,649.10
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	10	$381.40

Practice: 595 - Integrated Pest Management

Scenario: #7 - Basic, Orchard, 1RC

Scenario Description:

A basic IPM plan with LGU-approved pest monitoring techniques and pest thresholds (where available) is applied in Large Scale Orchard/Specialty Crops to address one identified resource concern (e.g. Water Quality - Impacts to Human Drinking Water) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concern) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Before Situation:

Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to an identified resource concern (e.g. Water Quality – Impacts to Human Drinking Water).

After Situation:

After implementing the 595 practice, a basic IPM system has been implemented with Land Grant University approved pest monitoring techniques and pest thresholds (where available) to help meet the minimum criteria for at least one identified resource concern (e.g. Water Quality - Impacts to Human Drinking Water) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concern) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $1,328.24 **Scenario Cost/Unit:** $132.82

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	10	$1,099.40
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	6	$228.84

Practice: 595 - Integrated Pest Management

Scenario: #8 - Basic, Orchard, >1RC

Scenario Description:

A basic IPM plan with LGU-approved pest monitoring techniques and pest thresholds (where available) is applied in Large Scale Orchard/Specialty Crops to address multiple identified resource concerns (e.g. Water Quality - Impacts to Human Drinking Water and Pollinator Impacts) with either risk prevention (e.g. planned pesticides have no risks to identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Before Situation:

Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to two or more identified resource concerns (e.g. Water Quality – Impacts to Human Drinking Water and Impacts on Pollinators).

After Situation:

After implementing the 595 practice, a basic IPM system has been implemented with Land Grant University approved pest monitoring techniques and pest thresholds (where available) to help meet the minimum criteria for two or more identified resource concerns (e.g. Water Quality - Impacts to Human Drinking Water and Impacts on Pollinators) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $2,030.50 **Scenario Cost/Unit:** $203.05

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	10	$381.40
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	15	$1,649.10

Practice: 595 - Integrated Pest Management

Scenario: #9 - Advanced, Orchard, All RCs

Scenario Description:

A comprehensive IPM plan with LGU-approved pest prevention, avoidance and monitoring techniques and pest thresholds (where available) is applied in Large Scale Orchard/Specialty Crops to address all identified resource concerns with either risk prevention (e.g. planned pesticides have no risk to identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Before Situation:

Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to an identified resource concern (e.g. Water Quality – Impacts to Human Drinking Water).

After Situation:

After implementing the 595 practice, a comprehensive IPM plan with Land Grant University approved pest prevention, avoidance and monitoring techniques and pest thresholds (where available) is applied to help meet the minimum criteria for all identified resource concerns with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $3,152.30 **Scenario Cost/Unit:** $315.23

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	25	$953.50
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	20	$2,198.80

Practice: 595 - Integrated Pest Management

Scenario: #10 - Basic, Small Farm, 1RC

Scenario Description:

A basic IPM plan with LGU-approved pest monitoring techniques and pest thresholds (where available) is applied in Small Farm/Diversified Systems (e.g. CSA, organic, etc.) to address one identified resource concern (e.g. Water Quality - Impacts to Human Drinking Water) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concern) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings). This scenario attempts to capture the higher cost/acre of planning and implementing IPM techniques on smaller acreages with very diverse cropping systems.

Before Situation:

Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to an identified resource concern (e.g. Water Quality – Impacts to Human Drinking Water).

After Situation:

After implementing the 595 practice, a basic IPM system has been implemented with Land Grant University approved pest monitoring techniques and pest thresholds (where available) to help meet the minimum criteria for at least one identified resource concern resource concern (e.g. Water Quality - Impacts to Human Drinking Water) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concern) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $625.98 **Scenario Cost/Unit:** $625.98

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	2	$76.28
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	5	$549.70

Practice: 595 - Integrated Pest Management

Scenario: #11 - Basic, Small Farm, >1RC

Scenario Description:

A basic IPM plan with LGU-approved pest monitoring techniques and pest thresholds (where available) is applied in Small Farm/ Diversified Systems (e.g. CSA, organic, etc.) to address multiple identified resource concerns (e.g. Water Quality - Impacts to Human Drinking Water and Pollinator Impacts) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings). This scenario attempts to capture the higher cost/acre of planning and implementing IPM techniques on smaller acreages with very diverse cropping systems.

Before Situation:

Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to two or more identified resource concerns (e.g. Water Quality – Impacts to Human Drinking Water and Impacts on Pollinators).

After Situation:

After implementing the 595 practice, a basic IPM system has been implemented with Land Grant University approved pest monitoring techniques and pest thresholds (where available) to help meet the minimum criteria for two or more identified resource concerns (e.g. Water Quality - Impacts to Human Drinking Water and Impacts on Pollinators) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $812.20 **Scenario Cost/Unit:** $812.20

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	4	$152.56
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	6	$659.64

Practice: 595 - Integrated Pest Management

Scenario: #12 - Advanced, Small Farm, All RCs

Scenario Description:

A comprehensive IPM plan with LGU-approved pest prevention, avoidance and monitoring techniques and pest thresholds (where available) is applied in Small Farm/Diversified Systems (e.g. CSA, Organic, etc.) to address all identified resource concerns with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings. This scenario attempts to capture the higher cost/acre of planning and implementing IPM techniques on smaller acreages with very diverse cropping systems.

Before Situation:

Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to an identified resource concern (e.g. Water Quality – Impacts to Human Drinking Water).

After Situation:

After implementing the 595 practice, a comprehensive IPM plan with Land Grant University approved pest prevention, avoidance and monitoring techniques and pest thresholds (where available) is applied to help meet the minimum criteria for all identified resource concerns with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $1,218.30 **Scenario Cost/Unit:** $1,218.30

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	9	$989.46
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	6	$228.84

Practice: 600 - Terrace

Scenario: #1 - Broadbased

Scenario Description:

An earthen embankment with channel constructed across the field slope as part of a system to shorten slope lengths and reduce sheet, rill, and gully erosion in a cropped field. The typical installation is a broadbased terrace having 5:1 upstream and 5:1 downstream slopes measuring 2,500 feet in a field with slopes from 2% to 8% constructed in loam soils or similar in regards to workability. Channel and berm are farmed. A stable outlet is provided in the form of a Grassed Waterway or Underground Outlet. Costs include all equipment and forces necessary to excavate, shape, and compact terrace. This practice addresses Concentrated Flow Erosion and Excessive Sediment in surface waters.

Before Situation:

Long slope lengths contribute to excessive sedimentation and soil erosion in cropped fields as a result of gully, rill, and sheet erosion. The slopes may or may not have remnant non-functioning terraces that are beyond their life. The excessive erosion may lead to deterioration of receiving waters due to excessive sedimentation and nutrient transport.

After Situation:

A system of broadbased terraces measuring 2,500 feet in length, 2.5 height, and 5:1 front and back slopes is installed with spacing designed to intercept flow of water and shorten slope length to reduce erosion to acceptable levels. Work is done with dozer, scraper, or road grader. The installed terrace is typically farmed. Associated practices are Critical Area Planting (342), Grassed Waterway (412), and Underground Outlet (620).

Scenario Feature Measure: Length of Terrace

Scenario Unit: Foot

Scenario Typical Size: 2,500

Scenario Cost: $5,859.92 **Scenario Cost/Unit:** $2.34

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	33	$4,117.74
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	6	$247.38
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	33	$1,238.16
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 600 - Terrace

Scenario: #2 - Flat Channel

Scenario Description:

An earthen embankment with channel constructed across the field slope as part of a system to shorten slope lengths, and reduce sheet, rill, and gully erosion in a cropped field. The typical installation is a flat channel (level) terrace storing runoff with a length of 2,500 feet and side slopes of 8:1 or greater in a field with slopes from 2% to 8% constructed in loam soils or similar in regards to workability. Costs include all equipment and forces necessary to excavate, shape, and compact terrace. This practice addresses Concentrated Flow Erosion and Excessive Sediment in surface waters.

Before Situation:

Long slope lengths contribute to excessive sedimentation and soil erosion in cropped fields as a result of gully, rill, and sheet erosion. The excessive erosion may lead to deterioration of receiving waters due to excessive sedimentation and nutrient transport.

After Situation:

A system of flat channel (level) terraces with approximately 8:1 front and back slopes, 2.5 feet height, and 2,500 feet in length is installed with spacing designed to intercept flow of water and shorten slope length to reduce erosion to acceptable levels. Work is done with dozer, scraper, or road grader. The installed terrace is typically farmed. Associated practices are Critical Area Planting (342), Grassed Waterway (412), and Underground Outlet (620).

Scenario Feature Measure: Length of Terrace

Scenario Unit: Foot

Scenario Typical Size: 2,500

Scenario Cost: $9,675.28 **Scenario Cost/Unit:** $3.87

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	56	$6,987.68
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	8	$329.84
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	56	$2,101.12
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 600 - Terrace

Scenario: #3 - 5 to 1 & 2 to 1

Scenario Description:

An earthen embankment with channel constructed across the field slope as part of a system to shorten slope lengths and reduce sheet, rill, and gully erosion in a cropped field. The typical installation is a system of terraces (2,500 feet in length) that have one relatively flat (5:1) slope and one steep (2:1) slope constructed in a field with slopes from 2% to 8% installed in loam soils or similar soils in regards to workability. The steep slope is established to permanent vegetation with the flatter slope farmed. A stable outlet is provided in the form of a Grassed Waterway or Underground Outlet. Costs include all equipment and forces necessary to excavate, shape, and compact terrace. Seeding is not included. This practice addresses Concentrated Flow Erosion and Excessive Sediment in surface waters.

Before Situation:

Long slope lengths contribute to excessive sedimentation and soil erosion in cropped fields as a result of gully, rill, and sheet erosion. The excessive erosion may lead to deterioration of receiving waters due to excessive sedimentation and nutrient transport.

After Situation:

A system of terraces with one steep (2:1) and one flat (5:1) slope measuring 2,500 feet in length and 2.5' height is installed with spacing designed to intercept flow of water and shorten slope length to reduce erosion to acceptable levels. Work is done with dozer, scraper, or road grader. Associated practices are Critical Area Planting (342), Grassed Waterway (412), and Underground Outlet (620).

Scenario Feature Measure: Length of Terrace

Scenario Unit: Feet

Scenario Typical Size: 2,500

Scenario Cost: $3,464.03 **Scenario Cost/Unit:** $1.39

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	19	$2,370.82
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	3	$123.69
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	19	$712.88
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: **600 - Terrace**

Scenario: **#4 - Narrow Base < 8%**

Scenario Description:

An earthen embankment with channel constructed across the field slope as part of a system to shorten slope lengths and reduce sheet, rill, and gully erosion in a cropped field. The typical installation is a system of narrow base terraces with 2:1 slopes, 2,500' length, and 2.5' height in a field with slopes from 3% to 8% constructed in loam soils or similar in regards to workability. A stable outlet is provided in the form of a Grassed Waterway or Underground Outlet. Costs include all equipment and forces necessary to excavate, shape, and compact terrace. Permanent vegetation is established. Seeding is not included. This practice addresses Concentrated Flow Erosion and Excessive Sediment in surface waters.

Before Situation:

Long slope lengths contribute to excessive sedimentation and soil erosion in cropped fields as a result of gully, rill, and sheet erosion. The excessive erosion may lead to deterioration of receiving waters due to excessive sedimentation and nutrient transport.

After Situation:

A system of narrow base terraces with approximately 2:1 front and back slopes measuring 2,500 feet in length and 2.5 feet height is constructed with spacing designed to intercept flow of water and shorten slope length to reduce erosion to acceptable levels. Work is done with dozer, scraper, or road grader. Associated practices are Critical Area Planting (342), Grassed Waterway (412), and Underground Outlet (620).

Scenario Feature Measure: Length of Terrace

Scenario Unit: Feet

Scenario Typical Size: 2,500

Scenario Cost: $4,275.53 **Scenario Cost/Unit:** $1.71

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	24	$2,994.72
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	24	$900.48
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	3	$123.69
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 600 - Terrace

Scenario: #5 - Narrow Base > 8%

Scenario Description:

An earthen embankment with channel constructed across the field slope as part of a system to shorten slope lengths and reduce sheet, rill, and gully erosion in a cropped field. The typical installation is a system of narrow base terraces with 2:1 slopes, 2,500' length, and 2.5' height in a field with slopes exceeding 8% constructed in loam soils or similar in regards to workability. A stable outlet is provided in the form of a Grassed Waterway or Underground Outlet. Costs include all equipment and forces necessary to excavate, shape, and compact terrace. Permanent vegetation is established. Seeding is not included. This practice addresses Concentrated Flow Erosion and Excessive Sediment in surface waters.

Before Situation:

Long slope lengths contribute to excessive sedimentation and soil erosion in cropped fields as a result of gully, rill, and sheet erosion. The excessive erosion may lead to deterioration of receiving waters due to excessive sedimentation and nutrient transport.

After Situation:

A system of narrow base terraces with approximately 2:1 front and back slopes measuring 2,500 feet in length and 2.5' height is constructed with spacing designed to intercept flow of water and shorten slope length to reduce erosion to acceptable levels. Work is done with dozer, scraper, or road grader. Associated practices are Critical Area Planting (342), Grassed Waterway (412), and Underground Outlet (620).

Scenario Feature Measure: Length of Terrace

Scenario Unit: Feet

Scenario Typical Size: 2,500

Scenario Cost: $4,641.36 **Scenario Cost/Unit:** $1.86

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	26	$3,244.28
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	26	$975.52
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 601 - Vegetative Barriers

Scenario: #1 - Seeded Strips, 3-5 ft wide

Scenario Description:

Permanent strips of stiff, dense vegetation 3-5 feet wide are established along the general contour of slopes or across concentrated flow areas to reduce erosion and manage water flow and trap sediment.

Before Situation:

Significant erosion is occurring resulting in substantial transport of sediment across the slope or concentrated flow areas. A large amount of sediment is subsequently delivered to the edge of the field and/or waterways.

After Situation:

A strip or strips of stiff, dense vegetation three to five feet wide is/are established along the general contour of the slope or across concentrated flow areas that effectively settles a significant amount or sediment above the leading edge of the vegetative barrier.Barrier may also help to connect green areas to provide shelter for wildlife.Management practices such as Conservation Crop Rotation (code 328) and the residue and tillage management practices (codes 329, 345 and 346) must be considered in designing the conservation management system on cropland.

Practices such as water and sediment control basins, subsurface drainage, and underground outlets may be needed to adequately handle surface and subsurface water.

Scenario Feature Measure: Linear feet of practice installed

Scenario Unit: Linear Foot

Scenario Typical Size: 1,000

Scenario Cost: $9.35 **Scenario Cost/Unit:** $0.01

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	0.0918	$1.86
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	0.0918	$0.97
Materials						
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.0918	$6.51

Practice: 601 - Vegetative Barriers

Scenario: #2 - Seeded Strips, >5 ft wide

Scenario Description:

Permanent strips of stiff, dense vegetation greater than 5 feet wide are established along the general contour of slopes or across concentrated flow areas to stabilize slopes, reduce erosion, manage water flow and trap sediment.

Before Situation:

Significant erosion is occurring resulting in substantial transport of sediment across the slope or concentrated flow areas. A large amount of sediment is subsequently delivered to the edge of the field and/or waterways.

After Situation:

A strip or strips of stiff, dense vegetation greater than five feet wide is/are established along the general contour of the slope or across concentrated flow areas that effectively settles a significant amount or sediment above the leading edge of the vegetative barrier.Barrier may also help to connect green areas to provide shelter for wildlife. A strip of land 5-10 feet wide is taken out of crop production.Management practices such as Conservation Crop Rotation (code 328) and the residue and tillage management practices (codes 329, 345 and 346) must be considered in designing the conservation management system on cropland.
Practices such as water and sediment control basins, subsurface drainage, and underground outlets may be needed to adequately handle surface and subsurface water.

Scenario Feature Measure: Linear feet of practice installed

Scenario Unit: Linear Foot

Scenario Typical Size: 1,000

Scenario Cost: $47.69 **Scenario Cost/Unit:** $0.05

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	0.1837	$3.73
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	0.1837	$1.94
Foregone Income						
FI, Fallow	1975	Fallow Cover is Primary Crop	Acre	($44.70)	#######	($2.74)
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$170.63	#######	$10.45
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$347.53	#######	$21.28
Materials						
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.1837	$13.03

Practice: 601 - Vegetative Barriers

Scenario: #3 - Cuttings, on slopes

Scenario Description:

Permanent strips of stiff, dense vegetation established along the general contour of slopes typically in vineyards, orchard or other cropped land to sabilize slopes, reduce erosion, manage water flow and trap sediment.

Before Situation:

Significant erosion is occurring resulting in substantial transport of sediment across the slope or concentrated flow areas. A large amount of sediment is subsequently delivered to the edge of the field and/or waterways.

After Situation:

A strip or strips of stiff, dense vegetation are established along the general contour of the slope that effectively settles a significant amount or sediment above the leading edge of the vegetative barrier. Barrier may also help to connect green areas to provide shelter for wildlife. Management practices such as Conservation Crop Rotation (code 328) and the residue and tillage management practices (codes 329, 345 and 346) must be considered in designing the conservation management system on cropland.
Practices such as water and sediment control basins, subsurface drainage, and underground outlets may be needed to adequately handle surface and subsurface water.

Scenario Feature Measure: Linear feet of practice installed

Scenario Unit: Linear Foot

Scenario Typical Size: 100

Scenario Cost: $783.36 **Scenario Cost/Unit:** $7.83

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Ground sprigging	1101	Includes costs for equipment, power unit and labor.	Acre	$95.60	0.0092	$0.88
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	0.0092	$0.06
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	0.0092	$0.05
Materials						
One Species, Warm Season, Introduced Perennial Rhizome	2324	Cool season introduced perennial rhizome. Includes material and shipping only.	100 Foot	$781.57	1	$781.57
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	0.0092	$0.14
Nitrogen (N), Ammonium Sulfate	70	Price per pound of N supplied by Ammonium Sulfate. Price is not per pound of total product applied, no conversion is needed.	Pound	$1.42	0.4591	$0.65

Practice: 603 - Herbaceous Wind Barriers

Scenario: #1 - Annual Species

Scenario Description:

This scenario describes the implementation of herbaceous barriers to reduce wind velocities and wind-borne particulate matter. In this scenario barriers are composed of annual vegetation, living or dead. Plant materials shall be selected for local adaptation and climatic conditions and are resistant to lodging and are non-spreading in their habit. Barriers will be designed as close to perpendicular to prevailing winds as practical. Barrier direction, spacing, and composition needed to achieve the desired purpose shall be designed using the currently approved wind erosion technology. Implementation will reduce soil erosion, protect growing plants from damage by wind blown soil particles, and reduce soil particulate emissions to the air.

Before Situation:

Typically cropland has excessive soil disturbance and unsheltered distance that results in excessive wind erosion that affect soil resources. Seedling development and wildlife habitat are negatively affected by wind-borne sediment and sediment-borne contaminants travelling offsite.

After Situation:

Implementation of herbaceous wind barriers will modify the flow and velocity of air dependant upon barrier height, porosity, spacing and wind speed. Orientation is generally placed across an entire field perpendicular to applicable prevailing wind direction. Implementation will reduce soil loss, protect growing plants from damage by wind blown soil particles, reduce soil particulate emissions to the air and may provide some temporary food and cover for wildlife. Payment is for the design and implementation of annual barriers and required reestablishment.

Scenario Feature Measure: linear feet of barrier planted

Scenario Unit: Linear Feet

Scenario Typical Size: 1,320

Scenario Cost: $170.66 **Scenario Cost/Unit:** $0.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	0.15	$3.04
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	1	$37.31
Foregone Income						
FI, Wheat Irrigated	1964	Irrigated Wheat is Primary Crop	Acre	$463.99	0.05	$23.20
FI, Soybeans Irrigated	1962	Irrigated Soybeans is Primary Crop	Acre	$469.34	0.05	$23.47
FI, Vegetables	2033	Vegetables is Primary Crop	Acre	$1,093.36	0.05	$54.67
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	1	$23.08
Materials						
One Species, Cool Season, Annual Grass or Legume	2311	Cool season annual grass or legume. Includes material and shipping only.	Acre	$39.29	0.15	$5.89

Practice: **603 - Herbaceous Wind Barriers**

Scenario: **#2 - Perennial species**

Scenario Description:

This scenario describes the implementation of herbaceous barriers to reduce wind velocities and wind-borne particulate matter. In this scenario barriers are composed of perennial living vegetation. Plant materials shall be selected for local adaptation and climatic conditions and are resistant to lodging and are non-spreading in their habit. Barriers will be designed as close to perpendicular to prevailing winds as practical. Barrier direction, spacing, and composition needed to achieve the desired purpose shall be designed using the currently approved wind erosion technology. Implementation will reduce soil erosion, protect growing plants from damage by wind blown soil particles, reduce soil particulate emissions to the air and provide food and cover for wildlife.

Before Situation:

Typically cropland has excessive soil disturbance and unsheltered distance that results in excessive wind erosion that affect soil resources. Seedling development and wildlife habitat are negatively affected by wind-borne sediment and sediment-borne contaminants travelling offsite.

After Situation:

Implementation of perennial herbaceous wind barriers will modify the flow and velocity of air dependant upon barrier height, porosity, spacing and wind speed. Orientation is generally placed across an entire field perpendicular to applicable prevailing wind direction. Implementation will reduce soil loss; protect growing plants from damage by wind blown soil particles, provide food and cover for wildlife. Payment is for the design and implementation of perennial barriers and required reestablishment.

Scenario Feature Measure: linear feet of barrier planted

Scenario Unit: Linear Feet

Scenario Typical Size: 1,320

Scenario Cost: $175.41 **Scenario Cost/Unit:** $0.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	1	$37.31
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	0.15	$3.04
Foregone Income						
FI, Soybeans Irrigated	1962	Irrigated Soybeans is Primary Crop	Acre	$469.34	0.05	$23.47
FI, Vegetables	2033	Vegetables is Primary Crop	Acre	$1,093.36	0.05	$54.67
FI, Wheat Irrigated	1964	Irrigated Wheat is Primary Crop	Acre	$463.99	0.05	$23.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	1	$23.08
Materials						
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.15	$10.64

Practice: 603 - Herbaceous Wind Barriers

Scenario: #3 - Snow Deposition

Scenario Description:

This scenario describes the implementation of herbaceous barriers that are designed specifically to improve available soil moisture for crops/forages by reducing wind velocities and distributing snow more evenly across an entire field. The planned herbaceous barrier(s) will meet the current 603 standard. Payment for implementation is to defray the costs of design and layout of the barriers, site preparation, planting, application of fertilizers and amendments, and seeding. Current wind erosion technologies will be used in the design of barriers to meet the intended purposes. Implementation will enhance snow deposition to increase plant-available moisture and may also reduce soil erosion.

Before Situation:

Typically cropland or hayland are managed so that they are unprotected during fall/winter causing damage by wind erosion and allowing snow to drift or blow across or off the field. Management on cropland commonly includes soil disturbance resulting in wind erosion that degrades soil quality, causes offsite deposition of soil and snow and adversely affects plant productivity and wildlife habitat.

After Situation:

Herbaceous wind barriers will be designed so that wind velocities are reduced enhancing snow deposition onto crop or forage fields that improve plant available soil moisture. The minimum height of these barriers must be at least 1.5 feet during periods of expected snow fall and must achieve a porosity of 60-75 percent while being established in a manner that reduces wind erosion to acceptable levels. Plant materials must be adapted to local soil and climate conditions, including stiff, erect, non-spreading growth habit and resistance to lodging. The use of plant species that enhance plant species diversity will also enhance wildlife habitat. Spacing shall not exceed 12 times the height of the barrier. Mechanical or chemical seedbeds will be prepared to provide a firm weed-free seedbed. Seeding will be completed using an appropriate drill. If annual vegetation is used, re-establishment will be completed so that barriers are in place prior to expected snow fall events.

Scenario Feature Measure: linear feet of barrier planted

Scenario Unit: Linear Feet

Scenario Typical Size: 1,320

Scenario Cost: $106.32 **Scenario Cost/Unit:** $0.08

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.29	0.15	$3.04
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	1	$37.31
Foregone Income						
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$347.53	0.07	$24.33
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$170.63	0.08	$13.65
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	1	$23.08
Materials						
One Species, Cool Season, Introduced Perennial Grass	2313	Introduced, cool season perennial grass. Includes material and shipping only.	Acre	$32.72	0.15	$4.91

Practice: 606 - Subsurface Drain

Scenario: #1 - Single-Wall Pipe, ≤ 6 inch

Scenario Description:

Description: Below ground installation of perforated HDPE, Single-wall Corrugated Plastic Pipe, 6" or less, using a drainage plow.

Resource Concerns: Excess Water (Seasonal High Water Table); Degraded Plant Condition; Water Quality Degradation (Nutrients).
Associated Practices: 608 - Surface Drain, Main or Lateral; 587 - Structure for Water Control, 533 - Pumping Plant; and 554 - Drainage Water Management.

Before Situation:

Before installation soil conditions are excessively wet in the spring due to poor internal soil drainage. Excess soil water is causing crop stress and delay of field operations (seed bed preparation, planting, etc.).

After Situation:

The drainage modifications result in reduced plant stress due to excessive wetness caused by a seasonal high water table, or improved drainage water quality due to system retrofit enabling drainage water management.

HDPE (CPP) Single-Wall is manufactured in sizes (nominal diameter) from 3-inch to 24-inch; typical practice sizes range from 3-inch to 12-inch; and typical scenario size is 5-inch. Construct 2,000 feet of 5-inch, Single-Wall, perforated HDPE Corrugated Plastic Pipe (CPP), installed below ground to a minimum depth 5 feet. The unit is in weight of pipe material in pounds. 2,000 feet of 5-inch, Single-Wall, perforated HDPE CPP weighs 0.50 lb/ft, or a total of 1,000 pounds. The typical number of mainline connections for 2,000 feet of subsurface drainline is a total of 3 each.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 1,000

Scenario Cost: $8,038.04 **Scenario Cost/Unit:** $8.04

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, tile line plowing, earth, 60"	1457	Plowing in 3"-15" CPP drain line into earth, 60" depth, includes equipment and labor for trenching, laying, and backfilling.	Foot	$2.32	2000	$4,640.00
Materials						
Drainage Lateral Connection	1458	Connect 3"-6" drainage lateral to main drain, includes excavation to 6' depth, install tee on main line, connect lateral, and backfill. Includes material cost for tee.	Each	$28.26	3	$84.78
Pipe, HDPE, corrugated single wall, ≤ 12" weight priced Compound	1380	High Density Polyethylene (HDPE) compound manufactured into single wall corrugated pipe or tubing. Materials only.	Pound	$1.82	1000	$1,820.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 606 - Subsurface Drain

Scenario: #2 - Single-Wall Pipe, ≤ 6 inch, Enveloped

Scenario Description:

Description: Below ground installation of perforated HDPE, Single-wall Corrugated Plastic Pipe, 6" or less, with Sand-Gravel envelope, using a drainage trencher.
Resource Concerns: Excess Water (seasonal High Water Table); Degraded Plant Condition; Water Quality Degradation (Nutrients).
Associated Practices: 608 - Surface Drain, Main or Lateral; 587 - Structure for Water Control, 533 - Pumping Plant; and 554 - Drainage Water Management.

Before Situation:

Before installation soil conditions are excessively wet in the spring due to poor internal soil drainage. Excess soil water is causing crop stress and delay of field operations (seed bed preparation, planting, etc.).

After Situation:

The drainage modifications result in reduced plant stress due to excessive wetness caused by a seasonal high water table, or improved drainage water quality due to system retrofit enabling drainage water management.

HDPE (CPP) Single-Wall is manufactured in sizes (nominal diameter) from 3-inch to 24-inch; typical practice sizes range from 3-inch to 12-inch; and typical scenario size is 5-inch. Construct 2,000 feet of 5-inch, Single-Wall, perforated HDPE Corrugated Plastic Pipe (CPP), installed below ground to a minimum depth of 5 feet, and surrounded with a sand-gravel envelope. The unit is in weight of pipe material in pounds. 2,000 feet of 5-inch, Single-Wall, perforated HDPE CPP weighs 0.50 lb/ft, or a total of 1,000 pounds. The typical volume sand-gravel for 2,000 feet of 12"wide x 12" high envelope is 64 cubic yards. The typical number of mainline connections for 2,000 feet of subsurface drainline is a total of 3 each.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 1,000

Scenario Cost: $10,643.24 **Scenario Cost/Unit:** $10.64

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Earth, 12" x 60"	1459	Trenching, earth, 12" wide x 60" depth, includes equipment and labor for trenching, laying 3"-6" CPP drain line with envelope, and backfilling.	Foot	$1.87	2000	$3,740.00
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	$88.87	8	$710.96
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	8	$300.16
Materials						
Drainage Lateral Connection	1458	Connect 3"-6" drainage lateral to main drain, includes excavation to 6' depth, install tee on main line, connect lateral, and backfill. Includes material cost for tee.	Each	$28.26	3	$84.78
Pipe, HDPE, corrugated single wall, ≤ 12" weight priced Compound	1380	High Density Polyethylene (HDPE) compound manufactured into single wall corrugated pipe or tubing. Materials only.	Pound	$1.82	1000	$1,820.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	64	$2,494.08
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 606 - Subsurface Drain

Scenario: #3 - Single-Wall Pipe, ≥ 8 inch

Scenario Description:

Description: Below ground installation of HDPE, Single-wall Corrugated Plastic Pipe, 8" or larger, using a drainage plow.

Resource Concerns: Excess Water (Seasonal High Water Table); Degraded Plant Condition; Water Quality Degradation (Nutrients).
Associated Practices: 607 - Surface Drain, Field Ditch; 608 - Surface Drain, Main or Lateral; 587 - Structure for Water Control, 533 - Pumping Plant; and 554 - Drainage Water Management.

Before Situation:

Before installation soil conditions are excessively wet in the spring due to poor internal soil drainage. Excess soil water is causing crop stress and delay of field operations (seed bed preparation, planting, etc.).

After Situation:

The drainage modifications result in reduced plant stress due to excessive wetness caused by a seasonal high water table, or improved drainage water quality due to system retrofit enabling drainage water management.

HDPE (CPP) Single-Wall is manufactured in sizes (nominal diameter) from 3-inch to 24-inch; typical practice sizes range from 3-inch to 12-inch; and typical scenario size is 10-inch. Construct 1,000 feet of 10-inch, Single-Wall, HDPE Corrugated Plastic Pipe (CPP), installed below ground to a minimum depth 5 feet. The unit is in weight of pipe material in pounds. 1,000 feet of 10-inch, Single-Wall, HDPE CPP weighs 1.80 lb/ft, or a total of 1,800 pounds.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 1,800

Scenario Cost: $6,575.98 **Scenario Cost/Unit:** $3.65

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, tile line plowing, earth, 60"	1457	Plowing in 3"-15" CPP drain line into earth, 60" depth, includes equipment and labor for trenching, laying, and backfilling.	Foot	$2.32	1000	$2,320.00
Materials						
Pipe, HDPE, corrugated single wall, ≤ 12" weight priced Compound	1380	High Density Polyethylene (HDPE) compound manufactured into single wall corrugated pipe or tubing. Materials only.	Pound	$1.82	1800	$3,276.00
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 606 - Subsurface Drain

Scenario: #4 - Twin-Wall Pipe, ≥ 8 inch

Scenario Description:

Description: Below ground installation of HDPE, Twin-wall Corrugated Plastic Pipe, 8" or larger, using a drainage plow.

Resource Concerns: Excess Water (Seasonal High Water Table); Degraded Plant Condition; Water Quality Degradation (Nutrients).
Associated Practices: 607 - Surface Drain, Field Ditch; 608 - Surface Drain, Main or Lateral; 587 - Structure for Water Control, 533 - Pumping Plant; and 554 - Drainage Water Management.

Before Situation:

Before installation soil conditions are excessively wet in the spring due to poor internal soil drainage. Excess soil water is causing crop stress and delay of field operations (seed bed preparation, planting, etc.).

After Situation:

The drainage modifications result in reduced plant stress due to excessive wetness caused by a seasonal high water table, or improved drainage water quality due to system retrofit enabling drainage water management.

HDPE (CPP) Twin-Wall is manufactured in sizes (nominal diameter) from 4-inch to 60-inch; typical practice sizes range from 8-inch to 15- inch; and typical scenario size is 12-inch. Construct 1,000 feet of 12-inch, Twin-Wall, HDPE Corrugated Plastic Pipe (CPP), installed below ground to a minimum depth 5 feet. The unit is in weight of pipe material in pounds. 1,000 feet of 12-inch, Twin-Wall, HDPE CPP weighs 3.2 lb/ft, or a total of 3,200 pounds.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 3,200

Scenario Cost: $12,957.20 **Scenario Cost/Unit:** $4.05

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Earth, 24" x 60"	1460	Trenching, earth, 24" wide x 60" depth, includes equipment and labor for trenching and backfilling.	Foot	$3.65	1000	$3,650.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	40	$923.20
Materials						
Pipe, HDPE, corrugated double wall, ≤ 12", soil tight, weight priced	1587	High Density Polyethylene (HDPE) compound manufactured into double wall corrugated pipe ≤ 12" diameter. Materials only.	Pound	$2.62	3200	$8,384.00

Practice: **607 - Surface Drainage, Field Ditch**

Scenario: **#1 - Drainage Ditch, <=3ft deep**

Scenario Description:

This scenario is the construction of a surface drain, field ditch, 2-3 feet deep. Typical construction dimensions are 4' bottom x 2.5' deep x 1320' length with a side slope of 3:1. Excess water is either reused in an Irrigation System, Tailwater Recovery (447) system, or conveyed to a receiving water body. If a drain deeper than 3 feet is needed, use the "Variable SIze, CuYds" scenario.

Resource concerns: Excess/Insufficient Water - Inefficient Use of Irrigation Water and Water Quality Degradation - Excessive Sediment in Surface Waters.

Associated Conservation Practices: 608-Surface Drain, Main or Lateral; 587 -Structure For Water Control; 554 - Drainage Water Management

Before Situation:

Excess water has no outlet and backs up into the fields causing damage or loss of the crop.

After Situation:

An earthen ditch that follows the natural slope of the land at the low end of the field will be constructed to carry excess water to an outlet.

Scenario Feature Measure: Linear Feet of Ditch

Scenario Unit: Linear Foot

Scenario Typical Size: 1,320

Scenario Cost: $4,488.94 **Scenario Cost/Unit:** $3.40

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	1406	$3,332.22
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	5	$623.90
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	5	$187.60
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: **607 - Surface Drainage, Field Ditch**

Scenario: **#2 - Drainage Ditch, >3ft deep**

Scenario Description:

This scenario is the construction of a surface drain, field ditch, calculated in CuYds. Typical construction dimensions are 4' bottom x 5' deep x 1320' length with a side slope of 3:1. Excess water is either reused in an Irrigation System, Tailwater Recovery (447) system, or conveyed to a receiving water body.

Resource concerns: Excess/Insufficient Water - Inefficient Use of Irrigation Water and Water Quality Degradation - Excessive Sediment in Surface Waters.

Associated Conservation Practices: 608-Surface Drain, Main or Lateral; 587 -Structure For Water Control; 554 - Drainage Water Management

Before Situation:

Excess water has no outlet and backs up into the fields causing damage or loss of the crop.

After Situation:

An earthen ditch that follows the natural slope of the land at the low end of the field will be constructed to carry excess water to an outlet.

Scenario Feature Measure: Volumn of Excavation

Scenario Unit: Cubic Yard

Scenario Typical Size: 4,645

Scenario Cost: $12,652.27 **Scenario Cost/Unit:** $2.72

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	4645	$11,008.65
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	8	$998.24
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	8	$300.16
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 608 - Surface Drainage, Main or Lateral

Scenario: #1 - Main or Lateral Drainage Ditch

Scenario Description:

This scenario is the construction of a surface drain, main or lateral. Typical construction dimensions are 4' wide bottom x 4' deep x 1320' length with a side slope of 2.5:1. If needed, seeding should be contracted under Critical Area Planting-342.
Resource Concerns: Excess/Insufficient Water - Inefficient Use of Irrigation Water and Water Quality Degradation - Excessive Sediment in Surface Waters.
Associated Conservation Practices: 607-Surface Drain, Field Ditch; 587 -Structure For Water Control; 554 Drainage Water Management; 342 Critical Area Planting.

Before Situation:

Excess water has no outlet and backs up into the fields causing damage or loss of the crop.

After Situation:

An earthen ditch that follows the natural slope of the land at the low end of the field is constructed to carry excess water to an outlet so that water no longer backs up into the field so that field production is improved.

Scenario Feature Measure: Volume of Earth Excavated

Scenario Unit: Cubic Yard

Scenario Typical Size: 2,738

Scenario Cost: $8,284.67 **Scenario Cost/Unit:** $3.03

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	10	$1,247.80
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	2738	$6,489.06
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	10	$375.20
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: 610 - Salinity and Sodic Soil Management

Scenario: #1 - Soil Management (non-Irrigated)

Scenario Description:

The producer secures training in Salinity and Sodic Soil Management, analyzes subsurface conditions in areas in and around a saline seep and using information gained from training and field observations carrys out a Salinity and Sodic Soil Management Plan employing as applicable changes in Conservation Cropping Systems, Critical Area Planting, Nutrient Management and use of soil amendments. Scenario includes cost of attending a 6 hr University, NRCS, or commodity group sponsored training session and 40 hours of mgt labor a year to analyze available data and field situation, then review, and modify as necessary the Salinity and Sodic Soil Management Plan and continue to carry it out.

Resource Concerns: Soil Quality Degradation - Concentration of salts or other chemicals, and Water Quality Degradation- Excessive salts in surface and ground waters.

Associated Practices: 328 -Conservation Cropping System; 342- Critical Area Planting; and 590 - Nutrient Management.

Before Situation:

A crop-fallow system on sodic and saline soils has resulted in saline seeps. The recharge area of the seep must be determined before the extents of the treatment can be planned. An analyses of the subsurface conditions in areas in and around a saline is completed on 95 acres of recharge area surrounding a 5 acre saline seep in order to determine groundwater gradients and limits of the recharge area.

After Situation:

A determination of extent of recharge area has been made. The area to be treated has been identified. The producer has developed and is carrying out a Salinity and Sodic Soil Management Plan. Deep percolation in the recharge area is eliminated and salts no longer leach into the ground or surface water.

Scenario Feature Measure: Acres included in Salinity and Sodic Soil Management Plan

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $1,693.38 **Scenario Cost/Unit:** $16.93

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$44.18	1	$44.18
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	40	$1,649.20

Practice: 610 - Salinity and Sodic Soil Management

Scenario: #2 - Soil Management (Irrigated)

Scenario Description:

The producer secures training in Salinity and Sodic Soil Management and develops and carries out a Salinity and Sodic Soil Management Plan. Scenario includes cost of attending a 6 hr University, NRCS, or commodity group sponsored training session and 12 hours of mgt labor a year to analyze available data and field situation, develop (or review and modify as necessary) plan and carry it out.
Resource Concerns: Soil Quality Degradation - Concentration of salts or other chemicals, and Water Quality Degradation- Excessive salts in surface and ground waters.
Associated Practices: 328-Conservation Crop Rotation; 449-Irrigation Water Management; and 590-Nutrient Management.

Before Situation:

Salintiy and or Sodic conditions have developed in the root zone of a 100 acre irrigated cropland field resulting in decreased soil quality, plant health problems, and yield reductions.

After Situation:

Producer conducts soil conductivity and salinity test to determine the root zone depth of water application necessary for flushing accumulated salts and maintaining a proper salt balance. Producer conducts irrigation suitability test of water supply results to determine suitability of applied water for irrigation and additional irrigation volumes needed for leaching. Routine periodic checks of water EC will be conducted by producer to monitor for water salinity which might require changes to Salinity and Sodic Soil Management Plan. The Salinity and Sodic Soil Management Plan is carried out employing soil and water testing and as applicable changes in Irrigation Water Management (449), Conservation Crop Rotation (328), tillage, and use of soil amendments. The producer has developed and is carrying out a Salinity and Sodic Soil Management Plan resulting in improved soil quality and plant health.

Scenario Feature Measure: Acres included in Salinity and Sodic Soil Management Plan

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $1,896.03 **Scenario Cost/Unit:** $18.96

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$44.18	1	$44.18
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	40	$1,649.20
Materials						
Test, Soil Test, Precision, Grid or Zone	300	Includes materials, shipping, labor, and equipment costs.	Each	$13.55	12	$162.60
Test, Standard Water Test, Irrigation Suitability	310	Irrigation water suitability lab analysis. Includes pH, alkalinity, carbonates/bicarbonates, EC, dissolved solids, B, Cl, Ca, Mg, Na, SAR, and hardness.	Each	$40.05	1	$40.05

Practice: 610 - Salinity and Sodic Soil Management

Scenario: #3 - Mgmt, gyp 1 to 4 ton/ac

Scenario Description:

The producer carries out a Salinity and Sodic Soil Management Plan on a 20 ac field. Scenario includes cost of 25 hours of mgt labor a year to analyze available data and field situation, develop (or review and modify as necessary) plan and carry it out and the application of 1 to 4 ton/ac of quary run gypsum. The gypsum will be applied once during a 3 year period.
Resource Concerns: Soil Quality Degradation - Concentration of salts or other chemicals, and Water Quality Degradation- Excessive salts in surface and ground waters.
Associated Practices: 328-Conservation Crop Rotation; 449-Irrigation Water Management; and 590-Nutrient Management.

Before Situation:

Sodic conditions have developed in the root zone of a 20 acre irrigated cropland field resulting in decreased soil quality, plant health problems, and yield reductions.

After Situation:

Producer conducts soil conductivity and salinity test to determine gypsum requirements and to determine the root zone depth of water application necessary for flushing accumulated salts and maintaining a proper salt balance. Gypsum is applied. Producer conducts irrigation suitability test of water supply results to determine suitability of applied water for irrigation and additional irrigation volumes needed for leaching. Routine periodic checks of water EC will be conducted by producer to monitor for water salinity which might require changes to Salinity and Sodic Soil Management Plan. The Salinity and Sodic Soil Management Plan is carried out employing soil and water testing and as applicable changes in Irrigation Water Management (449), Conservation Crop Rotation (328), tillage, and use of soil amendments. The producer has developed and is carrying out a Salinity and Sodic Soil Management Plan resulting in improved soil quality and plant health.

Scenario Feature Measure: Acres included in Salinity and Sodic Soil Management Plan

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $3,491.30 **Scenario Cost/Unit:** $174.57

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Lime application	953	Lime application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$9.65	20	$193.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	25	$1,030.75
Materials						
Gypsum, Ground Ag Grade, Bulk	1224	Agricultural grade quarry ground gypsum (CaCO4) for dispersive soil treatment. Materials and delivery only.	Ton	$35.77	60	$2,146.20
Test, Standard Water Test, Irrigation Suitability	310	Irrigation water suitability lab analysis. Includes pH, alkalinity, carbonates/bicarbonates, EC, dissolved solids, B, Cl, Ca, Mg, Na, SAR, and hardness.	Each	$40.05	1	$40.05
Test, Soil Test, Precision, Grid or Zone	300	Includes materials, shipping, labor, and equipment costs.	Each	$13.55	6	$81.30

Practice: 610 - Salinity and Sodic Soil Management

Scenario: #4 - Mgmt, gyp >4 to 8 ton/ac

Scenario Description:

The producer carries out a Salinity and Sodic Soil Management Plan on a 20 ac field. Scenario includes cost of 25 hours of mgt labor a year to analyze available data and field situation, develop (or review and modify as necessary) plan and carry it out and the application of greater than 4 but not more than 8 tons/ac of quary run gypsum. The gypsum will be applied once during a 3 year period.
Resource Concerns: Soil Quality Degradation - Concentration of salts or other chemicals, and Water Quality Degradation- Excessive salts in surface and ground waters.
Associated Practices: 328-Conservation Crop Rotation; 449-Irrigation Water Management; and 590-Nutrient Management.

Before Situation:

Sodic conditions have developed in the root zone of a 20 acre irrigated cropland field resulting in decreased soil quality, plant health problems, and yield reductions.

After Situation:

Producer conducts soil conductivity and salinity test to determine gypsum requirements and to determine the root zone depth of water application necessary for flushing accumulated salts and maintaining a proper salt balance. Gypsum is applied. Producer conducts irrigation suitability test of water supply results to determine suitability of applied water for irrigation and additional irrigation volumes needed for leaching. Routine periodic checks of water EC will be conducted by producer to monitor for water salinity which might require changes to Salinity and Sodic Soil Management Plan. The Salinity and Sodic Soil Management Plan is carried out employing soil and water testing and as applicable changes in Irrigation Water Management (449), Conservation Crop Rotation (328), tillage, and use of soil amendments. The producer has developed and is carrying out a Salinity and Sodic Soil Management Plan resulting in improved soil quality and plant health.

Scenario Feature Measure: Acres included in Salinity and Sodic Soil Management Plan

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $7,068.30 **Scenario Cost/Unit:** $353.42

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Lime application	953	Lime application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$9.65	20	$193.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	25	$1,030.75
Materials						
Test, Standard Water Test, Irrigation Suitability	310	Irrigation water suitability lab analysis. Includes pH, alkalinity, carbonates/bicarbonates, EC, dissolved solids, B, Cl, Ca, Mg, Na, SAR, and hardness.	Each	$40.05	1	$40.05
Gypsum, Ground Ag Grade, Bulk	1224	Agricultural grade quarry ground gypsum (CaCO4) for dispersive soil treatment. Materials and delivery only.	Ton	$35.77	160	$5,723.20
Test, Soil Test, Precision, Grid or Zone	300	Includes materials, shipping, labor, and equipment costs.	Each	$13.55	6	$81.30

Practice: 610 - Salinity and Sodic Soil Management

Scenario: #5 - Mgmt, gyp > 8 ton/ac

Scenario Description:

The producer carries out a Salinity and Sodic Soil Management Plan on a 20 ac field. Scenario includes cost of 25 hours of mgt labor a year to analyze available data and field situation, develop (or review and modify as necessary) plan and carry it out and the application of over 8 ton/ac of quary run gypsum. The gypsum will be applied once during a 3 year period.
Resource Concerns: Soil Quality Degradation - Concentration of salts or other chemicals, and Water Quality Degradation- Excessive salts in surface and ground waters.
Associated Practices: 328-Conservation Crop Rotation; 449-Irrigation Water Management; and 590-Nutrient Management.

Before Situation:

Sodic conditions have developed in the root zone of a 20 acre irrigated cropland field resulting in decreased soil quality, plant health problems, and yield reductions.

After Situation:

Producer conducts soil conductivity and salinity test to determine gypsum requirements and to determine the root zone depth of water application necessary for flushing accumulated salts and maintaining a proper salt balance. Gypsum is applied. Producer conducts irrigation suitability test of water supply results to determine suitability of applied water for irrigation and additional irrigation volumes needed for leaching. Routine periodic checks of water EC will be conducted by producer to monitor for water salinity which might require changes to Salinity and Sodic Soil Management Plan. The Salinity and Sodic Soil Management Plan is carried out employing soil and water testing and as applicable changes in Irrigation Water Management (449), Conservation Crop Rotation (328), tillage, and use of soil amendments. The producer has developed and is carrying out a Salinity and Sodic Soil Management Plan resulting in improved soil quality and plant health.

Scenario Feature Measure: Acres included in Salinity and Sodic Soil Management Plan

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $9,929.90 **Scenario Cost/Unit:** $496.50

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Lime application	953	Lime application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$9.65	20	$193.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	25	$1,030.75
Materials						
Test, Soil Test, Precision, Grid or Zone	300	Includes materials, shipping, labor, and equipment costs.	Each	$13.55	6	$81.30
Test, Standard Water Test, Irrigation Suitability	310	Irrigation water suitability lab analysis. Includes pH, alkalinity, carbonates/bicarbonates, EC, dissolved solids, B, Cl, Ca, Mg, Na, SAR, and hardness.	Each	$40.05	1	$40.05
Gypsum, Ground Ag Grade, Bulk	1224	Agricultural grade quarry ground gypsum (CaCO4) for dispersive soil treatment. Materials and delivery only.	Ton	$35.77	240	$8,584.80

Practice: 612 - Tree/Shrub Establishment

Scenario: #1 - Reforestation, <1 ac, Hand planting, Per Tree

Scenario Description:

Tree seedlings will be hand planted on less than 1 acre of forestland where few or no forest trees are growing, the existing stand of trees needs underplanting, or the previously planted seedling tree stocking level is below desirable conditions. Wildlife habitat is degraded by loss of forest conditions. This resource concern addressed is degraded plant condition - inadequate structure and composition; and inadequate wildlife & fish habitat.

Before Situation:

The stocking level of the forest does not meet the minimum recommended number of trees per acre. The existing condition of the forest stand does not meet the landowners objectives. To be a viable forest additional seedlings need planting. Wildlife habitat is rated poor.

After Situation:

The prescribed number of trees are hand planted on <1 acre, and the objectives of the landowner are met. The forest will provide wildlife habitat, provide a long term ground cover, and capture atmospheric carbon.

Scenario Feature Measure: Each Planted Seedling

Scenario Unit: Each

Scenario Typical Size: 300

Scenario Cost: $665.53 **Scenario Cost/Unit:** $2.22

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	2.5	$29.05
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	5.5	$126.94
Materials						
Tree, conifer, seedling, bare root, 2-1	1514	Bare root conifer trees, 2-1 (3 years old). Includes materials and shipping only.	Each	$0.63	150	$94.50
Tree, conifer, seedling, containerized, 20 cu. in.	1521	Containerized conifer stock, 20 cubic inches (e.g. "Styro 45" plug), 2.4" x 6". Includes materials and shipping only.	Each	$1.17	150	$175.50

Practice: 612 - Tree/Shrub Establishment

Scenario: #2 - Reforestation, <1 ac., Hand planting, Browse protection, Per Tree

Scenario Description:

Tree seedlings will be hand planted on less than 1 acre of forestland where few or no forest trees are growing, the existing stand of trees needs underplanting, or the previously planted seedling tree stocking level is below desirable conditions. Seedlings are protected from wildlife browsing. Wildlife habitat has been degraded by loss of forest conditions. This resource concern addressed is degraded plant condition and inadequate structure and composition; and inadequate wildlife & fish habitat.

Before Situation:

The stocking level does not meet the minimum recommended number of trees per acre and does not meet the landowners objectives. To be a viable forest additional seedlings need planting. Wildlife habitat is rated poor. Wildlife are known to browse tree seedlings in the area causing great damage.

After Situation:

The prescribed number of trees are hand planted on <1 acre, and the objectives of the landowner are met. Seedlings are protected from widlife browsing by installing some type of protection devise. A forest will provide wildlife habitat, provide a long term ground and capture atmospheric carbon.

Scenario Feature Measure: Each Planted Seedling

Scenario Unit: Each

Scenario Typical Size: 300

Scenario Cost: $1,193.77 **Scenario Cost/Unit:** $3.98

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	2.5	$29.05
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	9	$207.72
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	6	$247.38
Materials						
Tree shelter, solid tube type, 3-1/4" x 24"	1559	3-1/4" x 36" tree tube for protection from animal damage. Materials only.	Each	$1.67	100	$167.00
Tree shelter, mesh tree tube, 24"	1555	24" tall vexar or other open weave tubular tree shelter to protect from animal damage. Materials only.	Each	$0.52	100	$52.00
Stake, bamboo, 3/8" x 36"	1584	3/8" x 36" bamboo stakes to anchor items in place. Inlcudes materials and shipping only.	Each	$0.11	300	$33.00
Tree shelter, solid tube type, 4" x 18"	1562	4" x 18" tree tube for protection from animal damage. Materials only.	Each	$1.13	100	$113.00
Tree, conifer, seedling, bare root, 2-1	1514	Bare root conifer trees, 2-1 (3 years old). Includes materials and shipping only.	Each	$0.63	150	$94.50
Tree, conifer, seedling, containerized, 20 cu. in.	1521	Containerized conifer stock, 20 cubic inches (e.g. "Styro 45" plug), 2.4" x 6". Includes materials and shipping only.	Each	$1.17	150	$175.50

Practice: 612 - Tree/Shrub Establishment

Scenario: #3 - Reforestation, 1 acre or more, Hand planting

Scenario Description:

This practice involves planting of tree seedlings on areas 1 acre or more after the site has been prepared for seedling growth and establishment. The productivity of the site is good and will handle a high density planting rate (about 450 TPA). Terrain is moderately to steeply sloping, too steep to be planted with a mechanical tree planter so the area is hand planted. Resource concerns addressed are degraded plant condition - undesirable plant productivity and health, and inadequate structure and composition; soil erosion; and degraded wildlife habitat.

Before Situation:

The land has a little/no tree cover, or is stocked with the wrong tree species. Competing vegetation is a before and after planting concern. Soil condition is degraded due to the loss of the native forest ecosystem (organic matter in top soil depleted). The main resource concerns are degraded plant condition and inadequate structure and composition

After Situation:

40 acres of land is established with permanent tree cover that will improve degraded plant condition, reduce soil erosion, establish wildlife habitat, sequester carbon and reduce invasive species presence. Establishing forest vegetation also creates corridors for wildlife movement.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $21,421.50 **Scenario Cost/Unit:** $535.54

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	80	$2,984.80
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	160	$1,859.20
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	50	$2,061.50
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	200	$4,616.00
Materials						
Tree, conifer, seedling, bare root, 1-1	1513	Bare root conifer trees, 1-1 (2 years old). Includes materials and shipping only.	Each	$0.47	9000	$4,230.00
Tree, conifer, seedling, bare root, 2-1	1514	Bare root conifer trees, 2-1 (3 years old). Includes materials and shipping only.	Each	$0.63	9000	$5,670.00

Practice: 612 - Tree/Shrub Establishment

Scenario: #4 - Reforestation, 1 acre or more, Hand planting, Browse protection

Scenario Description:

This practice involves planting of tree seedlings on areas 1 acre or more after the site has been prepared for seedling growth and establishment. The productivity of the site is good and will handle a medium density planting rate (about 300 TPA). Newly planted seedlings are protected from browsing by installing open tree tubes. Terrain is moderatey to steeply sloping, too steep to be planted with a mechanical tree planter so the area is hand planted. Resource concerns addressed are degraded plant condition - undesirable plant productivity and health, inadequate structure and composition; and degraded wildlife habitat.

Before Situation:

The land has a little/no tree cover, or is stocked with the wrong tree species. Competing vegetation is a before and after planting concern. Soil condition is degraded due to the lose of the native forest ecosystem (organic matter in top soil depleted). The main resource concern is degraded plant condition and inadequate structure and composition

After Situation:

40 acres of land is established with permanent tree coverthat will improve degraded plant condition, reduce soil erosion, establish wildlife habitat, sequester carbon and reduce invasive species presence. Establishing forest vegetation also creates corridors for wildlife movement. Trees have vexar tubes, or similar, installed to protect from animal damage.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $27,736.86 **Scenario Cost/Unit:** $693.42

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	48	$1,790.88
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	104	$1,208.48
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	200	$4,616.00
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	50	$2,061.50
Materials						
Tree, conifer, seedling, bare root, 1-1	1513	Bare root conifer trees, 1-1 (2 years old). Includes materials and shipping only.	Each	$0.47	6000	$2,820.00
Tree, conifer, seedling, bare root, 2-1	1514	Bare root conifer trees, 2-1 (3 years old). Includes materials and shipping only.	Each	$0.63	6000	$3,780.00
Stakes, bamboo 3/8" x 48"	1585	3/8" x 48" bamboo stakes to anchor items in place. Inlcudes materials and shipping only.	Each	$0.13	12000	$1,560.00
Tree shelter, mesh tree tube, 24"	1555	24" tall vexar or other open weave tubular tree shelter to protect from animal damage. Materials only.	Each	$0.52	6000	$3,120.00
Tree shelter, solid tube type, 4" x 18"	1562	4" x 18" tree tube for protection from animal damage. Materials only.	Each	$1.13	6000	$6,780.00

Practice: 612 - Tree/Shrub Establishment

Scenario: #5 - Medium Density, Mechanical Planting

Scenario Description:

This practice involves planting of tree seedlings after the site has been prepared for seedling growth and establishment. The productivity of the site is good and will handle a medium density planting rate (300-450 trees per acre). Terrain is moderately sloping and will be planted with a mechanical tree planter. Smaller size seedlings (1-0) are planted. The resource concerns addressed is degraded plant condition - undesirable plant productivity and health, and inadequate structure and composition; and degraded wildlife habitat.

Before Situation:

The land has a little or no tree cover, or is stocked with the wrong tree species. Competing vegetation is a before and after planting concern. Soil condition is degraded due to the lose of the native forest ecosystem (organic matter in top soil depleted). Native wildlife habitat is lacking. The main resource concern is degraded plant condition and inadequate structure and composition

After Situation:

40 acres of land is established with permanent tree coverthat will improve degraded plant condition, reduce soil erosion, establish wildlife habitat, sequester carbon and reduce invasive species presence. Establishing forest vegetation also creates corridors for wildlife movement.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $9,997.98 **Scenario Cost/Unit:** $249.95

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Mechanical tree planter	1600	Mechanical tree planter. Requires a pulling unit of either tractor or small dozer depending upon site conditions. Does not include labor.	Hour	$6.60	18	$118.80
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	8	$298.48
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	18	$1,214.10
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	30	$692.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	20	$446.60
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	20	$824.60
Materials						
Tree, conifer, seedling, bare root, 1-0	1512	Bare root conifer trees, 1-0 (1 year old). Includes materials and shipping only.	Each	$0.35	18000	$6,300.00
Mobilization						
Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been i	Dollar	$1.03	100	$103.00

Practice: 612 - Tree/Shrub Establishment

Scenario: #6 - High Density, Mechanical planting

Scenario Description:

This practice applies to forestlands that are being actively managed. Tree seedlings are planted after the site has been prepared for seedling establishment and growth. Forest site productivity is high or very high and dense planting is planned (typically > 450 trees per acre). Larger containerized seedlings are planted. Terrain conditions allow for mechanical tree planting. Resource concerns addressed are degraded plant condition -- undesirable plant productivity and health, and inadequate structure and composition and degraded wildlife habitat.

Before Situation:

The land lacks forest cover and needs replanting, is stocked with the wrong tree species, or is a nonstocked field. Seedlings selected are appropriate for the site and site conidtions. The main resource concerns are degraded plant condition and inadequate structure and composition. Competing vegetation is a before and after planting concern. Soil condition is degraded due to the loss organic matter in top soil. Tree seedlings with larger size root systems are planted to compete with other vegetation.

After Situation:

50 acres of land is established with permanent tree cover that will improve degraded plant condition, establish wildlife habitat, sequester atmospheric carbon. Establishing forest vegetation also creates corridors for wildlife movement. Actions should be planned with competing vegetation concerns.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 50

Scenario Cost: $26,577.74 **Scenario Cost/Unit:** $531.55

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	20	$746.20
Mechanical tree planter	1600	Mechanical tree planter. Requires a pulling unit of either tractor or small dozer depending upon site conditions. Does not include labor.	Hour	$6.60	34	$224.40
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	34	$2,293.30
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	38	$848.54
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	28	$1,154.44
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	42	$969.36
Materials						
Tree, conifer, seedling, containerized, 10 cu. in.	1519	Containerized conifer stock, 10 cubic inches (approx 6" plug), 1.7" x 6"). Includes materials and shipping only.	Each	$0.57	34000	$19,380.00
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28
Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been i	Dollar	$1.03	100	$103.00

Practice: 612 - Tree/Shrub Establishment

Scenario: #7 - Conservation, Hand Planting

Scenario Description:

Improving a forestry or agroforestry setting by hand planting tree and/or shrub seedlings for conservation purposes other than standard reforestation. A small percentage of shrubs targeted for wildlife purposes may also be included. The number of trees/shrubs to plant may be lower than establishing a new forest, typically 150 trees per acre. Resource concerns are degraded plant condition - undesireable productivity and health, and Inadequate structure and composition; inadequate habitat for fish and wildlife - habitat degradation.

Before Situation:

In an existing upland forest the present trees/shrubs are poor quality, at low stocking levels, or are undesirable species. Existing conditions do not meet landonwer objectives of growing high quality trees/shrubs. Wildlife habitat is poor due to the above described conditions. Resource concerns are degrade plant condition - undesireable productivity and health, and Inadequate structure and composition; inadequate habitat for fish and wildlife - habitat degradation. Prior to planting any needed vegetation control will be conducted first.

After Situation:

The typical area of treatment can run from 1/2 acre to 10 acres. Tree/shrub seedlings are planted by hand in the best locations for seedling survival. Post planting vegetation control is planned to ensure seedling survival.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $2,248.61 **Scenario Cost/Unit:** $224.86

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	9	$335.79
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	16	$185.92
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	10	$412.30
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	20	$461.60
Materials						
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.50	1500	$750.00
Mobilization						
Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been i	Dollar	$1.03	100	$103.00

Practice: 612 - Tree/Shrub Establishment

Scenario: #8 - Conservation, Hand Planting, Browse protection

Scenario Description:

Improving a forestry or agroforestry setting by hand planting tree and/or shrub seedlings for conservation purposes other than standard reforestation. A small percentage of shrubs targeted for wildlife purposes may also be included. Seedlings are protected from deer browsing. The number of trees/shrubs to plant may be lower than establishing a new forest, typically 150 trees per acre. Resource concerns are degraded plant condition - undesireable productivity and health, and Inadequate structure and composition; inadequate habitat for fish and wildlife - habitat degradation.

Before Situation:

In an existing upland forest the present trees are poor quality, at low stocking levels, or are undesirable species. Existing conditions do not meet landonwer objectives of growing high quality trees. Wildlife habitat is poor due to the above described conditions. Resource concerns are degrade plant condition - undesireable productivity and health, and Inadequate structure and composition; inadequate habitat for fish and wildlife - habitat degradation. Prior to planting any needed vegetation control will be conducted first.

After Situation:

The typical area of treatment can run from 1/2 acre to 10 acres. Tree/shrub seedlings are planted by hand in the best locations for seedling survival. Tree tubes are installed to protect seedlings from animal browsing damage. Post planting vegetation control is planned to ensure seedling survival.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $6,732.26 **Scenario Cost/Unit:** $673.23

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	18	$671.58
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	27	$313.74
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	10	$412.30
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	33	$761.64
Materials						
Stakes, wood, 3/4" x 3/4" x 36"	1581	3/4" x 3/4" x 36" wood stakes to fasten items in place. Includes materials only.	Each	$0.71	1500	$1,065.00
Tree shelter, solid tube type, 3-1/4" x 30"	1560	3-1/4" x 30" tree tube for protection from animal damage. Materials only.	Each	$1.77	1500	$2,655.00
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.50	1500	$750.00
Mobilization						
Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been i	Dollar	$1.03	100	$103.00

Practice: 612 - Tree/Shrub Establishment

Scenario: #9 - Conservation, 1 gal pots, Hand planting, Per seedling

Scenario Description:

Seedlings (potted) to be planted for conservation purposes other than standard reforestation. Planting will be by hand. The resource setting is an area that historically was an upland forest. Resource concerns are degrade plant condition - undesireable productivity and health, and Inadequate structure and composition; inadequate habitat for fish and wildlife.

Before Situation:

The native forest that has been removed and the land is either row cropped, grazed or hayed or brushy forest. If any upland trees exist they are poor quality tree or undesirable species. Terrain is gently to moderately sloping with soil erosion-sheet and rill ocurring.

After Situation:

The typical area of treatment can range from less than 1 acre to 10 acre; typical scenario based on 1 ac, 300 TPA. Potted (1-gal potted stock) seedlings are planted by hand. Post vegetation growth should be evaluated and controlled as necessary.

Scenario Feature Measure: Per Seedling planted

Scenario Unit: Each

Scenario Typical Size: 300

Scenario Cost: $2,716.19 **Scenario Cost/Unit:** $9.05

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	7	$261.17
Trailer, flatbed, small	1505	Small flatbed trailer (typically less than 30' in length) pulled by a pickup to transport materials and equipment. Truck not included.	Hour	$6.52	2	$13.04
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	15	$174.30
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	23	$530.84
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	8	$329.84
Materials						
Tree, conifer, seedling or transplant, potted, 1/2 to 1 gal.	1536	Potted conifer, 1/2 to 1 gal. Includes materials and shipping only.	Each	$4.42	100	$442.00
Shrub, seedling or transplant, potted, 1/2 to 1 gal.	1526	Potted shrub, 1/2 to 1 gal. Includes materials and shipping only.	Each	$4.81	100	$481.00
Tree, hardwood, seedling or transplant, potted, 1/2 to 1 gal.	1531	Potted hardwood tree, 1/2 to 1 gal. Includes materials and shipping only.	Each	$4.84	100	$484.00

Practice: 612 - Tree/Shrub Establishment

Scenario: #10 - Native Seed, Hand Plant

Scenario Description:

Native seed (acorns, nuts, etc) from native tree species are directly planted in the soil. Site preparation is completed (discing to eliminate competing vegetation) using Practice 490 Tree/Shrub Site Preparation. The native seed are collected/purchased locally so as to get trees known to be adapted to local conditions. Resource concerns are degraded plant condition, inadequate habitat for fish and widllife.

Before Situation:

The forest is degrading or a catistrophic event (fire/flood) has occured. High value species, lumber and widlife habitat, are not regenerating due to changes in the natural disturbance regime or past harvesting. Unwanted shade tolerant tree species have regenerated and are in the overstory competing with desirable species as well as in the mid and understory where they will eventually out-compete with desirable species.

After Situation:

Seed from native species are collected or purchased and planted at prescribed rates. Degraded plant condition is on an upward trend and habitat for wildlife will improve.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $535.21 **Scenario Cost/Unit:** $535.21

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	4	$46.48
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	6	$138.48
Materials						
Trees and shrubs, seed	1871	Tree or shrub seed, e.g., acorns, to establish trees. Includes materials and shipping only.	Pound	$4.67	75	$350.25

Practice: 612 - Tree/Shrub Establishment

Scenario: #11 - Floodplain Stabilization

Scenario Description:

Large woody cuttings and cottonwood or other tree boles along with smaller cuttings/whips are planted on natural floodplain levees designed to capture large and small wood and sediments during overbank event. Trapped sediments then allow for natural regeneration of willows, cottonwood, red alter, and/or other early successional species. Typical treatment size is about 1 acre with a combined total of about 100 6" dia cuttings and tree boles installed. Resource concerns addressed are degraded plant condition - undesireable plant productivity and inadequiate structuer and composition; degraded water quality - excessive sediments in surface waters; and degraded wildlife habitat.

Before Situation:

The floodplain is unstable and the stream/river system is widening and becoming more shallow. Because of the changes in the river/stream and floodplain, the side channels used for spawnin, rearing and escape are becoming cut off from use or changing and becoming less useable. There is significant cutting and shifting of the streambanks and exposed soil.

After Situation:

Woody cuttings and tree boles are planted and are sprouting into permanent tree cover on small areas, typically 1-2 acres, on floodplain levees. Estabilished trees will improve plant condition, sequester atmospheric carbon and help stabilize steambanks and floodplains. Establishing forest vegetation also creates corridors for wildlife movement and improves fish and wildlife and stream habitat.

Scenario Feature Measure: Area Treated

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $5,749.13 **Scenario Cost/Unit:** $5,749.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	7	$472.15
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	8	$298.48
Trailer, flatbed, small	1505	Small flatbed trailer (typically less than 30' in length) pulled by a pickup to transport materials and equipment. Truck not included.	Hour	$6.52	5	$32.60
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.53	7	$164.71
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	7	$81.34
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	48	$1,107.84
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	18	$401.94
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	9	$371.07
Materials						
Cuttings, woody, medium size	1308	Woody cuttings, live stakes or whips typically 1/4" to 1" diameter and 24" to 48" long. Includes materials and shipping only.	Each	$0.49	250	$122.50
Cuttings, woody, large size	1309	Woody pole cuttings or posts 2" to 6" in diameter and 6' long. Includes materials and shipping only.	Each	$18.38	100	$1,838.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 614 - Watering Facility

Scenario: #1 - Tire Trough

Scenario Description:

A permanent watering facility for livestock and/or wildlife constructed from tires that stores adequate quantity and quality of water for storage and/or direct drinking access. All watering facilities will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation. This watering facility will address the resource concerns of inadequate supply of water for livestock and/or wildlife, habitat degradation, water quality, and undesirable plant productivity and health.

Before Situation:

There is insufficient water to meet livestock or wildlife watering needs at a site. Animals may have access to streams or ponds, need to travel a long distance to available water or pasture use and rotation may be affected. This practice applies to all land uses where there is a need for new or improved watering facilities for livestock and/or wildlife where water is not available in sufficient quantities at specific locations; and where habitat, water quality, plant productivity and health needs to be improved. Resource concerns include, but may not be limited to, Plant Condition and Quality, Soil Erosion and Stream Habitat/Water Quality.

After Situation:

A permanent watering facility using a 10' diameter tire is installed with all tank materials, tank plumbing and float valve, to provide adequate water storage capacity to ensure an adequate supply and quality of water for livestock or wildlife for storage and/or direct drinking access and provides improved plant productivity and health, water quality, and habitat. All watering facilities are constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation and placed on a properly prepared foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as appropriate.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 981

Scenario Cost: $2,253.40 **Scenario Cost/Unit:** $2.30

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formless, non reinforced	36	Non reinforced concrete cast-in-placed without forms by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	0.7	$112.63
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	6	$337.26
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	13	$300.04
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	7	$156.31
Materials						
Tank, Tire, 10' diameter	287	Tire, includes material cost for tank and shipping. Labor and other appurtenance costs not included.	Each	$983.38	1	$983.38
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.47	1	$24.47
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	1	$76.41

Materials

Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.85	24	$20.40
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	1.7	$45.68
Tank, Float Valve Assembly	1077	Float Valve, Stem, Swivel, Float Ball	Each	$23.94	1	$23.94
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.90	2	$15.80

Practice: 614 - Watering Facility

Scenario: #2 - Frost Free Trough

Scenario Description:

A permanent watering facility for livestock and/or wildlife using a frost free watering system that stores adequate quantity and quality of water for storage and/or direct drinking access. All watering facilities will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation. This watering facility will address the resource concerns of inadequate supply of water for livestock and/or wildlife, habitat degradation, water quality, and undesirable plant productivity and health.

Before Situation:

There is insufficient water to meet livestock or wildlife watering needs at a site. Animals may have access to streams or ponds, need to travel a long distance to available water or pasture use and rotation may be affected. This practice applies to all land uses where there is a need for new or improved watering facilities for livestock and/or wildlife; where water is not available in sufficient quantities at specific locations; and where habitat, water quality, plant productivity and health needs to be improved. Resource concerns include, but may not be limited to, Plant Condition and Quality, Soil Erosion and Stream Habitat/Water Quality.

After Situation:

A permanent watering facility including a 4-hole frost free waterer is installed with all tank materials, tank plumbing and float valve, to provide adequate water storage capacity to ensure an adequate supply and quality of water for livestock or wildlife for storage and or direct drinking access and provides improved plant productivity and health, water quality, and habitat. All watering facilities are constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation and placed on a properly prepared foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as appropriate.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 70

Scenario Cost: $2,243.99 **Scenario Cost/Unit:** $32.06

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	0.27	$43.44
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	4	$224.84
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	34	$784.72
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	5	$111.65
Materials						
Tank, Freeze Proof, 4 hole	281	Tank, Freeze Proof with 4 drinking holes. Includes materials and shipping.	Each	$913.39	1	$913.39
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	0.33	$8.87

Practice: 614 - Watering Facility

Scenario: #3 - Above Ground Storage Tank

Scenario Description:

A permanent above ground storage facility to provide water for a watering facility for livestock and/or wildlife. All water storage facilities will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation. This watering facility will address the resource concerns of inadequate supply of water for livestock and/or wildlife, habitat degradation, water quality, and undesirable plant productivity and health.

Before Situation:

There is insufficient water to meet livestock or wildlife watering needs at a site. Animals may have access to streams or ponds, need to travel a long distance to available water or pasture use and rotation may be affected. This practice applies to all land uses where there is a need for new or improved watering facilities for livestock and/or wildlife where water is not available in sufficient quantities at specific locations; and where habitat, water quality, plant productivity and health needs to be improved. Resource concerns include, but may not be limited to, Plant Condition and Quality, Soil Erosion and Stream Habitat/Water Quality.

After Situation:

A permanent water storage facility using an above ground poly tank is installed with all tank materials, tank plumbing and float valve, to provide adequate water storage capacity to ensure an adequate supply and quality of water for livestock, wildlife or other conservation practices for storage and or direct drinking access and provides improved plant productivity and health, water quality, and habitat. All water storage facilities are constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation and placed on a properly prepared foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as appropriate.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 3,000

Scenario Cost: $4,000.90 **Scenario Cost/Unit:** $1.33

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	4	$224.84
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	1.8	$915.07
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	10	$24.50
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	26	$600.08
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	5	$111.65

Materials

Materials

Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	2	$53.74
Tank, Float Valve Assembly	1077	Float Valve, Stem, Swivel, Float Ball	Each	$23.94	1	$23.94
Tank, Poly Enclosed Storage, >1,000	1075	Water storage tanks. Includes materials and shipping only.	Gallon	$0.63	3000	$1,890.00

Practice: 614 - Watering Facility

Scenario: #4 - Below Ground Storage Tank

Scenario Description:

A permanent below-ground storage facility to provide water for a watering facility for livestock and/or wildlife. All water storage facilities will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation. This watering facility will address the resource concerns of inadequate supply of water for livestock and or wildlife, habitat degradation, water quality, and undesirable plant productivity and health.

Before Situation:

There is insufficient water to meet livestock or wildlife watering needs at a site. Animals may have access to streams or ponds, need to travel a long distance to available water or pasture use and rotation may be affected. This practice applies to all land uses where there is a need for new or improved watering facilities for livestock and/or wildlife; where water is not available in sufficient quantities at specific locations; and where habitat, water quality, plant productivity and health needs to be improved. Resource concerns include, but may not be limited to, Plant Condition and Quality, Soil Erosion and Stream Habitat/Water Quality.

After Situation:

A permanent water storage facility using a below-ground concrete tank is installed with all tank materials, tank plumbing and float valve, to provide adequate water storage capacity to ensure an adequate supply and quality of water for livestock, wildlife or other conservation practices for storage and/or direct drinking access and provides improved plant productivity and health, water quality, and habitat. Typical scenario is for a 8.4' inner length and width square tank with 10" thick walls, 10' outer dimension.
All water storage facilities are constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation and placed on a properly prepared foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as appropriate.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 2,500

Scenario Cost: $7,172.56 **Scenario Cost/Unit:** $2.87

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	8	$1,530.96
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	8	$539.60
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	18	$415.44
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	18	$675.36
Materials						
Tank, Float Valve Assembly	1077	Float Valve, Stem, Swivel, Float Ball	Each	$23.94	1	$23.94
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	2	$53.74
Tank, Concrete, 2500 gallon	1055	Concrete tank for water storage, with riser and lid. Includes materials and delivery.	Each	$3,180.70	1	$3,180.70

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 614 - Watering Facility

Scenario: #5 - Stock Trough, 300 gal or less

Scenario Description:

A permanent watering facility for livestock and/or wildlife constructed of approved materials with 300 gallons or less of capacity that stores adequate quantity and quality of water for storage and/or direct drinking access. All watering facilities will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation. This watering facility will address the resource concerns of inadequate supply of water for livestock and/or wildlife, habitat degradation, water quality, and undesirable plant productivity and
health.

Before Situation:

There is insufficient water to meet livestock or wildlife watering needs at a site. Animals may have access to streams or ponds, need to travel a long distance to available water or pasture use and rotation may be affected. This practice applies to all land uses where there is a need for new or improved watering facilities for livestock and/or wildlife; water is not available in sufficient quantities at specific locations; and where habitat, water quality, plant productivity and health needs to be improved. Resource concerns include, but may not be limited to, Plant Condition and Quality, Soil Erosion and Stream Habitat/Water Quality.

After Situation:

A permanent watering facility with a capacity of 300 gallons or less is installed with all tank materials, tank plumbing and float valve, to provide adequate water storage capacity to ensure an adequate supply and quality of water for livestock or wildlife for storage and/or direct drinking access and provides improved plant productivity and health, water quality, and habitat. All watering facilities are constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation and placed on a properly prepared foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as appropriate.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 275

Scenario Cost: $1,837.72 **Scenario Cost/Unit:** $6.68

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	4	$224.84
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	5	$187.60
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80
Materials						
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.85	24	$20.40
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	1	$76.41
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.47	1	$24.47
Tank, Galvanized Steel Livestock, >75 - 300 gallon	1067	Includes tank materials and float valve	Gallon	$1.27	275	$349.25

Materials

Tank, Float Valve Assembly	1077	Float Valve, Stem, Swivel, Float Ball	Each	$23.94	1	$23.94
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	0.5	$13.44
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.90	5	$39.50

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 614 - Watering Facility

Scenario: #6 - Stock Trough, >300 to 600 gal

Scenario Description:

A permanent watering facility for livestock and/or wildlife constructed of approved materials with >300 to 600 gallons of capacity that stores adequate quantity and quality of water for storage and or direct drinking access. All watering facilities will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation. This watering facility will address the resource concerns of inadequate supply of water for livestock and/or wildlife, habitat degradation, water quality, and undesirable plant productivity and
health.

Before Situation:

There is insufficient water to meet livestock or wildlife watering needs at a site. Animals may have access to streams or ponds, need to travel a long distance to available water or pasture use and rotation may be affected. This practice applies to all land uses where there is a need for new or improved watering facilities for livestock and/or wildlife; where water is not available in sufficient quantities at specific locations; and where habitat, water quality, plant productivity and health needs to be improved. Resource concerns include, but may not be limited to, Plant Condition and Quality, Soil Erosion and Stream Habitat/Water Quality.

After Situation:

A permanent watering facility with a capacity of >300 to 600 gallons is installed with all tank materials, tank plumbing and float valve, to provide adequate water storage capacity to ensure an adequate supply and quality of water for livestock or wildlife for storage and/or direct drinking access and provides improved plant productivity and health, water quality, and habitat. All watering facilities are constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation and placed on a properly prepared foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as appropriate.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 400

Scenario Cost: $1,729.13 **Scenario Cost/Unit:** $4.32

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	4	$224.84
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	5	$187.60
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Materials						
Tank, Galvanized, 400 gallon	279	Tank Galvanized - 400 gallon capacity	Each	$233.86	1	$233.86
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	0.5	$13.44
Tank, Float Valve Assembly	1077	Float Valve, Stem, Swivel, Float Ball	Each	$23.94	1	$23.94
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.85	32	$27.20

Materials

Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.47	1	$24.47
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	1	$76.41
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.90	5	$39.50

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 614 - Watering Facility

Scenario: #7 - Stock Trough, >600 gal

Scenario Description:

A permanent watering facility for livestock and/or wildlife constructed of approved materials with >600 gallons of capacity that stores adequate quantity and quality of water for storage and/or direct drinking access. All watering facilities will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation. This watering facility will address the resource concerns of inadequate supply of water for livestock and/or wildlife, habitat degradation, water quality, and undesirable plant productivity and
health.

Before Situation:

There is insufficient water to meet livestock or wildlife watering needs at a site. Animals may have access to streams or ponds, need to travel a long distance to available water or pasture use and rotation may be affected. This practice applies to all land uses where there is a need for new or improved watering facilities for livestock and/or wildlife; where water is not available in sufficient quantities at specific locations; and where habitat, water quality, plant productivity and health needs to be improved. Resource concerns include, but may not be limited to, Plant Condition and Quality, Soil Erosion and Stream Habitat/Water Quality.

After Situation:

A permanent watering facility with a capacity of >600 gallons is installed with all tank materials, tank plumbing and float valve, to provide adequate water storage capacity to ensure an adequate supply and quality of water for livestock or wildlife for storage and/or direct drinking access and provides improved plant productivity and health, water quality, and habitat. All watering facilities are constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation and placed on a properly prepared foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as appropriate.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 718

Scenario Cost: $1,945.38 **Scenario Cost/Unit:** $2.71

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	4	$224.84
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	5	$187.60
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80
Materials						
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.47	1	$24.47
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	1	$26.87
Tank, Float Valve Assembly	1077	Float Valve, Stem, Swivel, Float Ball	Each	$23.94	1	$23.94
Tank, Galvanized Steel Livestock, > 300 - 1,000 gallon	1068	Includes tank materials and float valve	Gallon	$0.75	718	$538.50
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.90	5	$39.50

Materials

Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	1	$76.41

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 614 - Watering Facility

Scenario: #8 - Remote Stock Trough

Scenario Description:

A permanent watering facility for livestock and/or wildlife located in a remote area constructed of approved materials that stores adequate quantity and quality of water for storage and/or direct drinking access. All watering facilities will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation. This watering facility will address the resource concerns of inadequate supply of water for livestock and/or wildlife, habitat degradation, water quality, and undesirable plant productivity and health.

Before Situation:

There is insufficient water to meet livestock or wildlife watering needs at a site. Animals may have access to streams or ponds, need to travel a long distance to available water or pasture use and rotation may be affected. This practice applies to all land uses where there is a need for new or improved watering facilities for livestock and/or wildlife; where water is not available in sufficient quantities at specific locations; and where habitat, water quality, plant productivity and health needs to be improved. Resource concerns include, but may not be limited to, Plant Condition and Quality, Soil Erosion and Stream Habitat/Water Quality.

After Situation:

A permanent watering facility with typical capacity of 500 gallons is installed in a remote location with all tank materials, tank plumbing and float valve, to provide adequate water storage capacity to ensure an adequate supply and quality of water for livestock or wildlife for storage and/or direct drinking access and provides improved plant productivity and health, water quality, and habitat. All watering facilities are constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation and placed on a properly prepared foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as appropriate.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 500

Scenario Cost: $2,991.96 **Scenario Cost/Unit:** $5.98

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	12	$809.40
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	12	$450.24
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	16	$369.28
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	12	$494.76
Materials						
Tank, Poly Livestock, >300 - 1,000 gallon	1065	Includes tank materials and float valve	Gallon	$0.71	500	$355.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #1 - Rock-lined Catch Basin with outlet pipe <=6 inch

Scenario Description:

Installation of a rock-lined catch basin and outlet pipe with a pipe diameter of 6" or less. This practice is often installed in conjunction with terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical scenario is for iInstallation of 200 feet of 6" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Trench is excavated 52" deep and 24" wide by hydraulic track excavator. Costs include 6" SDR-35 pipe, Precast concrete drop inlet with steel grate, trench excavation, trench backfill, rodent guard and laid up stone headwall at outlet

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 200

Scenario Cost: $2,333.76 **Scenario Cost/Unit:** $11.67

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	1	$2.05
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	67	$121.27
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	67	$164.15
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Materials						
Pipe, PVC, 6", SDR 35	993	Materials: - 6" - PVC - SDR 35 - ASTM D3034	Foot	$3.70	200	$740.00
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	1.6	$61.52
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Catch Basin, concrete, 2'x2'x6'	1257	Catch Basin, Precast Concrete, 2' square or round, cast grate, 6' deep. Includes materials, equipment and labor.	Each	$583.68	1	$583.68
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #2 - Rock-lined Catch Basin with outlet pipe <=6 inch, Complex Install

Scenario Description:

Installation of a rock-lined catch basin and outlet pipe 6" in diameter or less in complex sites (such as sites with rocky soils or sites requireing special features in the design such as steel encasement of the pipe or cutting of concrete for installation). This practice is often installed in conjunction with terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical scenario is for iInstallation of 200 feet of 6" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Trench is excavated 52" deep and 24" wide by hydraulic track excavator in rocky soils. Costs include 6" SDR-35 pipe, Precast concrete drop inlet with steel grate, trench excavation, trench backfill, rodent guard and laid up stone headwall at outlet

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 200

Scenario Cost: $2,544.81 **Scenario Cost/Unit:** $12.72

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	67	$164.15
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	1	$2.05
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	67	$332.32
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Materials						
Pipe, PVC, 6", SDR 35	993	Materials: - 6" - PVC - SDR 35 - ASTM D3034	Foot	$3.70	200	$740.00
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	1.6	$61.52
Catch Basin, concrete, 2'x2'x6'	1257	Catch Basin, Precast Concrete, 2' square or round, cast grate, 6' deep. Includes materials, equipment and labor.	Each	$583.68	1	$583.68
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #3 - Outlet Pipe <=6 inch

Scenario Description:

Installation of an outlet line with a diameter of 6" or less to convey stormwater from one location to a suitable and stable outlet. This practice is often installed in conjunction with roof runoff structures, terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Roof Runoff Structure (558), Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical scenario is for iInstallation of 500 feet of 6" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Trench is excavated 52" deep and 24" wide by hydraulic track excavator. Costs include 6" PVC pipe trench excavation, trench backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $3,393.19 **Scenario Cost/Unit:** $6.79

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	170	$307.70
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	170	$416.50
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Materials						
Pipe, PVC, 6", SDR 35	993	Materials: - 6" - PVC - SDR 35 - ASTM D3034	Foot	$3.70	500	$1,850.00
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	4	$153.80
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #4 - Outlet Pipe <=6 inch, Complex Install

Scenario Description:

Installation of an outlet line with a diameter of 6" or less in complex sites (such as sites with rocky soils or sites requireing special features in the design such as steel encasement of the pipe or cutting of concrete for installation) to convey stormwater from one location to a suitable and stable outlet. This practice is often installed in conjunction with roof runoff structures, terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Roof Runoff Structure (558), Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical scenario is for iInstallation of 500 feet of 6" approved plastic pipe in soils requiring rock ripping to convey stormwater from one location to a suitable and stable outlet. Trench is excavated 52" deep and 24" wide by hydraulic track excavator. Costs include 6" PVC pipe trench excavation, trench backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $3,928.69 **Scenario Cost/Unit:** $7.86

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	170	$843.20
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	170	$416.50
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Materials						
Pipe, PVC, 6", SDR 35	993	Materials: - 6" - PVC - SDR 35 - ASTM D3034	Foot	$3.70	500	$1,850.00
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	4	$153.80
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #5 - Outlet Pipe <=6 inch, Imported Fill

Scenario Description:

Installation of an outlet line with a diameter of 6" or less to convey stormwater from one location to a suitable and stable outlet on a site where fill is required to cover the pipe (for example when installing pipe and fill to cover an open ditch). This practice is often installed in conjunction with roof runoff structures, terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Roof Runoff Structure (558), Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical scenario is for iInstallation of 500 feet of 6" approved plastic pipe to cover an open ditch and convey stormwater from one location to a suitable and stable outlet. Assume average ditch dimensions are 52" deep and 24" wide. Costs include grading of ditch, pipe installation, ditch backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $6,933.93 **Scenario Cost/Unit:** $13.87

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	170	$416.50
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	10	$674.50
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	170	$402.90
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	8	$915.84
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	40	$923.20
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	18	$675.36
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Pipe, PVC, 6", SDR 35	993	Materials: - 6" - PVC - SDR 35 - ASTM D3034	Foot	$3.70	500	$1,850.00
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	4	$153.80

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 620 - Underground Outlet

Scenario: #6 - Rock-lined Catch Basin with outlet pipe >6-12 inch

Scenario Description:

Installation of a rock-lined catch basin and outlet pipe with a pipe >6" to 12". This practice is often installed in conjunction with terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical scenario is for the installation of a 2'x2'x6' concrete catch basin and 200 feet of 10" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Trench Excavation is 58" deep and 28" wide. Costs include 10" HDPE pipe, Precast concrete drop inlet with steel grate, trench excavation, trench backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 200

Scenario Cost: $2,942.92 **Scenario Cost/Unit:** $14.71

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	84	$152.04
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	1	$2.05
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	84	$205.80
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Pipe, HDPE, CPT, Double Wall, Soil Tight, 10"	1243	Pipe, Corrugated HDPE Double Wall, 10" diameter with soil tight joints - AASHTO M252. Material cost only.	Foot	$5.51	200	$1,102.00
Catch Basin, concrete, 2'x2'x6'	1257	Catch Basin, Precast Concrete, 2' square or round, cast grate, 6' deep. Includes materials, equipment and labor.	Each	$583.68	1	$583.68
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	4	$153.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #7 - Rock-lined Catch Basin with outlet pipe >6-12 inch, Complex Install

Scenario Description:

Installation of a rock-lined catch basin and outlet pipe with a pipe >6" to 12" in complex sites (such as sites with rocky soils or sites requireing special features in the design such as steel encasement of the pipe or cutting of concrete for installation).This practice is often installed in conjunction with terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606).

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical scenario is for the installation of a 2'x2'x6' catch basin and 200 feet of 10" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet in complex sites (such as sites with rocky soils or sites requireing special features in the design such as steel encasement of the pipe or cutting of concrete for installation). Trench Excavation is 58" deep and 28" wide. Costs include 10" HDPE pipe, Precast concrete drop inlet with steel grate, trench excavation in rocky soils, trench backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 200

Scenario Cost: $3,207.52 **Scenario Cost/Unit:** $16.04

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	84	$416.64
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	84	$205.80
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	1	$2.05
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Pipe, HDPE, CPT, Double Wall, Soil Tight, 10"	1243	Pipe, Corrugated HDPE Double Wall, 10" diameter with soil tight joints - AASHTO M252. Material cost only.	Foot	$5.51	200	$1,102.00
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	4	$153.80
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Catch Basin, concrete, 2'x2'x6'	1257	Catch Basin, Precast Concrete, 2' square or round, cast grate, 6' deep. Includes materials, equipment and labor.	Each	$583.68	1	$583.68
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #8 - Outlet Pipe >6-12 inch

Scenario Description:

Installation of an outlet line with a diameter of >6" to 12" to convey stormwater from one location to a suitable and stable outlet. This practice is often installed in conjunction with roof runoff management, terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Roof Runoff Structure (558), Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste.Typical scenario is for the installation of 500 feet of 10" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Trench Excavation is 58" deep and 28" wide. Costs include 10" HDPE pipe, trench excavation in rocky soils, trench backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $4,762.53 **Scenario Cost/Unit:** $9.53

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	210	$380.10
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	210	$514.50
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Pipe, HDPE, CPT, Double Wall, Soil Tight, 10"	1243	Pipe, Corrugated HDPE Double Wall, 10" diameter with soil tight joints - AASHTO M252. Material cost only.	Foot	$5.51	500	$2,755.00
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	9.5	$365.28
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #9 - Outlet Pipe >6-12 inch, Complex Install

Scenario Description:

Installation of an outlet line with a diameter of >6" to 12" in complex sites (such as sites with rocky soils or sites requireing special features in the design such as steel encasement of the pipe or cutting of concrete for installation) to convey stormwater from one location to a suitable and stable outlet. This practice is often installed in conjunction with roof runoff management, terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Roof Runoff Structure (558), Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical scenario is for the installation of 500 feet of 10" approved plastic pipe in an area requiring rock ripping. Trench Excavation is 58" deep and 28" wide. Costs include 10" HDPE pipe, trench excavation in rocky soils, trench backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $5,424.03 **Scenario Cost/Unit:** $10.85

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	210	$514.50
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	210	$1,041.60
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	9.5	$365.28
Pipe, HDPE, CPT, Double Wall, Soil Tight, 10"	1243	Pipe, Corrugated HDPE Double Wall, 10" diameter with soil tight joints - AASHTO M252. Material cost only.	Foot	$5.51	500	$2,755.00
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #10 - Outlet Pipe >6-12 inch, Imported Fill

Scenario Description:

Installation of an outlet line with a diameter of >6" to 12" to convey stormwater from one location to a suitable and stable outlet on a site where fill is required to cover the pipe (for example when installing pipe and fill to cover an open ditch). This practice is often installed in conjunction with roof runoff management, terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Roof Runoff Structure (558), Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste.Typical scenario is for the installation of 500 feet of 10" approved plastic pipe to cover an open ditch and convey stormwater from one location to a suitable and stable outlet. Assume average ditch dimensions are 58" deep and 28"wide. Costs include grading of ditch, pipe installation, ditch backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $8,325.67 **Scenario Cost/Unit:** $16.65

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	210	$497.70
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	10	$674.50
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	210	$514.50
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	8	$915.84
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	18	$675.36
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	40	$923.20
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	9.5	$365.28

Materials

Pipe, HDPE, CPT, Double Wall, Soil Tight, 10"	1243	Pipe, Corrugated HDPE Double Wall, 10" diameter with soil tight joints - AASHTO M252. Material cost only.	Foot	$5.51	500	$2,755.00

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 620 - Underground Outlet

Scenario: #11 - Rock-lined Catch Basin with outlet pipe >12-18 inch

Scenario Description:

Installation of a rock-lined catch basin and outlet pipe with a pipe >12" to 18". This practice is often installed in conjunction with terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical installation is for 200 feet of 18" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Trench excavation is 66" deep x 39" wide. Costs include 18" HDPE pipe, Precast concrete drop inlet with steel grate, trench excavation, bedding material, trench backfill, rodent guard and laid up stone headwall at outlet. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 200

Scenario Cost: $5,016.93 **Scenario Cost/Unit:** $25.08

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	132	$238.92
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	132	$323.40
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Pipe, HDPE, CPT, Double Wall, Soil Tight, 18"	1245	Pipe, Corrugated HDPE Double Wall, 18" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$10.94	200	$2,188.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	24	$935.28
Catch Basin, concrete, 2'x2'x6'	1257	Catch Basin, Precast Concrete, 2' square or round, cast grate, 6' deep. Includes materials, equipment and labor.	Each	$583.68	1	$583.68
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #12 - Rock-lined Catch Basin with outlet pipe >12-18 inch, Complex Install

Scenario Description:

Installation of a rock-lined catch basin and outlet pipe with a pipe >12" to 18" in complex sites (such as sites with rocky soils or sites requireing special features in the design such as steel encasement of the pipe or cutting of concrete for installation). This practice is often installed in conjunction with terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical installation is for 200 feet of 18" approved plastic pipe in a site requiring rock ripping to convey stormwater from one location to a suitable and stable outlet. Trench excavation is 66" deep x 39" wide. Costs include 18" HDPE pipe, Precast concrete drop inlet with steel grate, trench excavation, bedding material, trench backfill, rodent guard and laid up stone headwall at outlet. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 200

Scenario Cost: $5,432.73 **Scenario Cost/Unit:** $27.16

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	132	$654.72
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	132	$323.40
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Pipe, HDPE, CPT, Double Wall, Soil Tight, 18"	1245	Pipe, Corrugated HDPE Double Wall, 18" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$10.94	200	$2,188.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	24	$935.28
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Catch Basin, concrete, 2'x2'x6'	1257	Catch Basin, Precast Concrete, 2' square or round, cast grate, 6' deep. Includes materials, equipment and labor.	Each	$583.68	1	$583.68
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #13 - Outlet Pipe >12-18 inch

Scenario Description:

Installation of an outlet line with a diameter of >12" to 18" to convey stormwater from one location to a suitable and stable outlet. This practice is often installed in conjunction with roof runoff management, terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Roof Runoff Structure (558), Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical install is for 500 feet of 18" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Trench excavation is 66" deep x 39" wide. Costs include 18" HDPE pipe, Precast concrete drop inlet with steel grate, trench excavation, bedding material, trench backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $9,961.65 **Scenario Cost/Unit:** $19.92

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	330	$597.30
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	330	$808.50
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	60	$2,338.20
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Pipe, HDPE, CPT, Double Wall, Soil Tight, 18"	1245	Pipe, Corrugated HDPE Double Wall, 18" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$10.94	500	$5,470.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #14 - Outlet Pipe >12-18 inch, Complex Install

Scenario Description:

Installation of an outlet line with a diameter of >12" to 18" in complex sites (such as sites with rocky soils or sites requireing special features in the design such as steel encasement of the pipe or cutting of concrete for installation) to convey stormwater from one location to a suitable and stable outlet. This practice is often installed in conjunction with roof runoff management, terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Roof Runoff Structure (558), Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical install is for 500 feet of 18" approved plastic pipe and excavation requiring rock ripping to convey stormwater from one location to a suitable and stable outlet. Trench excavation is 66" deep x 39" wide. Costs include 18" HDPE pipe, Precast concrete drop inlet with steel grate, trench excavation, bedding material, trench backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $11,001.15 **Scenario Cost/Unit:** $22.00

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	330	$1,636.80
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	330	$808.50
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Pipe, HDPE, CPT, Double Wall, Soil Tight, 18"	1245	Pipe, Corrugated HDPE Double Wall, 18" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$10.94	500	$5,470.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	60	$2,338.20
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #15 - Outlet Pipe >12-18 inch, Imported Fill

Scenario Description:

Installation of an outlet line with a diameter of >12" to 18" to convey stormwater from one location to a suitable and stable outlet on a site where fill is required to cover the pipe (for example when installing pipe and fill to cover an open ditch). This practice is often installed in conjunction with roof runoff management, terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Roof Runoff Structure (558), Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical install is for 500 feet of 18" approved plastic pipe to cover an open ditch and convey stormwater from one location to a suitable and stable outlet. Assume average ditch dimensions are 66" deep x 39". Costs include grading of ditch, pipe installation, ditch backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $13,509.53 **Scenario Cost/Unit:** $27.02

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	10	$674.50
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	8	$915.84
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	330	$782.10
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	330	$808.50
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	18	$675.36
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	40	$923.20
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Materials						
Pipe, HDPE, CPT, Double Wall, Soil Tight, 18"	1245	Pipe, Corrugated HDPE Double Wall, 18" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$10.94	500	$5,470.00
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35

Materials

Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	60	$2,338.20

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 620 - Underground Outlet

Scenario: #16 - Rock-lined Catch Basin with outlet pipe >18-24 inch

Scenario Description:

Installation of a rock-lined catch basin and outlet pipe with a pipe >18" to 24". This practice is often installed in conjunction with terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical installation is for a 4'x4' manhole and 200' of 24" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Trench excavation is 72" x 48" wide. Costs include 24" HDPE pipe, Precast concrete drop inlet with steel grate, 24" HDPE pipe, trench excavation, bedding material, trench backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 200

Scenario Cost: $6,692.67 **Scenario Cost/Unit:** $33.46

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	132	$323.40
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	132	$238.92
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Catch Basin, concrete, 3'x3'x6'	1258	Catch Basin, Precast Concrete, 3' square or round, cast grate, 6' deep. Includes materials, equipment and labor.	Each	$767.42	1	$767.42
Pipe, HDPE, CPT, Double Wall, Soil Tight, 24"	1246	Pipe, Corrugated HDPE Double Wall, 24" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$18.40	200	$3,680.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	24	$935.28
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #17 - Rock-lined Catch Basin with outlet pipe >18-24 inch, Complex Install

Scenario Description:

Installation of a rock-lined catch basin and outlet pipe with a pipe >18" to 24" in complex sites (such as sites with rocky soils or sites requireing special features in the design such as steel encasement of the pipe or cutting of concrete for installation). This practice is often installed in conjunction with terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical installation is for a 4'x4' manhole and 200' of 24" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Trench excavation is 72" x 48" wide, all excavation is assumed to be rock ripping. Costs include 24" HDPE pipe, Precast concrete drop inlet with steel grate, 24" HDPE pipe, trench excavation, bedding material, trench backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 200

Scenario Cost: $7,108.47 **Scenario Cost/Unit:** $35.54

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	132	$654.72
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	132	$323.40
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	24	$935.28
Pipe, HDPE, CPT, Double Wall, Soil Tight, 24"	1246	Pipe, Corrugated HDPE Double Wall, 24" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$18.40	200	$3,680.00
Catch Basin, concrete, 3'x3'x6'	1258	Catch Basin, Precast Concrete, 3' square or round, cast grate, 6' deep. Includes materials, equipment and labor.	Each	$767.42	1	$767.42
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #18 - Outlet Pipe >18-24 inch

Scenario Description:

Installation of an outlet line with a diameter of >18" to 24" to convey stormwater from one location to a suitable and stable outlet. This practice is often installed in conjunction with roof runoff management, terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Roof Runoff Structure (558), Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Install 500 feet of 24" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Trench excavation is 72" x 48" wide. Costs include 24" HDPE pipe, 24" HDPE pipe, trench excavation, bedding material, trench backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $15,155.80 **Scenario Cost/Unit:** $30.31

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	445	$805.45
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	445	$1,090.25
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	85	$3,312.45
Pipe, HDPE, CPT, Double Wall, Soil Tight, 24"	1246	Pipe, Corrugated HDPE Double Wall, 24" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$18.40	500	$9,200.00
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #19 - Outlet Pipe >18-24 inch, Complex Install

Scenario Description:

Installation of an outlet line with a diameter of >18" to 24" in complex sites (such as sites with rocky soils or sites requireing special features in the design such as steel encasement of the pipe or cutting of concrete for installation) to convey stormwater from one location to a suitable and stable outlet. This practice is often installed in conjunction with roof runoff management, terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Roof Runoff Structure (558), Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Install 500 feet of 24" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Trench excavation is 72" x 48" wide, all excavation is assumed to be rock ripping. Costs include 24" HDPE pipe, 24" HDPE pipe, trench excavation, bedding material, trench backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $16,557.55 **Scenario Cost/Unit:** $33.12

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	445	$2,207.20
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	445	$1,090.25
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	85	$3,312.45
Pipe, HDPE, CPT, Double Wall, Soil Tight, 24"	1246	Pipe, Corrugated HDPE Double Wall, 24" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$18.40	500	$9,200.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #20 - Outlet Pipe >18-24 inch, Imported fill

Scenario Description:

Installation of an outlet line with a diameter of >18" to 24" to convey stormwater from one location to a suitable and stable outlet on a site where fill is required to cover the pipe (for example when installing pipe and fill to cover an open ditch). This practice is often installed in conjunction with roof runoff management, terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Roof Runoff Structure (558), Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Install 500 feet of 24" approved plastic pipe to cover an open ditch and convey stormwater from one location to a suitable and stable outlet. Assume average ditch dimensions are 6'wide x 4' deep. Costs include grading of ditch, pipe installation, ditch backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $18,850.54 **Scenario Cost/Unit:** $37.70

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	8	$915.84
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	445	$1,090.25
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	10	$674.50
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	445	$1,054.65
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	18	$675.36
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	40	$923.20
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	85	$3,312.45
Pipe, HDPE, CPT, Double Wall, Soil Tight, 24"	1246	Pipe, Corrugated HDPE Double Wall, 24" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$18.40	500	$9,200.00

Materials

Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 620 - Underground Outlet

Scenario: #21 - Catch Basin with outlet pipe >24-30 inch

Scenario Description:

Installation of a concrete catch basin and outlet pipe with a pipe >24" to 30". This practice is often installed in conjunction with terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical installation is for a 3' x 3' x 6' catchbasin with 200' of 30" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Trench excavation is 78" deep x 56" wide. Costs include 30" HDPE pipe, precast concrete drop inlet with steel grate, trench excavation, bedding material, trench backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 200

Scenario Cost: $9,488.57 **Scenario Cost/Unit:** $47.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	226	$409.06
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	226	$553.70
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	42	$1,636.74
Catch Basin, concrete, 3'x3'x6'	1258	Catch Basin, Precast Concrete, 3' square or round, cast grate, 6' deep. Includes materials, equipment and labor.	Each	$767.42	1	$767.42
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Pipe, HDPE, CPT, Double Wall, Soil Tight, 30"	1247	Pipe, Corrugated HDPE Double Wall, 30" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$26.87	200	$5,374.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #22 - Catch Basin with outlet pipe >24-30 inch, Complex Install

Scenario Description:

Installation of a concrete catch basin and outlet pipe with a pipe >24" to 30" in complex sites (such as sites with rocky soils or sites requireing special features in the design such as steel encasement of the pipe or cutting of concrete for installation).. This practice is often installed in conjunction with terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical installation is for a 4"x4" manhole with 200' of 30" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Trench excavation is 78" deep x 56" wide, all excavation is assumed to be rock ripping. Costs include 30" HDPE pipe, Precast concrete drop inlet with steel grate, trench excavation, bedding material, trench backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 200

Scenario Cost: $10,200.47 **Scenario Cost/Unit:** $51.00

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	226	$1,120.96
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	226	$553.70
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Pipe, HDPE, CPT, Double Wall, Soil Tight, 30"	1247	Pipe, Corrugated HDPE Double Wall, 30" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$26.87	200	$5,374.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	42	$1,636.74
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Catch Basin, concrete, 3'x3'x6'	1258	Catch Basin, Precast Concrete, 3' square or round, cast grate, 6' deep. Includes materials, equipment and labor.	Each	$767.42	1	$767.42
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #23 - Outlet Pipe >24-30 inch

Scenario Description:

Installation of an outlet line with a diameter of >24" to 30" to convey stormwater from one location to a suitable and stable outlet. This practice is often installed in conjunction with roof runoff management, terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Roof Runoff Structure (558), Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical installation is 500 feet of 30" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Trench excavation is 78" deep x 56" wide. Costs include 30" HDPE pipe, trench excavation, bedding material, trench backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $20,681.40 **Scenario Cost/Unit:** $41.36

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	565	$1,022.65
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	565	$1,384.25
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Pipe, HDPE, CPT, Double Wall, Soil Tight, 30"	1247	Pipe, Corrugated HDPE Double Wall, 30" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$26.87	500	$13,435.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	105	$4,091.85
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #24 - Outlet Pipe >24-30 inch, complex installation

Scenario Description:

Installation of an outlet line with a diameter of >24" to 30" in complex sites (such as sites with rocky soils or sites requireing special features in the design such as steel encasement of the pipe or cutting of concrete for installation) to convey stormwater from one location to a suitable and stable outlet. This practice is often installed in conjunction with roof runoff management, terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Roof Runoff Structure (558), Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical installation is 500 feet of 30" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Trench excavation is 78" deep x 56" wide. Costs include 30" HDPE pipe, trench excavation, bedding material, trench backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $22,461.15 **Scenario Cost/Unit:** $44.92

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	565	$1,384.25
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	565	$2,802.40
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	105	$4,091.85
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Pipe, HDPE, CPT, Double Wall, Soil Tight, 30"	1247	Pipe, Corrugated HDPE Double Wall, 30" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$26.87	500	$13,435.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #25 - Catch Basin with outlet pipe >30-70 inch

Scenario Description:

Installation of a concrete catch basin and outlet pipe with a pipe >30" - 70". This practice is often installed in conjunction with terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical installation is for a 4'x4' 200 feet of 36" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Trench excavation is 84" deep x 64" wide. Costs include 36" HDPE pipe, Precast concrete drop inlet with steel grate, trench excavation, bedding material, trench backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 200

Scenario Cost: $14,923.44 **Scenario Cost/Unit:** $74.62

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	460	$1,127.00
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	460	$832.60
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Pipe, HDPE, CPT, Double Wall, Soil Tight, 36"	1248	Pipe, Corrugated HDPE Double Wall, 36" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$34.91	200	$6,982.00
Manhole, 4' x 4'	1053	Precast Manhole with base and top delivered. 4' diameter x 4' depth. Materials only.	Each	$1,726.89	1	$1,726.89
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	90	$3,507.30
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #26 - Catch Basin with outlet pipe >30-70 inch, Complex Install

Scenario Description:

Installation of a concrete catch basin and outlet pipe with a pipe >30" - 70" in complex sites (such as sites with rocky soils or sites requireing special features in the design such as steel encasement of the pipe or cutting of concrete for installation). This practice is often installed in conjunction with terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical installation is for a 4'x4' 200 feet of 36" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Trench excavation is 84" deep x 64" wide. Costs include 36" HDPE pipe, Precast concrete drop inlet with steel grate, trench excavation, bedding material, trench backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 200

Scenario Cost: $16,372.44 **Scenario Cost/Unit:** $81.86

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	460	$2,281.60
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	460	$1,127.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	1	$65.35
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	90	$3,507.30
Pipe, HDPE, CPT, Double Wall, Soil Tight, 36"	1248	Pipe, Corrugated HDPE Double Wall, 36" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$34.91	200	$6,982.00
Manhole, 4' x 4'	1053	Precast Manhole with base and top delivered. 4' diameter x 4' depth. Materials only.	Each	$1,726.89	1	$1,726.89
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #27 - Outlet Pipe >30 inch

Scenario Description:

Installation of an outlet line with a diameter of >30" to convey stormwater from one location to a suitable and stable outlet. This practice is often installed in conjunction with roof runoff management, terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Roof Runoff Structure (558), Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical installation is for 500 feet of 36" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Trench excavation is 84" deep x 64" wide. Costs include 36" HDPE pipe, Precast concrete drop inlet with steel grate, trench excavation, bedding material, trench backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $29,937.92 **Scenario Cost/Unit:** $59.88

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	690	$1,690.50
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	690	$1,248.90
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	135	$8,822.25
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	1	$38.97
Pipe, HDPE, CPT, Double Wall, Soil Tight, 36"	1248	Pipe, Corrugated HDPE Double Wall, 36" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$34.91	500	$17,455.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #28 - Outlet Pipe >30", Complex Install

Scenario Description:

Installation of an outlet line with a diameter of >30" in complex sites (such as sites with rocky soils or sites requireing special features in the design such as steel encasement of the pipe or cutting of concrete for installation) to convey stormwater from one location to a suitable and stable outlet. This practice is often installed in conjunction with roof runoff management, terraces, diversions, sediment control basins, waterways or simlar practices. Associated practices are Roof Runoff Structure (558), Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Typical installation is for 500 feet of 36" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Trench excavation is 84" deep x 64" wide, all excavation is assumed to be rock ripping. Costs include 36" HDPE pipe, Precast concrete drop inlet with steel grate, trench excavation, bedding material, trench backfill, rodent guard and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $31,669.82 **Scenario Cost/Unit:** $63.34

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	690	$1,248.90
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	690	$3,422.40
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	1	$38.97
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	135	$8,822.25
Pipe, HDPE, CPT, Double Wall, Soil Tight, 36"	1248	Pipe, Corrugated HDPE Double Wall, 36" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$34.91	500	$17,455.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 620 - Underground Outlet

Scenario: #29 - Catch Basin and outlet pipe >70 inch

Scenario Description:

Installation of a concrete catch basin and outlet pipe with a pipe >70". This practice is often installed in conjunction with diversions, sediment basins or drainage ways serving large (square miles) drainage areas. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Terrace (600), Diversion (342), Water and Sediment Control Basin (638), and Subsurface Drainage (606)

Before Situation:

Excessive sedimentation and soil erosion as a result of gully, rill or sheet erosion which exceeds "T" from farm fields and other locations. Also, roof runoff or surface runoff that becomes contminated with agricultural wastes that significantly contributes to the amount of runoff that has to be stored or treated.

After Situation:

Field system meets "T" or "clean" storm water runoff is diverted away from an agricultural waste management system to minimize the volume of runoff that is contaminated by agricultural waste. Install 500 feet of 72" reinforce concrete pipe to convey stormwater from one location to a suitable and stable outlet. Trench excavation is 9' deep x 8' wide and 1:1 ss. Costs include 72" concrete pipe, Precast concrete drop inlet with steel grate, trench excavation, bedding material, trench backfill, and laid up stone headwall at outlet.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $174,269.06 **Scenario Cost/Unit:** $348.54

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	$2.05	2	$4.10
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.81	2850	$5,158.50
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	2300	$5,635.00
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	9	$4,575.33
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	700	$16,156.00
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	60	$2,473.80
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	6	$392.10
Pipe, concrete, gravity, 72" diameter	2197	72" diameter low head stormwater concrete pipe. Materials only.	Foot	$268.20	500	$134,100.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	135	$5,260.95
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 629 - Waste Treatment

Scenario: #4 - Aerator less than or equal to 5 hp

Scenario Description:

This practice scenario includes installation of an aerator into a liquid storage pond or tank that has a surface area less than 1 acre. The purpose of the practice is to address resource concerns related to water quality degradation due to (excess nutrient and pathogens) and air quality impacts (PM & PM precursors, and objectionable odors).

Associated practices: Nutrient Management (590) and Waste Storage Facility (313)

Before Situation:

A dairy, swine, or other agricultural operation in which the waste goes into a storage pond. The pond is not managed as an anaerobic lagoon and the nutrients stratify over time and odors are objectionable. It is difficult to properly estimate the nutrient content being pumped onto the land because of the stratification. There is also not enough aerobic microbial activity in the pond to prevent objectionable odors.

After Situation:

This scenario assumes that the producer would like to increase oxygen content in the storage pond and mix the waste for even nutrient distribution. Under aerobic conditions microorganisms can convert nutrients and odors will be reduced. Nutrient content of the liquid waste is more uniform which is better for uniform agronomic application rates improving nutrient management and to protect air and water quality resources.

Scenario Feature Measure: Horse Power of aerator

Scenario Unit: Horse Power

Scenario Typical Size: 1

Scenario Cost: $1,280.79 **Scenario Cost/Unit:** $1,280.79

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	2	$76.28
Materials						
Aerator, pond, 1 hp	1708	1 hp Aerator for pond or tank with less than 10 acres of surface area. Materials only.	Each	$1,204.51	1	$1,204.51

Practice: 629 - Waste Treatment

Scenario: #5 - Aerator greater than 5 hp

Scenario Description:

This practice scenario includes installation of an aerator into a liquid storage pond or tank with a surface area larger than 1 acre. The purpose of the practice is to address resource concerns related to water quality degradation due to (excess nutrient and pathogens) and air quality impacts (PM & PM precursors, and objectionable odors).
Associated practices: Nutrient Management (590) and Waste Storage Facility (313)

Before Situation:

A dairy, swine, or other agricultural operation in which the waste goes into a storage pond. The pond is not managed as an anaerobic lagoon and the nutrients stratify over time and odors are objectionable. It is difficult to properly estimate the nutrient content being pumped onto the land because of the stratification. There is also not enough aerobic microbial activity in the pond to prevent objectionable odors.

After Situation:

This scenario assumes that the producer would like to increase oxygen content in the storage pond and mix the waste for even nutrient distribution. Under aerobic conditions microorganisms can convert nutrients and odors will be reduced. Nutrient content of the liquid waste is more uniform which is better for uniform agronomic applications rates improving nutrient management and to protect air and water quality resources.

Scenario Feature Measure: Each aerator

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $9,683.28 **Scenario Cost/Unit:** $9,683.28

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	3	$114.42
Materials						
Aerator, pond, 10 hp	1709	10 hp Aerator for pond or tank with 10 or more acres of surface area. Materials only	Each	$9,568.86	1	$9,568.86

Practice: 629 - Waste Treatment

Scenario: #7 - Swine Waste, Phosphorus Reduction System

Scenario Description:

This practice scenario includes infrastructure to remove phosphorus from swine operation wastewater in watersheds with limited land for application and the phosphorus index is rated High or greater. The purpose of the practice is to address resource concerns related to water quality degradation (excess nutrients).

Associated practices: Nutrient Management (590), Waste Storage Facility (313), Irrigation Water Conveyance, Pipeline (430), Irrigation System, Spinkler (442), Irrigation System, Microirrigation (442)

Before Situation:

Untreated swine lagoon water is applied to fields in a watershed where the phosphorus index is rated High or greater.

After Situation:

This scenario assumes that swine wastewater is treated with a phosphorus reduction system. The precipitated phosphorus, in the form of struvite, can be collected and sold to commercial fertilizer producers. The treated wastewater may be able to be agronomically applied at higher application rates and/or on fewer acres. This system has been shown to decrease movement of phosphorus particles into waterways.

Scenario Feature Measure: gallons per minute treated

Scenario Unit: Gallon/Minute

Scenario Typical Size: 600

Scenario Cost: $386,446.24 **Scenario Cost/Unit:** $644.08

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	149.2	$16,403.05
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	803.5	$30,645.49
Materials						
Struvite extraction system	1865	Struvite extraction system (magnesium ammonium phosphate) Phred components including fabricated parts, off the shelf parts, and installation materials.	Each	##########	1	$331,242.45
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99
Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been i	Dollar	$1.03	7442	$7,665.26

Practice: 629 - Waste Treatment

Scenario: #8 - Wastewater Treatment System, High Levels

Scenario Description:

This practice scenario represents a treament system that addresses the disinfection of wastewater at the highest log kill rate, typically 3 log kill. The system includes installation of reverse osmosis, heat application or equivalent system that treats the wastewater runoff from an agricultural operation, typically a flower and plant nursery which covers about 5 acres. The purpose of the practice is to address resource concerns related to water quality degradation due to pathogens.

Associated practices: 533-Pumping Plant; 447-Irrigation System, Tailwater Recovery

Before Situation:

Nursery waste water currently outlets in an untreated manner which presents potential soil, and water quality concerns.

After Situation:

This scenario allows the producer to collect wastewater from a nursery before it affects water quality. One 5,000 tank is used to store irrigation runoff prior to treatment and one 5,000 gallon tank is used to store the post treated water until it is ready to be used again. The typical treatment device includes a series of tanks with membranes that treat the water, or heating units which treat the water with heat. This treatment device will be installed using Associated Practice 533-Pumping Plant, Scenario "Elec<3 HP(Press Tank)". Combined with the associated practices, wastewater is collected, treated, and returned to the irrigation system for use.

Scenario Feature Measure: Typical Size

Scenario Unit: Gallon per Minute

Scenario Typical Size: 50

Scenario Cost: $31,141.90 **Scenario Cost/Unit:** $622.84

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	7.4	$1,190.66
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	40	$1,525.60
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	40	$923.20
Materials						
Filter, effluent, municipal grade	2063	Effluent filter rated 8,000 to 10,000 gallons per day with 1/16" to 1/32" filtration. Includes materials and shipping only.	Each	$342.55	3	$1,027.65
Tank, Poly Enclosed Storage, >1,000	1075	Water storage tanks. Includes materials and shipping only.	Gallon	$0.63	10000	$6,300.00
Switches and Controls, Wi-Fi system and software	1194	Software with built-in cellular or Wi-Fi communication commonly used to control pumps and irrigation systems	Each	$415.23	1	$415.23
Micro Irrigation, media filter	1482	Sand or media filter for Micro irrigation system. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	$4,939.89	4	$19,759.56

Practice: 629 - Waste Treatment

Scenario: #9 - Wastewater Treatment System, Medium Levels

Scenario Description:

This practice scenario represents a treament system that addresses the disinfection of wastewater at a medium rate, typically 1 log kill. The system includes installation of an ozone injection or an equivalent system that treats the wastewater runoff from an agricultural operation, typically a flower and plant nursery which covers about 5 acres. The purpose of the practice is to address resource concerns related to water quality degradation due to pathogins.

Associated practices: 533-Pumping Plant; 447-Irrigation System, Tailwater Recovery

Before Situation:

Nursery waste water currently outlets in an untreated manner which presents potential soil, and water quality concerns.

After Situation:

This scenario allows the producer to collect wastewater from a nursery before it affects water quality. One 5,000 tank is used to store irrigation runoff prior to treatment and one 5,000 gallon tank is used to store the post treated water until it is ready to be used again. The treatment device includes a small compressor that injects ozone. The ozone is allowed to mix with the wastewater in a contact tank for a specified time. This treatment device will be installed using Associated Practice 533-Pumping Plant, Scenario "Elec<3 HP(Press Tank)". Combined with the associated practices, wastewater is collected, treated, and returned to the irrigation system for use.

Scenario Feature Measure: Typical Size

Scenario Unit: Gallon per Minute

Scenario Typical Size: 50

Scenario Cost: $22,664.12 **Scenario Cost/Unit:** $453.28

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	7.4	$1,190.66
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	40	$1,525.60
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	40	$923.20
Materials						
Micro Irrigation, media filter	1482	Sand or media filter for Micro irrigation system. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	$4,939.89	2	$9,879.78
Filter, effluent, municipal grade	2063	Effluent filter rated 8,000 to 10,000 gallons per day with 1/16" to 1/32" filtration. Includes materials and shipping only.	Each	$342.55	2	$685.10
Valve, distribution	2064	Sequencing valve, 4 or 6 way, for pressure dosing wastewater. Includes materials and shipping only.	Each	$141.29	5	$706.45
Tank, Poly Enclosed Storage, >1,000	1075	Water storage tanks. Includes materials and shipping only.	Gallon	$0.63	10000	$6,300.00
Switches and Controls, Wi-Fi system and software	1194	Software with built-in cellular or Wi-Fi communication commonly used to control pumps and irrigation systems	Each	$415.23	1	$415.23
Scroll Compressor - 2 HP	1181	Scroll compressor, 2 Horsepower, controls, wiring, and appurtenances. Materials only.	Each	$1,038.10	1	$1,038.10

Practice: 629 - Waste Treatment

Scenario: #10 - Wastewater Treatment System, Low Levels

Scenario Description:

This practice scenario represents a treament system that addresses the disinfection of wastewater at a log kill rate lower than 1. The system might include installation of UV, chemical injection, or some other suitable system that treats the wastewater runoff from an agricultural operation, typically a flower and plant nursery which covers about 5 acres. The purpose of the practice is to address resource concerns related to water quality degradation due to pathogins.

Associated practices: 533-Pumping Plant; 447-Irrigation System, Tailwater Recovery

Before Situation:

Nursery waste water currently outlets in an untreated manner which presents potential soil, and water quality concerns.

After Situation:

This scenario allows the producer to collect wastewater from a agricultural operation such as a nursery before it affects water quality. One 5,000 tank is used to store irrigation runoff prior to treatment and one 5,000 gallon tank is used to store the post treated water until it is ready to be used again. The treatment device may include a chemical injection system, or if UV light is used, a similar small pump is used to circulate the waste water through the UV system. This treatment device will be installed using Associated Practice 533-Pumping Plant, Scenario "Elec<3 HP(Press Tank)". Combined with the associated practices, wastewater is collected, treated, and returned to the irrigation system for use.

Scenario Feature Measure: Typical Size

Scenario Unit: Gallon per Minute

Scenario Typical Size: 50

Scenario Cost: $18,495.19 **Scenario Cost/Unit:** $369.90

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	4.2	$675.78
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	20	$762.80
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	20	$461.60
Materials						
Micro Irrigation, media filter	1482	Sand or media filter for Micro irrigation system. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	$4,939.89	2	$9,879.78
Switches and Controls, Wi-Fi system and software	1194	Software with built-in cellular or Wi-Fi communication commonly used to control pumps and irrigation systems	Each	$415.23	1	$415.23
Tank, Poly Enclosed Storage, >1,000	1075	Water storage tanks. Includes materials and shipping only.	Gallon	$0.63	10000	$6,300.00

Practice: **630 - Vertical Drain**

Scenario: **#2 - Drywell**

Scenario Description:

A gravel filled dry well trench to allow for runoff waters from roofs or other impermeable areas to infiltrate into substrata layers. Dry well is in a site with porous, underground strata into which drainage water can be discharged without contaminating groundwater resources by providing an outlet for drainage water from a surface or subsurface drainage system. Resource concerns addressed include soil erosion and surface water quality. Associated practices are Underground Outlet-620 and Roof Runoff Management-558.

Before Situation:

This practice is applicable in locations where the underlying strata can receive, transmit or store the design drainage flow, and other drainage outlets are not available and cannot be provided at a reasonable cost. Example situations for the Pacific Region include:
1. Roof drainage goes onto slab areas where it is contaminated with manure, outlets to unstable areas and causes erosion, or outlets directly into waterways reducing ground water recharge. There is no stable outlet or means to enhance infiltration into ground water.
2. Rainfall runoff from impervious areas, such as residential homes and driveways, is unnaturally increased causing erosion and sedimentation in downstream waters.

After Situation:

A drywell increases infiltration into ground water and provides a stable infiltration area. Typical scenario is for excavation of a 100' long trench 3'x4', lining 3 sides with geotextile and installation of 4" perforated pipe and gravel.

Scenario Feature Measure: Length of Trench

Scenario Unit: Foot

Scenario Typical Size: 100

Scenario Cost: $2,347.76 **Scenario Cost/Unit:** $23.48

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.20	45	$99.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.69	9	$222.21
Materials						
Pipe, HDPE, 4", PCPT, Single Wall	1270	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 4" diameter - ASTM F405. Material cost only.	Foot	$0.47	100	$47.00
Geotextile, non-woven, heavy weight	1210	Non-woven greater than 8 ounce/square yard geotextile with staple anchoring. Materials only.	Square Yard	$4.04	117	$472.68
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$27.75	45	$1,248.75
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.12	1	$258.12

Practice: **630 - Vertical Drain**

Scenario: **#3 - Percolation Vault**

Scenario Description:

Percolation vaults are structures designed to prevent contamination of and accommodate infiltration of stormwater runoff in locations having inadequate availability of land and/or high value land (e.g. greenhouses/nurseries in urban settings). The structures consist of infiltration galleries (chambers) built beneath the ground to which runoff is channeled and held until it seeps in and becomes groundwater (recharge). The infiltration galleries are covered using structural materials that sustain significant loads allowing operations such as greenhouses/nurseries to exist immediately above. Associated conservation practices are Underground Outlet (620), Structure for Water Control (587), and Roof Runoff Structure (558).

Before Situation:

Stormwater runoff is uncontrolled and readily picks up contaminants. The contaminated water negatively impacts surface water and groundwater quality. The location is such that adequate land area is not available, or it's too expensive, to construct detention storage ponds or other above-ground storage facilities for this water.

After Situation:

Prevention of stormwater runoff contamination is accomplished since the water is channeled immediately into the percolation vault(s) and no opportunity exists to generate poor water quality. A complete system is installed which meets the resource concern. Typical system includes 2 concrete inlet boxes which direct surface flow into subsurface HDPE pipe vaults. Pipe vaults are typically 100 feet in total length. Gravel and Geotextile fabric surround the inlet boxes and pipe vaults to promote infiltration.

Scenario Feature Measure: Complete System

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $37,097.30 **Scenario Cost/Unit:** $37,097.30

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, large equipment, 1500 ft	1221	Bulk excavation of common earth including sand and gravel with scrapers with average haul distance of 1500 feet. Includes equipment and labor.	Cubic Yard	$3.61	1550	$5,595.50
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.43	500	$2,715.00
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.44	500	$1,220.00
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$506.66	15	$7,599.90
Materials						
Pipe, HDPE, CPT, Double Wall, Soil Tight, 60"	1250	Pipe, Corrugated HDPE Double Wall, 60" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$119.51	100	$11,951.00
Geotextile, non-woven, light weight	1209	Non-woven less than 8 ounce/square yard geotextile with staple anchoring. Materials only.	Square Yard	$1.87	770	$1,439.90
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$27.75	160	$4,440.00
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$26.70	80	$2,136.00

Practice: 632 - Waste Separation Facility

Scenario: #1 - Separator, Vibratory or Rotating Screen

Scenario Description:

A small rotating or vibratory screen mechanical separation facility to partition solids, liquids, and/or associated nutrients from animal waste streams. The partitioning of the previously mentioned components facilitates the protection of air and water quality, protects animal health, and improves the management of an animal waste management system. The sceanrio included the stand, a wall to mount the stand on, the seperator and installation of the seperator. This scenario does not include a pump or transfer pipeline.

Associated practices include Nutrient Management (590), Composting Facility (317), Anaerobic Digester (366), Waste Storage Facility (313), Waste Transfer (634), Amendments for the Treatment of Agricultural Waste (591), Pumping Plant (533), Vegetated Treatment Area (635), Pond Lining or Sealing (521A-D), and Waste Treatment (629).

Before Situation:

Applicable to situations where partitioning solids, liquids, and nutrients will facilitate the management of an animal waste management system, improve air quality (reduce odors), and address water quality concerns.

After Situation:

One small rotating or vibratory screen type separation facility installed at livestock facility before storage or treatment or after treatment, for example, after an anaerobic digester. Part of an animal waste management system.

Scenario Feature Measure: Item

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $33,860.88 **Scenario Cost/Unit:** $33,860.88

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	10	$1,609.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	32	$738.56
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	16	$610.24
Materials						
Vibratory or Rotating Screen	1948	Vibratory or Rotating Screen, includes materials, shipping and equipment.	Each	$30,044.58	1	$30,044.58
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 632 - Waste Separation Facility

Scenario: #2 - Separator, Screw or Roller Press

Scenario Description:

A small screw or roller press mechanical separation facility to partition solids, liquids, and/or associated nutrients from animal waste streams. The partitioning of the previously mentioned components facilitates the protection of air and water quality, protects animal health, and improves the management of an animal waste management system.

Associated practices include Nutrient Management (590), Composting Facility (317), Anaerobic Digester (366), Waste Storage Facility (313), Waste Transfer (634), Amendments for the Treatment of Agricultural Waste (591), Pumping Plant (533), Vegetated Treatment Area (635), Pond Lining or Sealing (521A-D), and Waste Treatment (629).

Before Situation:

Applicable to situations where partitioning solids, liquids, and nutrients will facilitate the management of an animal waste management system, improve air quality (reduce odors), and address water quality concerns.

After Situation:

One small screw or roller press type separation facility installed at livestock facility before storage or treatment or after treatment, for example, after an anaerobic digester. Part of an animal waste management system.

Scenario Feature Measure: Item

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $46,616.30 **Scenario Cost/Unit:** $46,616.30

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	10	$1,609.00
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	16	$610.24
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	32	$738.56
Materials						
Screw or Roller Press - Small	1950	Screw or Roller Press with a capacity of < 100 GPM. Includes materials and equipment.	Each	$42,800.00	1	$42,800.00
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 632 - Waste Separation Facility

Scenario: #3 - Earthen Settling Structure

Scenario Description:

An earthen structure, such as a basin or a terrace or dike like structure, used to capture and separate a portion of the solids from a liquid stream from a feedlot or confinement facility. A concrete pad should be installed on the bottom of the basin and around outlet structures to facilitate cleanout. Removes as portion of the solids to facilitate waste handling and to address water quality concerns.

Associated practices include Nutrient Management (590), Composting Facility (317), Anaerobic Digester (366), Waste Storage Facility (313), Waste Transfer (634), Vegetated Treatment Area (635), Pond Lining or Sealing (521A-D), and Waste Treatment (629).

Before Situation:

Applicable to situations where partitioning solids, liquids, and nutrients will facilitate the management of an animal waste management system, improve air quality (reduce odors), and address water quality concerns.

After Situation:

One earthen settling basin structure (60 ft wide by 200 ft long by 3 ft deep, with three screening outlet structures) constructed around or at a livestock feeding operation. Removes a portion of the solids that otherwise would leave with the runoff from an animal feeding operation. Part of an animal waste management system.

Scenario Feature Measure: Cubic Foot of Design Storage

Scenario Unit: Cubic Foot

Scenario Typical Size: 30,000

Scenario Cost: $15,730.68 **Scenario Cost/Unit:** $0.52

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	12	$6,100.44
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	1000	$4,400.00
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	1000	$2,370.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Weeping Wall	1765	Weeping wall or picket screen structure for solid settling basin. Materials only.	Foot	$52.98	24	$1,271.52
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	14	$545.58
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 632 - Waste Separation Facility

Scenario: #4 - Concrete Basin=<1000CF

Scenario Description:

A concrete structure, such as a basin with concrete walls and floor, used to capture and separate a portion of the solids from a liquid stream from a feedlot or confinement facility. Removes as portion of the solids to facilitate waste handling and to address water quality concerns.

Associated practices include Nutrient Management (590), Composting Facility (317), Anaerobic Digester (366), Waste Storage Facility (313), Waste Transfer (634), Pumping Plant (533), Vegetated Treatment Area (635), Pond Lining or Sealing (521A-D), and Waste Treatment (629).

Before Situation:

Applicable to situations where partitioning solids, liquids, and nutrients will facilitate the management of an animal waste management system, improve air quality (reduce odors), and address water quality concerns.

After Situation:

One concrete settling basin structure (13ft wide by 25ft long 2.3ft tall at bottom of 10:1 ramp with 2ft of flat area next to a weeping wall/picket structure or outlet control) constructed around or at a livestock feeding operation. Removes a portion of the solids that otherwise would leave with the runoff from an animal feeding operation. Part of an animal waste management system.

Scenario Feature Measure: Cubic Foot of Design Storage

Scenario Unit: Cubic Foot

Scenario Typical Size: 380

Scenario Cost: $4,215.23 **Scenario Cost/Unit:** $11.09

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	7.1	$1,142.39
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	0	$0.00
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	3	$1,525.11
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	39	$95.55
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	21	$49.77
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Weeping Wall	1765	Weeping wall or picket screen structure for solid settling basin. Materials only.	Foot	$52.98	2	$105.96
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	6.5	$253.31
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 632 - Waste Separation Facility

Scenario: #5 - Concrete Basin>1000 CF

Scenario Description:

A concrete structure, such as a basin with concrete walls and floor, used to capture and separate a portion of the solids from a liquid stream from a feedlot or confinement facility. Removes as portion of the solids to facilitate waste handling and to address water quality concerns.

Associated practices include Nutrient Management (590), Composting Facility (317), Anaerobic Digester (366), Waste Storage Facility (313), Waste Transfer (634), Pumping Plant (533), Vegetated Treatment Area (635), Pond Lining or Sealing (521A-D), and Waste Treatment (629).

Before Situation:

Applicable to situations where partitioning solids, liquids, and nutrients will facilitate the management of an animal waste management system, improve air quality (reduce odors), and address water quality concerns.

After Situation:

One concrete settling basin structure (20 ft wide by 30 ft long with 3 ft high walls and weeping wall/picket structure or outlet control) constructed around or at a livestock feeding operation. Removes a portion of the solids that otherwise would leave with the runoff from an animal feeding operation. Part of an animal waste management system.

Scenario Feature Measure: Cubic Foot of Design Storage

Scenario Unit: Cubic Foot

Scenario Typical Size: 1,800

Scenario Cost: $11,100.30 **Scenario Cost/Unit:** $6.17

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	12	$1,930.80
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	50	$220.00
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	12	$6,100.44
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	50	$122.50
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	50	$118.50
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	32	$1,247.04
Weeping Wall	1765	Weeping wall or picket screen structure for solid settling basin. Materials only.	Foot	$52.98	6	$317.88
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 632 - Waste Separation Facility

Scenario: #6 - Concrete Sand Settling Lane

Scenario Description:

A concrete structure, a concrete lane with curbs, used to capture and separate a portion of the solids, mainly sand, from a liquid stream from a confinement facility. Removes as portion of the solids to facilitate waste handling and to address water quality concerns.

Associated practices include Nutrient Management (590), Composting Facility (317), Anaerobic Digester (366), Waste Storage Facility (313), Waste Transfer (634), Pumping Plant (533), Vegetated Treatment Area (635), Pond Lining or Sealing (521A-D), and Waste Treatment (629).

Before Situation:

Applicable to situations where partitioning solids, liquids, and nutrients will facilitate the management of an animal waste management system, improve air quality (reduce odors), and address water quality concerns.

After Situation:

One concrete settling lane structure (25 ft wide by 200 ft long by 0.5 ft thick) constructed around or at a livestock feeding operation. Removes a portion of the solids (sand) that otherwise would leave with the runoff from an animal feeding operation. Part of an animal waste management system.

Scenario Feature Measure: Square Foot of Settling Lane Footprint

Scenario Unit: Square Foot

Scenario Typical Size: 5,000

Scenario Cost: $29,836.80 **Scenario Cost/Unit:** $5.97

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	20	$10,167.40
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	90	$396.00
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	180	$426.60
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	90	$14,481.00
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	90	$3,507.30
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 632 - Waste Separation Facility

Scenario: #7 - Separator, Sloped Screen

Scenario Description:

A sloped screen mechanical separation facility to partition solids, liquids, and/or associated nutrients from animal waste streams. The partitioning of the previously mentioned components facilitates the protection of air and water quality, protects animal health, and improves the management of an animal waste management system.

Associated practices include Nutrient Management (590), Composting Facility (317), Anaerobic Digester (366), Waste Storage Facility (313), Waste Transfer (634), Amendments for the Treatment of Agricultural Waste (591), Pumping Plant (533), Vegetated Treatment Area (635), Pond Lining or Sealing (521A-D), and Waste Treatment (629).

Before Situation:

Applicable to situations where partitioning solids, liquids, and nutrients will facilitate the management of an animal waste management system, improve air quality (reduce odors), and address water quality concerns.

After Situation:

One sloped screen type separation facility installed at livestock facility before storage or treatment or after treatment, for example, after an anaerobic digester. Part of an animal waste management system.

Scenario Feature Measure: Item

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $39,672.30 **Scenario Cost/Unit:** $39,672.30

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	16	$610.24
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	32	$738.56
Materials						
Safety Guard, pipe fence and tractor guard	1953	Pipe fence and tractor guard 4' tall with working loads expected from equipment and livestock. Materials and shipping only.	Foot	$273.00	25	$6,825.00
Static Inclined Screen, medium (300-700 GPM capacity)	2273	Static Inclined Screen includes materials and equipment. Includes shipping.	Gallons per Minute	$61.28	500	$30,640.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 634 - Waste Transfer

Scenario: #1 - Wastewater catch basin less than 1000 gal.

Scenario Description:

Installation for a wastewater collection system that includes materials and structures to collect liquids of a design volume less than 1000 gallons such as silage leachate, lot runoff and other contaminated liquid effluent. This may include curbs, screens, precast manholes, sumps or catch basins. The wastewater will typically be transferred from the collection basin to a waste storage facility through a gravity or low pressure flow conduit.

Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling.

This scenario addresses the potential for surface water and groundwater quality degradation from liquid wastewater running unchecked out of silage bunkers and off of animal feeding lots.

Before Situation:

Inadequate storage is available to collect wastewater from an operation that may contaminate surface or groundwater resources. The liquids contain few solids or limited solids that can be easily screened out without blocking the collection intake.

After Situation:

This practice scenario is suitable where the estimated design volume for wastewater transfer is less than 1000 gallons of contaminated liquid that may flow from silage bunkers or animal lot areas after a precipitation event. The practice scenario typically includes materials and installation of flat and formed concrete for curbs and/or gutters to collect liquids. With the installation of a precast manhole with lid or catch basin with grate. The cost includes excavation, placement of bedding as needed, placement of structure and backfill with construction of concrete inlet collection area. Transfer pump if needed must be contracted under pumping plant, PS 533.

Scenario Feature Measure: Collection volume installed

Scenario Unit: Gallon

Scenario Typical Size: 1,000

Scenario Cost: $7,519.66 **Scenario Cost/Unit:** $7.52

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.30	2	$36.60
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	8	$449.68
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$54.81	4	$219.24
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	4	$269.80
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	2	$1,016.74
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	4	$643.60
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	32	$714.56
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	16	$659.68

Labor

Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	8	$300.16

Materials

Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	5	$134.35
Catch Basin, concrete, 60" dia.	1754	Precast 60-in diameter catch basin, 6' deep, with collar and grate cover. Materials only.	Each	$2,216.75	1	$2,216.75

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 634 - Waste Transfer

Scenario: #2 - Wastewater reception pit or basin 1000 to 5000 gal.

Scenario Description:

Installation for a wastewater collection system that includes materials and structures to collect liquids of a design volume between 1000 and 5000 gallons such as silage leachate, lot runoff and other contaminated liquid effluent. This scenario includes a reinforced concrete manure reception pit for temporary storage and transfer of manure and wastewater for an animal operation. Reception Pit includes safety fence w/gate or solid/grated cover. The wastewater will typically be transferred from the collection basin to a waste storage facility through a gravity or low pressure flow conduit.

Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling.

This scenario addresses the potential for surface water and groundwater quality degradation from liquid wastewater running unchecked out of silage bunkers and off of animal feeding lots.

Before Situation:

Inadequate storage is available to collect wastewater from an operation that may contaminate surface or groundwater resources.

After Situation:

This practice scenario is suitable where the estimated design volume for waste collection and transfer is between 1000 and 5000 gallons of liquid waste. The practice scenario typically includes materials and installation of flat and formed concrete for curbs and gutters to collect liquid slurry waste and the installation of an 8'x12'x6' reinforced concrete reception pit formed in place that includes safety fence w/gate or solid/grated cover. The cost includes excavation, placement of subgrade as needed, forming, pouring and finishing of concrete structure and backfilling. Transfer pump if needed must be contracted under pumping plant, PS 533.

Scenario Feature Measure: Collection volume installed

Scenario Unit: Gallon

Scenario Typical Size: 4,300

Scenario Cost: $14,763.70 **Scenario Cost/Unit:** $3.43

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	8	$539.60
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	14	$7,117.18
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.30	3	$54.90
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$54.81	8	$438.48
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	6	$965.40
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	24	$1,349.04
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	24	$989.52
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	24	$535.92

Labor

General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	64	$1,477.12

Materials

Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	12	$322.44
Safety chain tractor barrier	1725	3/8 in. Transport chain barrier installed to prevent tractor equipment from entering wastewater collection basin or pit. Material cost only.	Foot	$2.89	40	$115.60

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 634 - Waste Transfer

Scenario: #3 - Wastewater reception pit larger than 5000 gal.

Scenario Description:

Installation for a wastewater collection system that includes materials and structures to collect liquids of a design volume greater than 5000 gallons such as lot runoff, manure slurry and other contaminated liquid effluent. The wastewater collected in this pit is intended to be transferred to final storage within a 48 hour period. This scenario includes a reinforced concrete manure reception pit for temporary storage and transfer of manure and wastewater for an animal operation. Reception Pit includes safety fence w/gate or solid/grated cover. The wastewater will typically be transferred from the collection basin to a waste storage facility through a gravity or low pressure flow conduit.

Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling.

This scenario addresses the potential for surface water and groundwater quality degradation from liquid wastewater running unchecked out of silage bunkers and off of animal feeding lots.

Before Situation:

Inadequate storage is available to collect wastewater from an operation that may contaminate surface or groundwater resources.

After Situation:

This practice scenario is suitable where the estimated maximum design volume for wastewater collected is greater than 5000 gallons of liquid waste within 48 hours or before it is stored or treated. The practice scenario typically includes materials and installation of flat and formed concrete for curbs and gutters inlet area to collect liquid slurry waste and the installation of an 12 ft wide x 16 ft long x 6 ft deep reinforced concrete reception pit formed in place that includes safety fence w/gate or solid/grated cover. The cost includes excavation, placement of subgrade as needed, forming, pouring and finishing of concrete structure and backfilling. Transfer pump if needed must be contracted under pumping plant, PS 533.

Scenario Feature Measure: Collection volume installed

Scenario Unit: Gallon

Scenario Typical Size: 8,600

Scenario Cost: $22,157.43 **Scenario Cost/Unit:** $2.58

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	32	$1,798.72
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$54.81	16	$876.96
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	12	$809.40
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	22	$11,184.14
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	11	$1,769.90
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.30	4	$73.20
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	40	$1,649.20

Labor

General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	80	$1,846.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	32	$714.56

Materials

Safety chain tractor barrier	1725	3/8 in. Transport chain barrier installed to prevent tractor equipment from entering wastewater collection basin or pit. Material cost only.	Foot	$2.89	60	$173.40
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	15	$403.05

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 634 - Waste Transfer

Scenario: #4 - Concrete Channel

Scenario Description:

Installation of a concrete channel that consists of a slab with curb and footing on each side of the slab for the entire length of the channel to enable the facility manager to direct liquid waste to an existing collection basin and/or waste storage facility.

Water quality concerns will be addressed by preventing liquid waste from entering surface waters, and to facilitate timely land application of manure and wastewater at agronomic rates according to the CNMP. This scenario addresses the potential for surface water and groundwater quality degradation.

Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling.

Before Situation:

Current facility operations are allowing liquid waste to flow uncontrolled during periods of precipitation events or cleaning operations such that water resources can be contaminated.

After Situation:

Typical installation of a 12 foot wide 100' long concrete channel that consists of a 6" thick concrete slab with curbing on each side of the slab that is 2' high, 6" thick with footing for the entire length. The purpose is to transfer liquids or manure slurry from one area to an existing collection basin or waste storage facility. Includes safety chain for equipment.

Alternative configurations can consist of the installation of a more narrow or wider channel that may or may not have curbs or a deeper shaped channel and may include a half pipe on the bottom.

Scenario Feature Measure: Bottom surface area of concrete channel

Scenario Unit: Square Foot

Scenario Typical Size: 1,200

Scenario Cost: $12,750.39 **Scenario Cost/Unit:** $10.63

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.30	4	$73.20
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	8	$539.60
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	23	$3,700.70
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	11	$5,592.07
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	8	$300.16
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	40	$923.20
Materials						

Materials

Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	26	$698.62
Safety gate, span manure transfer channel or chute	1952	Safety gate to span manure transfer channel at push off wall or chute outlet. Minimum of 4' tall with openings that will not pass a 6" or larger sphere. Includes materials only.	Foot	$15.29	16	$244.64

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 634 - Waste Transfer

Scenario: #5 - Small Manure Flush System, less than 1000 gallon per flush to a waste storage pond through a collection basin and 8 inch diameter conduit.

Scenario Description:

Installation of a manure and wastewater collection system that includes materials and structures to flush waste from a concrete surface into a collection basin and transferred to a waste storage pond. This small flush system must have an adequate source for the flush water and will use an 8" diameter pipe. The system may include flush water tank, piping and valves, concrete flush lane, concrete curbs or gutter, precast manholes, sumps or catch basins. The animal waste will be transferred by a flush cyle released from the flush tank to rinse the concrete surface and carry the waste to a collection basin, into a pipe and to a waste storage pond.

Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling.

This scenario addresses the potential for surface water and groundwater quality degradation from animal waste.

Before Situation:

A small animal production facility does not have an efficient method for collecting and transferring the animal waste produced. A source of sufficient water or wastewater resources are available to design a flush system to clean the production floor and collect the waste materials deposited.

After Situation:

This practice scenario is suitable only where the water or wastewater supplies are available for operating a flush system to collect the animal waste deposited on the concrete surfaces. The design flush volume for a small wastewater flush system is less than 1000 gallons and requires no more than 50 feet of an 8 inch diameter pressure pipe for the flush pipe. The scenario includes materials and installation of a flush tank, piping and valves to manage the flush flow, concrete flush lane, concrete curbs or gutters to transfer the flow to a collection basin. The liquids then flow from the basin to the waste storage pond, an estimated length of 200 feet and requires an 8 inch diameter low pressure pipeline with an open outlet to the waste storage pond. The cost includes excavation, placement of bedding aggregate as needed, forming and placement of structures, conveyance pipeline with valves and structural backfill. Pump must be contracted under pumping plant, PS 533.

Scenario Feature Measure: 1000 Gallons of flush water

Scenario Unit: Gallon

Scenario Typical Size: 1,000

Scenario Cost: $13,982.08 **Scenario Cost/Unit:** $13.98

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	4	$269.80
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$54.81	4	$219.24
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	20	$1,124.20
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.30	4	$73.20
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	3	$1,525.11
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	7	$1,126.30

Labor

Labor

Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	20	$446.60
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	60	$1,384.80
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	30	$1,236.90
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	4	$150.08

Materials

Pipe, PVC, 8", SDR 21	988	Materials: - 8" - PVC - SDR 21 200 psi - ASTM D2241	Foot	$10.81	55	$594.55
Pipe, PVC, 8", SDR 35	994	Materials: - 8" - PVC - SDR 35 - ASTM D3034	Foot	$6.65	220	$1,463.00
Catch Basin, concrete, 60" dia.	1754	Precast 60-in diameter catch basin, 6' deep, with collar and grate cover. Materials only.	Each	$2,216.75	1	$2,216.75
Tank, Poly enclosed Storage, 300-1000 gal	1074	Water storage tanks. Includes materials and shipping only.	Gallon	$0.89	1000	$890.00
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	15	$403.05

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 634 - Waste Transfer

Scenario: #6 - Catch Basin with 30 inch diameter double wall gravity pipe

Scenario Description:

Gravity flow conduit is typically a large diameter water tight HDPE sanitary sewer pipe used to transfer manure by gravity from one location to another. The gravity transfer system typically consists of a catch basin with an adaptor to a smooth interior large diameter HDPE pipe. Adequate head on the pipe flow or change in elevation must be available for the gravity system to function and should be evaluated by the design engineer. This practice includes the inlet structure, transfer pipe plus an and all other fittings, trench excavation and backfill, labor and equipment for installation.

This conduit is part of a manure transfer system for a planned waste management or comprehensive nutrient management plan. This scenario addresses the transport of liquid waste to a waste storage or treatment facility to prevent a water quality resource concern of excessive nutrients/organics and harmful levels of pathogens in surface water and/or excessive nutrients/organics in ground water.

Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling.

Before Situation:

An area of waste production is separated from the waste storage facility and current operations may cause water quality concerns as it is not efficient in transporting the waste to the storage. The site has a change in elevation between production area and treatment or storage structure that is adequate to provide sufficient head for a gravity flow conduit to transport the slurry waste liquid stream.

After Situation:

Install an 80 foot long gravity transfer system of a precast catch vasin with an adaptor to a water tight smooth interior 30"diameter HDPE sanitary sewer grade pipe that will flow to an outlet at the site of manure treatment or storage. This scenario includes the catch vasin, pipe, inlet, outlet, couplers and all other fittings, trench excavation, pipe bedding and backfill. The site should be evaluated by the designing engineer to make sure there is adequate elevation drop before contracting.

The transfer conduit will provide collection and containment of the manure slurry, thereby protecting water quality resources.

Scenario Feature Measure: Length of pipe installed

Scenario Unit: Feet

Scenario Typical Size: 80

Scenario Cost: $9,617.75 **Scenario Cost/Unit:** $120.22

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	61	$144.57
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	7	$1,126.30
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$56.21	16	$899.36
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	33	$190.74
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.30	4	$73.20
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	15	$54.15
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	36	$830.88

Labor

Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	16	$600.32
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	16	$659.68

Materials

Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	7	$188.09
Pipe, HDPE, CPT, Double Wall, Soil Tight, 30"	1247	Pipe, Corrugated HDPE Double Wall, 30" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$26.87	88	$2,364.56
Catch Basin, concrete, 60" dia.	1754	Precast 60-in diameter catch basin, 6' deep, with collar and grate cover. Materials only.	Each	$2,216.75	1	$2,216.75
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	7	$269.15

Practice: 634 - Waste Transfer

Scenario: #7 - 30 inch diameter Double Wall Gravity Pipe

Scenario Description:

Gravity flow conduit is typically a large diameter water tight HDPE sanitary sewer pipe used to transfer manure by gravity from one location to another. The gravity transfer system typically consists of an existing inlet structure or hopper with attachment to a smooth interior large diameter pipe. The pipe conveys the slurry waste liquid between the waste collection point and a manure storage or waste treatment structure. Adequate head on the pipe flow or change in elevation must be available for the gravity system to function and should be evaluated by the design engineer. This practice includes the pipe attachment to an existing inlet structure and all other fittings, trench excavation and backfill, labor and a equipment for installation.

This conduit is part of a manure transfer system for a planned waste management or comprehensive nutrient management plan. This scenario addresses the transport of liquid waste to a waste storage or treatment facility to prevent a water quality resource concern of excessive nutrients/organics and harmful levels of pathogens in surface water and/or excessive nutrients/organics in ground water.

Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling.

Before Situation:

An area of waste production is separated from the waste storage facility and current operations may cause water quality concerns as it is not efficient in transporting the waste to the storage. The site has a change in elevation between production area and treatment or storage structure that is adequate to provide sufficient head for a gravity flow conduit to transport the slurry waste liquid stream.

After Situation:

Install a 150 foot long 30" diameter water tight HDPE pipe to transfer manure by gravity from one location to another. A gravity transfer system typically consists of a sealed inlet at an existing waste collection structure to a smooth interior 30" sewer grade pipe that will gravity flow to an outlet at a site of manure treatment or storage. This scenario includes the pipe, inlet, outlet, couplers and all other fittings, trench excavation, pipe bedding and backfill. The site should be evaluated by the designing engineer to make sure there is adequate elevation drop before contracting. If required an inlet structure may be contracted under another scenario.

The transfer conduit will provide collection and containment of the manure slurry, thereby protecting water quality resources.

Scenario Feature Measure: Length of pipe installed

Scenario Unit: Feet

Scenario Typical Size: 150

Scenario Cost: $12,390.90 **Scenario Cost/Unit:** $82.61

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	30	$1,686.30
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	45	$162.45
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.78	57	$329.46
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	125	$296.25
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	14	$2,252.60
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.30	7	$128.10

Labor

Labor

Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	30	$669.90
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	20	$824.60
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	48	$1,107.84

Materials

Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	13	$499.85
Pipe, HDPE, CPT, Double Wall, Soil Tight, 30"	1247	Pipe, Corrugated HDPE Double Wall, 30" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$26.87	165	$4,433.55

Practice: 634 - Waste Transfer

Scenario: #8 - Agitator-small

Scenario Description:

This scenario is for a manure and wastewater agitator associated with an agricultural production operation to transfer agricultural waste product from the production source to a storage facility for proper utilization. This agitator is typically no more than 15 HP and is used for smaller waste storage facilities that are less than 10 feet deep. This scenario does not include a pump.

Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling

The waste transfer equipment is installed to address water quality concerns by facilitating timely land application of waste at agronomic rates according to the nutrient management plan. This scenario addresses the potential for surface water and groundwater quality degradation.

Before Situation:

In this typical setting, the operator has a small waste storage structure from a confined animal feeding operation without an effective waste handling and transfer system to manage the waste stream departing from the facility.

After Situation:

The typical installation would be for a small manure 10 HP agitator to put settled manure solids into suspension for removal from an animal waste storage structure and transfer to the next step of waste treatment, utilization or storage. Part of an animal waste management system to address water quality concerns. If required a wastewater reception pit, concrete channel or transfer conduit scenario may need to be contracted to support the operation of this waste transfer system equipment.

Scenario Feature Measure: Agitator for wastewater, installed

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $11,770.80 **Scenario Cost/Unit:** $11,770.80

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	11	$419.54
Materials						
Manure agitator, mixing depth less than 10 feet.	1768	Agitator to move put settled manure solids into suspension for removal from an animal waste storage structure. Materials only.	Each	$11,209.52	1	$11,209.52
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	2	$141.74

Practice: 634 - Waste Transfer

Scenario: #9 - Agitator-medium

Scenario Description:

This scenario is for a manure and wastewater agitator associated with an agricultural production operation to transfer agricultural waste product from the storage facility to a site for proper utilization. This agitator is typically 30 HP and is used where the waste storage facility tank or pond is between 10 and 15 feet deep. The sceanrio included the stand, a wall to mount the stand on, the seperator and installation of the seperator. This scenario does not include a pump.

Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling

The waste transfer equipment is installed to address water quality concerns by facilitating timely land application of waste at agronomic rates according to the nutrient management plan. This scenario addresses the potential for surface water and groundwater quality degradation.

Before Situation:

In this typical setting, the operator has waste production from a confined animal feeding operation without an effective waste handling and transfer system to manage the waste stream departing from the facility.

After Situation:

A typical installation would be for a medium 30 HP manure agitator to put settled manure solids into suspension for removal from an animal waste storage structure and transfer to the next step of waste treatment, utilization or storage. Part of an animal waste management system to address water quality concerns. If required a wastewater reception pit, concrete channel or transfer conduit scenario may need to be contracted to support the operation of this waste transfer system equipment.

Scenario Feature Measure: Agitator for wastewater, installed

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $18,126.71 **Scenario Cost/Unit:** $18,126.71

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	12	$457.68
Materials						
Manure agitator, mixing depth 10 to 15 feet deep	1766	Agitator to move put settled manure solids into suspension for removal from an animal waste storage structure. Materials only.	Each	$17,323.81	1	$17,323.81
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 634 - Waste Transfer

Scenario: #10 - Agitator-large

Scenario Description:

This scenario is for a large manure and wastewater agitator associated with an agricultural production operation to transfer agricultural waste product from the storage facility to a site for proper utilization. This agitator is typically 100 HP and is used where the waste storage facility tank or pond is greater than15 feet deep. The sceanrio included the stand, a wall to mount the stand on, the seperator and installation of the seperator. This scenario does not include a pump.
Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling

The waste transfer equipment is installed to address water quality concerns by facilitating timely land application of waste at agronomic rates according to the nutrient management plan. This scenario addresses the potential for surface water and groundwater quality degradation.

Before Situation:

In this typical setting, the operator has waste production from a confined animal feeding operation without an effective waste handling and transfer system to manage the waste stream departing from the facility.

After Situation:

A typical installation would be for a large 100 HP manure agitator to put settled manure solids into suspension for removal from an animal waste storage structure and facilitate the transfer of this material to the next step of waste treatment or utilization. This agitator is for a tank deeper than 15 feet and is part of an animal waste management system to address water quality concerns. This covers the cost of the agitator equipment materials and labor for the electrical hook-up.

Scenario Feature Measure: Agitator for wastewater, installed

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $26,447.15 **Scenario Cost/Unit:** $26,447.15

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	12	$457.68
Materials						
Manure agitator, mixing depth greater than 15 feet deep.	1767	Agitator to move put settled manure solids into suspension for removal from an animal waste storage structure. Materials only.	Each	$25,476.19	1	$25,476.19
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 634 - Waste Transfer

Scenario: #11 - Waste hauling

Scenario Description:

This scenario describes hauling of animal manure to agricultural land for final utilization. This scenario can only be used for distances up to 150 miles. It is intended to be used in high risk water quality drainage areas or when soil test phosphorus exceeds the allowable limit on fields that have typically been used for manure application. This waste transfer payment is intended to offset additional costs associated with hauling the manure out of the high risk drainage area or transported a longer distance to fields with low soil test phosphorus. Limits of soil test phosphorus for contracting purposes need to meet acceptable state criteria.

Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling and Concrete channel and Transfer conduit scenario 634 - Waste Transfer.

This practice scenario addresses the water quality concerns for excessive nutrients or degradation of water resources from over application of manure on local fields.

Before Situation:

The local drainage area is at high risk for phosphorus leaving the fields in the runoff solution and further manure waste application will likely cause water quality degradation.

After Situation:

Trucks are loaded with 80 tons of manure solids and hauled 60 miles outside of the high risk drainage area to a location where phosphorus levels are in the low risk category according to the PhorphorusRisk index for leaving the fields.
Waste is transferred out of the critical drainage area for use as fertilizer on crops and pasture land.

Scenario Feature Measure: Ton of waste and miles hauled

Scenario Unit: Ton-Mile

Scenario Typical Size: 4,800

Scenario Cost: $1,113.99 **Scenario Cost/Unit:** $0.23

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Manure Hauling, solid manure, transportation	2031	Transportation cost of hauling solid manure. Trucking costs based on tons hauled times miles. Includes equipment, power unit and labor. Does not include costs for loading or unloading.	Ton-Mile	$0.13	4800	$624.00
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 634 - Waste Transfer

Scenario: #12 - PVC Pipe, less than or equal to 8 inch dia

Scenario Description:

Installation of an outlet line with a diameter of 6" or less to convey waste water. Placement of the pipe will be through an area that requires no additional work due to obstructions such as concrete slabs, utilities, or buildings, etc. Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling.

Before Situation:

An area of waste production is separated from the waste storage facility and current operations may cause water quality concerns as it is not efficient in transporting the waste to the storage. The site has a change in elevation between production area and treatment or storage structure that is adequate to provide sufficient head for a gravity flow conduit to transport the slurry waste liquid stream.

After Situation:

The transfer conduit will provide collection and containment of the manure slurry, thereby protecting water quality resources. The typical sceanrio is for the installation of 100' of 6" PVC pipeline.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Foot

Scenario Typical Size: 100

Scenario Cost: $851.11 **Scenario Cost/Unit:** $8.51

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.39	100	$139.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	1	$41.23
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	3	$69.24
Materials						
Pipe, PVC, 6", SDR 41	984	Materials: - 6" - PVC - SDR 41 100 psi - ASTM D2241	Foot	$3.45	100	$345.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 634 - Waste Transfer

Scenario: #13 - PVC Pipe, less than or equal to 8 in dia, adverse installation conditions

Scenario Description:

Installation of an outlet line with a diameter of 6" or less to convey waste water. Placement of the pipe will be through an area that requires additional work, such as under existing concrete slabs, under or through existing utilities, through barns, etc.
Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling.

Before Situation:

An area of waste production is separated from the waste storage facility and current operations may cause water quality concerns as it is not efficient in transporting the waste to the storage. The site has a change in elevation between production area and treatment or storage structure that is adequate to provide sufficient head for a gravity flow conduit to transport the slurry waste liquid stream.

After Situation:

The transfer conduit will provide collection and containment of the manure slurry, thereby protecting water quality resources. The typical sceanrio is for the installation of 100' of 6" PVC pipeline.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Foot

Scenario Typical Size: 100

Scenario Cost: $1,209.51 **Scenario Cost/Unit:** $12.10

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.30	2	$36.60
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.39	100	$139.00
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	2	$321.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	3	$69.24
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	1	$41.23
Materials						
Pipe, PVC, 6", SDR 41	984	Materials: - 6" - PVC - SDR 41 100 psi - ASTM D2241	Foot	$3.45	100	$345.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 634 - Waste Transfer

Scenario: #14 - PVC Pipe, greater than 8 inch dia.

Scenario Description:

Installation of a transfer line with a diameter of greater than 8-inches to convey waste water. Placement of the pipe will be through an area that requires no additional work due to obstructions such as concrete slabs, utilities, or buildings, etc.
Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling.

Before Situation:

An area of waste production is separated from the waste storage facility and current operations may cause water quality concerns as it is not efficient in transporting the waste to the storage. The site has a change in elevation between production area and treatment or storage structure that is adequate to provide sufficient head for a gravity flow conduit to transport the slurry waste liquid stream.

After Situation:

The transfer conduit will provide collection and transportation of the manure slurry, thereby protecting water quality resources. The typical sceanrio is for the installation of 100' of 12" PVC pipeline, and includes all necessary filltings and air vents.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Foot

Scenario Typical Size: 100

Scenario Cost: $2,009.77 **Scenario Cost/Unit:** $20.10

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.15	100	$315.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	3	$69.24
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	1	$41.23
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	2	$44.66
Materials						
Pipe, PVC, 12", ASTM-2241, SDR 41	1939	Materials: - 12" - PVC - ASTM 2241, SDR 41	Foot	$12.83	100	$1,283.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 634 - Waste Transfer

Scenario: #15 - PVC Pipe, greater than 8 inch dia, adverse installation conditions

Scenario Description:

Installation of a transfer line with a diameter of greater than 8-inches to convey waste water. Placement of the pipe will be through an area that requires additional work, such as under existing concrete slabs, under or through existing utilities, through barns, etc. Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling.

Before Situation:

An area of waste production is separated from the waste storage facility and current operations may cause water quality concerns as it is not efficient in transporting the waste to the storage. The site has a change in elevation between production area and treatment or storage structure that is adequate to provide sufficient head for a gravity flow conduit to transport the slurry waste liquid stream.

After Situation:

The transfer conduit will provide collection and transportation of the manure slurry, thereby protecting water quality resources. The typical sceanrio is for the installation of 100' of 12" PVC pipeline, and includes all necessary filltings and air vents.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Foot

Scenario Typical Size: 100

Scenario Cost: $2,681.91 **Scenario Cost/Unit:** $26.82

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.30	4	$73.20
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.15	100	$315.00
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	4	$643.60
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	1	$41.23
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	3	$69.24
Materials						
Pipe, PVC, 12", ASTM-2241, SDR 41	1939	Materials: - 12" - PVC - ASTM 2241, SDR 41	Foot	$12.83	100	$1,283.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 634 - Waste Transfer

Scenario: #16 - HDPE Pipe, less than or equal to 6 inch dia.

Scenario Description:

Installation of an HDPE outlet line with a diameter of 6" or less to convey waste water.
Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling.

Before Situation:

An area of waste production is separated from the waste storage facility and current operations may cause water quality concerns as it is not efficient in transporting the waste to the storage. The site has a change in elevation between production area and treatment or storage structure that is adequate to provide sufficient head for a gravity flow conduit to transport the slurry waste liquid stream.

After Situation:

The transfer conduit will provide collection and containment of the manure slurry, thereby protecting water quality resources. The typical sceanrio is for the installation of 100' of 6" SDR 17 (100 psi) HDPE pipeline. Pipe weight is 3.251 lbs/ft for a total weight of 325.1 lbs. Fittings, valves and appurtances are inculded and are estimated at 10% of the pipe weight for a total weight of 358 lbs.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Foot

Scenario Typical Size: 100

Scenario Cost: $2,184.51 **Scenario Cost/Unit:** $21.85

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.15	100	$315.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	20	$461.60
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	5	$206.15
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.64	358	$945.12
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 634 - Waste Transfer

Scenario: #17 - HDPE Pipe, less than or equal to 6 inch dia, adverse installation conditions

Scenario Description:

Installation of an HDPE outlet line with a diameter of 6" or less to convey waste water in adverse conditions such as under concrete. Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling.

Before Situation:

An area of waste production is separated from the waste storage facility and current operations may cause water quality concerns as it is not efficient in transporting the waste to the storage. The site has a change in elevation between production area and treatment or storage structure that is adequate to provide sufficient head for a gravity flow conduit to transport the slurry waste liquid stream.

After Situation:

The transfer conduit will provide collection and containment of the manure slurry, thereby protecting water quality resources. The typical sceanrio is for the installation of 100' of 6" SDR 17 (100 psi) HDPE pipeline under concrete. Pipe weight is 3.251 lbs/ft for a total weight of 325.1 lbs. Fittings, valves and appurtances are inculded and are estimated at 10% of the pipe weight for a total weight of 358 lbs.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Foot

Scenario Typical Size: 100

Scenario Cost: $3,259.71 **Scenario Cost/Unit:** $32.60

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.30	6	$109.80
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.15	100	$315.00
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	6	$965.40
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	20	$461.60
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	5	$206.15
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.64	358	$945.12
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 634 - Waste Transfer

Scenario: #18 - HDPE Pipe, greater than 6 inch dia.

Scenario Description:

Installation of an HDPE outlet line with a diameter of greater than 6" to convey waste water.
Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling.

Before Situation:

An area of waste production is separated from the waste storage facility and current operations may cause water quality concerns as it is not efficient in transporting the waste to the storage. The site has a change in elevation between production area and treatment or storage structure that is adequate to provide sufficient head for a gravity flow conduit to transport the slurry waste liquid stream.

After Situation:

The transfer conduit will provide collection and containment of the manure slurry, thereby protecting water quality resources. The typical sceanrio is for the installation of 100' of 12" SDR 17 (100 psi) HDPE pipeline. Pipe weight is 12.03 lbs/ft for a total weight of 1203 lbs. Fittings, valves and appurtances are inculded and are estimated at 10% of the pipe weight for a total weight of 1323 lbs.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Foot

Scenario Typical Size: 100

Scenario Cost: $4,732.11 **Scenario Cost/Unit:** $47.32

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.15	100	$315.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	20	$461.60
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	5	$206.15
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.64	1323	$3,492.72
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 634 - Waste Transfer

Scenario: #19 - HDPE Pipe, greater than 6 inch dia., adverse installation conditions

Scenario Description:

Installation of an HDPE outlet line with a diameter greater than to convey waste water in sites with adverse installation conditions such as installation under concrete.
Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling.

Before Situation:

An area of waste production is separated from the waste storage facility and current operations may cause water quality concerns as it is not efficient in transporting the waste to the storage. The site has a change in elevation between production area and treatment or storage structure that is adequate to provide sufficient head for a gravity flow conduit to transport the slurry waste liquid stream.

After Situation:

The transfer conduit will provide collection and containment of the manure slurry, thereby protecting water quality resources. The typical sceanrio is for the installation of 100' of 12" SDR 17 (100 psi) HDPE pipeline under concrete. Pipe weight is 12.03 lbs/ft for a total weight of 1203 lbs. Fittings, valves and appurtances are inculded and are estimated at 10% of the pipe weight for a total weight of 1323 lbs.

Scenario Feature Measure: Length of Conduit

Scenario Unit: Foot

Scenario Typical Size: 100

Scenario Cost: $5,807.31 **Scenario Cost/Unit:** $58.07

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	6	$965.40
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.15	100	$315.00
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.30	6	$109.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	20	$461.60
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	5	$206.15
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.64	1323	$3,492.72
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 634 - Waste Transfer

Scenario: #20 - Conveyor belt

Scenario Description:

Installation of a manure transfer conveyor belt for transfer of solid manure. Scenario unit is in feet, however the systems come in some typical lengths. The length used for contracting should be based on available lengths from local manufacturers. Typical systems come in 10'-100' sections, but site specific lengths may be available.

Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling.

Before Situation:

An area of waste production is separated from the waste storage facility and current operations may cause water quality concerns as it is not efficient in transporting the waste to the storage.

After Situation:

The transfer belt will provide for transfer of solid manure to a safe storage area, runoff is addressed. The typical sceanrio is for the installation of a 300' long conveyor system

Scenario Feature Measure: Length of conveyor

Scenario Unit: Foot

Scenario Typical Size: 300

Scenario Cost: $19,511.07 **Scenario Cost/Unit:** $65.04

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	10	$381.40
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Manure Transfer, 300' Conveyor belt system	1772	Conveyor belt system consisting of 3 conveyors. 100 ft collection conveyor to a 10 ft x 10 ft lean-to with a concrete floor and metal walls on the outside of the animal housing building to a 100 ft long vertical lift conveyor that drops to a 100 ft long p	Each	$18,862.57	1	$18,862.57

Practice: 634 - Waste Transfer

Scenario: #25 - Manure Auger

Scenario Description:

Installation of a auger conveyor belt for transfer of solid manure. Scenario unit is in feet, however the systems come in some typical lengths. The length used for contracting should be based on available lengths from local manufacturers. Typical lengths are often 12' sections.

Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling.

Before Situation:

An area of waste production is separated from the waste storage facility and current operations may cause water quality concerns as it is not efficient in transporting the waste to the storage.

After Situation:

Auger will transfer dry manure to a storage site. Typical scenairo is for a 12' long auger

Scenario Feature Measure: Length of auger

Scenario Unit: Foot

Scenario Typical Size: 12

Scenario Cost: $5,609.25 **Scenario Cost/Unit:** $467.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	10	$381.40
Materials						
Manure Transfer, Auger or screw conveyor to transfer waste solids	1773	Auger or screw conveyor to transfer waste solids to a storage facility or manure spreading equipment. Includes shipping.	Each	$4,960.75	1	$4,960.75

Practice: 635 - Vegetated Treatment Area

Scenario: #1 - Surface application, Gravity flow

Scenario Description:

This is a permanent herbaceous vegetative area or channel installed down slope from a livestock production area. Wastewater (runoff or milking parlor wastewater) is properly collected and released with a controlled gravity outflow into the VTA. The VTA vegetation is harvested to removed nutrients on a regular basis. This practice addresses water quality degradation due to uncontrolled nutrient rich wastewater that can flow into surface waters or leach into ground water. Associated practices: Waste Storage Facility (313), Fence (382), Solid/Liquid Waste Separation Facility (632), Waste Transfer (634), Roof Runoff Structure (558), Pumping Plant (533), Subsurface Drain (606), Critical Area Planting (342), Terrace (600), Nutrient Management (590), Diversion (362), Livestock Pipeline (516), Land Smoothing (466), Precision Land Forming (462), Waste Treatment (629)

Before Situation:

Nutrient rich wastewater is running off from an animal operation that has the potential to pollute surface waters or ponding and leaching into groundwater.

After Situation:

Typical VTA is 1.0 ac in size, includes a gravel trench for distribution flow (sheet flow) into the VTA. Typically requires grading and shaping, gravel spreader trenches and perforated pipe to maintain sheet flow throughout the VTA. A settling basin for wastewater collection is contracted using Solid/Liquid Waste Separation Facility (632). For milkhouse waste, Waste Treatment (629) could be contracted to provide pre-treatment prior to being released into the VTA. The VTA practice will provide a controlled release of nutrient rich wastewater into a designed vegetative area for nutrient uptake. This system will improve water quality by treating nutrient rich wastewater and prevent contamination of surface and ground water resources.

Scenario Feature Measure: Amount of VTA installed

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $8,836.57 **Scenario Cost/Unit:** $8,836.57

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	400	$980.00
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	16	$1,079.20
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	70	$165.90
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	20	$461.60
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	16	$600.32
Materials						
Coupling, PVC, endcap, 2", SCH 20	1727	2" - PVC- SCH 40- ASTM D1785 pipe endcaps. Materials only.	Each	$1.81	15	$27.15
Pipe, PE, 6", DR 9, perforated	1728	Materials: -6" - Perforated PE- 160 psi - ASTM D3035 DR 9	Foot	$26.87	80	$2,149.60
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	70	$2,727.90
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.35	45	$60.75
Mobilization						

Mobilization

Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	1	$70.87
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 635 - Vegetated Treatment Area

Scenario: #2 - Wastewater is Pumped up to the VTA

Scenario Description:

This is a permanent herbaceous vegetative area or channel located upslope from the livestock production area. The topography of the site requires wastewater to be pumped uphill to the VTA designed system. Wastewater (runoff or milking parlor wastewater) is properly collected at the production area and pumped uphill to a shallow tank or basin where it has a controlled gravity outflow into the VTA. The VTA vegetation is harvested to removed nutrients on a regular basis. This practice addresses water quality degradation due to uncontrolled nutrient rich wastewater that can flow into surface waters or leach into ground
water.

Associated practices: Waste Storage Facility (313), Fence (382), Solid/Liquid Waste Separation Facility (632), Waste Transfer (634), Irrigation System, Sprinkler (442), Roof Runoff Structure (558), Pumping Plant (533), Subsurface Drain (606), Critical Area Planting (342), Terrace (600), Nutrient Management (590), Diversion (362), Livestock Pipeline (516), Land Smoothing (466), Precision Land Forming (462), Waste Treatment (629).

Before Situation:

Nutrient rich wastewater is running off from an animal operation that has the potential to pollute surface waters or ponding and leaching into groundwater.

After Situation:

Typical VTA is 1.0 ac in size, includes the installation site to be upslope from the production area with a shallow tank or basin that provides a controlled gravity outflow into the VTA. Typically requires grading and shaping, gravel spreader trenches and perferated pipe to maintain sheet flow throughout the VTA. A settling basin for wastewater collection is contracted using Solid/Liquid Waste Separation Facility (632) and Pumping Plant (533) to get the wastewater upslope to the VTA distrubution point. For milkhouse waste, Waste Treatment (629) could be contracted to provide pretreatment prior to being released into the VTA. The VTA practice will provide a controlled release of nutrient rich wastewater into a designed vegetative area for nutrient uptake. This system will improve water quality by treating nutrient rich wastewater and prevent contamination of surface and ground water resources.

Scenario Feature Measure: Amount of VTA installed

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $15,048.94 **Scenario Cost/Unit:** $15,048.94

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	2	$321.80
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	12	$6,100.44
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	100	$237.00
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	400	$980.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	40	$923.20
Materials						
Ball Valve, 4"	1726	4" ball valve, metal body. Materials only.	Each	$317.69	2	$635.38
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.35	45	$60.75
Coupling, PVC, endcap, 2", SCH 20	1727	2" - PVC- SCH 40- ASTM D1785 pipe endcaps. Materials only.	Each	$1.81	15	$27.15
Pipe, PE, 6", DR 9, perforated	1728	Materials: -6" - Perforated PE- 160 psi - ASTM D3035 DR 9	Foot	$26.87	80	$2,149.60

Materials

Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	70	$2,727.90
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	6	$230.70

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	2	$141.74

Practice: 635 - Vegetated Treatment Area

Scenario: #3 - Mechanical distribution

Scenario Description:

This is a permanent herbaceous vegetative area located adjacent to a livestock production area. Wastewater (runoff or milking parlor wastewater) is properly collected at the production area and pumped to mechanically distribute wastewater onto the VTA. The VTA vegetation is harvested to removed nutrients on a regular basis. This practice addresses water quality degradation due to uncontrolled nutrient rich wastewater that can flow into surface waters or leach into ground water. Associated practices: Waste Storage Facility (313), Fence (382), Solid/Liquid Waste Separation Facility (632), Waste Transfer (634), Irrigation System, Sprinkler (442), Roof Runoff Structure (558), Pumping Plant (533), Subsurface Drain (606), Critical Area Planting (342), Terrace (600), Nutrient Management (590), Diversion (362), Livestock Pipeline (516), Land Smoothing (466), Precision Land Forming (462), Waste Treatment (629)

Before Situation:

Nutrient rich wastewater is running off from an animal operation that has the potential to pollute surface waters or ponding and leaching into groundwater.

After Situation:

Typical VTA is 1.0 ac in size, includes the sizing, grading and shaping of the VTA area. Typically requires grading and shaping to maintain sheet flow onto the VTA. A settling basin for wastewater collection is contracted using Solid/Liquid Waste Separation Facility (632) and Pumping Plant (533) to get the wastewater to the VTA mechanical distribution component that is contracted using Irrigation System, Sprinkler (442). For milkhouse waste, Waste Treatment (629) could be contracted to provide pretreatment prior to being pumped and distributed onto the VTA. The VTA practice will provide a controlled release of nutrient rich wastewater into a designed vegetative area for nutrient uptake. This system will improve water quality by treating nutrient rich wastewater and prevent contamination of surface and ground water resources.

Scenario Feature Measure: Amount of VTA installed

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $2,305.44 **Scenario Cost/Unit:** $2,305.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	16	$1,079.20
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	16	$600.32
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	16	$369.28
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 635 - Vegetated Treatment Area Scenario:

#4 - VTA using an Existing Vegetative Area Scenario

Description:

An existing permanent herbaceous vegetated area that meets the requirements for a VTA and is used as an overland flow area for nutrient rich runoff treatment. A flow distribution component is installed to achieve sheet flow at the start of the VTA. Clean runoff is diverted where possible. The VTA vegetation is harvested to removed nutrients on a regular basis. This practice addresses water quality degradation due to uncontrolled nutrient rich runoff that can flow into surface waters or leach into ground water. Associated practices: Waste Storage Facility (313), Fence (382), Solid/Liquid Waste Separation Facility (632), Waste Transfer (634), Irrigation System, Sprinkler (442), Roof Runoff Structure (558), Pumping Plant (533), Subsurface Drain (606), Critical Area Planting (342), Terrace (600), Nutrient Management (590), Diversion (362), Livestock Pipeline (516), Land Smoothing (466), Precision Land Forming (462), Waste Treatment Area (629)

Before Situation:

Nutrient rich wastewater is running off from an animal operation that has the potential to pollute surface waters or ponding and leaching into groundwater.

After Situation:

Typical VTA is 1.0 ac in size, includes a gravel trenchs and perforated pipe to establish sheet flow into the VTA where and existing permanent herbaceouse vegetated area meets the requirements for a VTA. Does not include any grading or seeding. The VTA practice will provide a controlled release of nutrient rich runoff into an existing vegetative area for nutrient uptake. This system will improve water quality by treating nutrient rich runoff and prevent contamination of surface and ground water resources.

Scenario Feature Measure: Amount of VTA treating wastewater

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $11,294.20 **Scenario Cost/Unit:** $11,294.20

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	75	$177.75
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	7	$3,558.59
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	445	$1,090.25
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	16	$369.28
Materials						
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.35	40	$54.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	75	$2,922.75
Coupling, PVC, endcap, 2", SCH 20	1727	2" - PVC- SCH 40- ASTM D1785 pipe endcaps. Materials only.	Each	$1.81	20	$36.20
Pipe, PE, 6", DR 9, perforated	1728	Materials: -6" - Perforated PE- 160 psi - ASTM D3035 DR 9	Foot	$26.87	100	$2,687.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Mobilization

Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	2	$141.74

Practice: 636 - Water Harvesting Catchment

Scenario: #1 - Elevated Catchment

Scenario Description:

Build a wooden frame, "post-and-pier" structure, with a corrugated metal roof (dimensions are 24 feet wide by 20 feet long), to collect rain water. The structure is supported by 9-each, "poured-in-place", concrete footings (dimensions are 2'x2' square x1' thick), 8 feet on-center, with tie-down straps. Divert collected water from catchment area with guttering and downspout through a 4" diameter PVC Schedule 40 pipe, to a tank (not included) for a reliable storage and subsequent use.
Resource concerns: Livestock production limitation - Inadequate livestock water; Insufficient water - Inefficient use of irrigation water.
Associated practices: 382 - Fence; 516 - Livestock Pipeline; 430 - Irrigation Pipeline; 614 - Watering Facility; or 436 - Irrigation Reservoir.

Before Situation:

Inadequate water available to address resource concerns. Client hauls water to supply needs.

After Situation:

The guttering and downspouts collects the roof runoff and the water is conveyed through a pipe, by gravity, to a storage tank for use by livestock or a very small irrigation system.

Scenario Feature Measure: Surface Area of Catchment

Scenario Unit: Square Yard

Scenario Typical Size: 53

Scenario Cost: $9,126.08 **Scenario Cost/Unit:** $172.19

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	4	$224.84
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$508.37	1.5	$762.56
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	40	$1,649.20
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	1	$37.52
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	120	$4,576.80
Materials						
Pipe, PVC, 6", SCH 40	980	Materials: - 6" - PVC - SCH 40 - ASTM D1785	Foot	$6.55	60	$393.00
Gutter, Downspout, PVC, 5"	1388	5" PVC guttering. Materials only.	Foot	$0.53	24	$12.72
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.85	512	$435.20
Corrugated Steel, 28 gage	223	Corrugated or ribbed, galvanized, 28 gauge, includes fasteners, materials only.	sq ft	$1.62	480	$777.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 636 - Water Harvesting Catchment

Scenario: #2 - Surface Catchment

Scenario Description:

Construct an apron, approximately 50 feet wide by 90 feet long, utilizing: a plastic or rubber membrane laid on a prepared ground surface; or an asphalt or concrete surface with curbing; to collect rain water. Divert collected water from the surface catchment by gravity through an 8" diameter, PVC SDR-35 pipe to an existing tank or plastic-lined earthen reservoir. Exclusion of animals is required, so conservation practice 382 - Fencing, may be needed to protect the catchment.
Resource Concern: Livestock production limitation - Inadequate livestock water.
Associated Practices: 382 - Fencing; 516 - Livestock Pipeline; 430 - Irrigation Pipeline; 614 - Watering Facility; 436 - Irrigation Reservoir; and 521A - Pond Sealing or Lining, Flexible Membrane.

Before Situation:

Inadequate water available to address resource concerns. Client hauls water to supply needs.

After Situation:

Design and construct an impervious surface as the primary collection component, and a pipe to convey the water to create a reliable water supply for livestock.

Scenario Feature Measure: Surface Area of Catchment

Scenario Unit: Square Yard

Scenario Typical Size: 500

Scenario Cost: $8,048.56 **Scenario Cost/Unit:** $16.10

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	12	$809.40
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	24	$989.52
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	72	$1,661.76
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	12	$450.24
Materials						
Pipe, PVC, 8", SDR 35	994	Materials: - 8" - PVC - SDR 35 - ASTM D3034	Foot	$6.65	140	$931.00
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Yard	$5.90	500	$2,950.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 636 - Water Harvesting Catchment

Scenario: #3 - Small Game Guzzler with Trough

Scenario Description:

Construct a collection apron, approximately 8 feet wide by 8 feet long, utilizing 28 gauge corrugated metal sheeting on an elevated wood-framed platform supported by T-posts; to collect rain water. Divert collected water from the collection apron by gravity through a 3" diameter, PVC SDR-35 pipe to a partially buried 500 gallon combined tank and watering trough located directly beneath the collection apron. The plastic tank/watering trough shall be outfitted with a wildlife escape ramp. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as appropriate.
Resource Concern: Wildlife - Inadequate livestock or wildlife water.
Associated Practices: 382 - Fencing; 614 - Watering Facility; 516 - Livestock Pipeline; 342 - Critical Area planting

Before Situation:

Inadequate water available to address resource concerns. Wildlife (small game) have limited or no availability to water.

After Situation:

Design and construct an impervious surface as the primary collection component, and a pipe to a storage tank/watering trough for wildlife (small game).

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $3,175.14 **Scenario Cost/Unit:** $3,175.14

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	6	$337.26
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	72	$1,661.76
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	6	$225.12
Materials						
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.47	1	$24.47
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.85	32	$27.20
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.90	8	$63.20
Tank, Poly enclosed Storage, 300-1000 gal	1074	Water storage tanks. Includes materials and shipping only.	Gallon	$0.89	500	$445.00
Gutter, Plastic, Small	1389	5" PVC guttering emptying into a 4" PVC Sch-40 pipe	Foot	$2.56	11	$28.16
Gutter, Downspout, PVC, 5"	1388	5" PVC guttering. Materials only.	Foot	$0.53	5	$2.65
Corrugated Steel, 28 gage	223	Corrugated or ribbed, galvanized, 28 gauge, includes fasteners, materials only.	sq ft	$1.62	64	$103.68
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 636 - Water Harvesting Catchment

Scenario: #4 - Big Game Guzzler with Trough

Scenario Description:

Construct a collection apron, approximately 8 feet wide by 20 feet long, utilizing 28 gauge corrugated metal sheeting on an elevated wood-framed platform supported by wood posts; to collect rain water. Divert collected water from the collection apron by gravity through a 3" diameter, PVC SDR-35 pipe to a partially buried 1500 gallon plastic tank. Water to be diverted from storage tank to nearby watering trough. The watering trough shall be outfitted with a wildlife escape ramp. All needed pipelines are installed using Livestock Pipeline (516).
Any needed vegetation of disturbed areas will use Critical Area Planting (342). Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as appropriate.
Resource Concern: Wildlife - Inadequate livestock or wildlife water.
Associated Practices: 382 - Fencing; 614 - Watering Facility; 516 - Livestock Pipeline; 342 - Critical Area planting

Before Situation:

Inadequate water available to address resource concerns. Wildlife (Big Game) have limited or no availability to water

After Situation:

Design and construct an impervious surface as the primary collection component, and a pipe to a storage tank/watering trough for wildlife (Big Game).

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $9,082.96 **Scenario Cost/Unit:** $9,082.96

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	40	$2,248.40
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	120	$2,769.60
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	40	$1,500.80
Materials						
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.85	154	$130.90
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.90	16	$126.40
Corrugated Steel, 28 gage	223	Corrugated or ribbed, galvanized, 28 gauge, includes fasteners, materials only.	sq ft	$1.62	360	$583.20
Tank, Poly Enclosed Storage, >1,000	1075	Water storage tanks. Includes materials and shipping only.	Gallon	$0.63	1500	$945.00
Gutter, Plastic, Small	1389	5" PVC guttering emptying into a 4" PVC Sch-40 pipe	Foot	$2.56	11	$28.16
Gutter, Downspout, PVC, 5"	1388	5" PVC guttering. Materials only.	Foot	$0.53	6	$3.18
Tank, Spring or Trough, concrete, < 200 gallons	282	Concrete tank with sloping sides. Includes materials and shipping.	Each	$466.21	1	$466.21
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.47	1	$24.47
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 636 - Water Harvesting Catchment

Scenario: #5 - Poly Tank, Small, 1000 gallons or less

Scenario Description:

Install a small (typically 1000 gallons or less) above-ground poly tank to collect rain water an impervious surface (not an existing roof). Stored water can be used with watering facilities, irrigation systems, or other conservation practices. The tank shall be constructed of approved materials that stores adequate quantity and quality of water for storage and or direct drinking access. Additional components may be needed to channel water from the impervious surface to the storage tank. All components used will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation.

Resource concerns addressed include: Inadequate water quantity for livestock, wildlife or crops; habitat degradation, water quality, and undesirable plant productivity and health.
Associated Practices: 614 - Watering Facility; 516 - Livestock Pipeline; 558 - Roof Runoff Structure; 620 - Underground Outlet; 430 - Irrigation Pipeline; 441 - Micro Irrigation; 533 - Pumping Plant; 342 - Critical Area Planting; 382 - Fencing

Before Situation:

Impervious surface currently exists, but there is no storage available. Water is not available in sufficent quantity or at the required times to provide for wildlife, livestock watering, irrigation, or for other conservation practices. This practice applies to all land uses where there is a need for new or improved watering facilities for livestock, wildlife and or other conservation practices; where water is not available in sufficient quantities at specific locations; and habitat, water quality, plant productivity and health needs to be improved.

After Situation:

A 750 gallon above-ground Poly tank with all tank materials, tank plumbing and float valve is installed to collect water from an impervious surface. Tank will provide adequate water storage capacity to ensure against inadequate supply of water for livestock and or wildlife, habitat degradation, water quality, water quantity, crops, and undesirable plant productivity and health.

Scenario Feature Measure: Gallons of Tank Storage Capacity

Scenario Unit: Gallon

Scenario Typical Size: 750

Scenario Cost: $2,257.32 **Scenario Cost/Unit:** $3.01

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	6	$337.26
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	6	$225.12
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	32	$738.56
Materials						
Tank, Poly enclosed Storage, 300-1000 gal	1074	Water storage tanks. Includes materials and shipping only.	Gallon	$0.89	750	$667.50
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	1.2	$32.24
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 636 - Water Harvesting Catchment

Scenario: #6 - Poly Tank, Large, >1000 gal

Scenario Description:

Install a large (typically > 1000 gallons) above-ground poly tank to collect rain water from an impervious surface (not an existing roof). Stored water can be used with watering facilities, irrigation systems, or other conservation practices. The tank shall be constructed of approved materials that stores adequate quantity and quality of water for storage and or direct drinking access. Additional components may be needed to channel water from the impervious surface to the storage tank. All components used will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation.

Resource concerns addressed include: Inadequate water quantity for livestock, wildlife or crops; habitat degradation, water quality, and undesirable plant productivity and health.
Associated Practices: 614 - Watering Facility; 516 - Livestock Pipeline; 558 - Roof Runoff Structure; 620 - Underground Outlet; 430 - Irrigation Pipeline; 441 - Micro Irrigation; 533 - Pumping Plant; 342 - Critical Area Planting; 382 - Fencing

Before Situation:

An impervious surface currently exists, but there is no storage available. Water is not available in sufficent quantity or at the required times to provide for wildlife, livestock watering, irrigation, or for other conservation practices. This practice applies to all land uses where there is a need for new or improved watering facilities for livestock, wildlife and or other conservation practices; where water is not available in sufficient quantities at specific locations; and habitat, water quality, plant productivity and health needs to be improved.

After Situation:

A 3000 gallon, above-ground Poly tank with all tank materials, tank plumbing, float valve and other miscellaneous components is installed to collect water from an impervious surface. Tank will provide adequate water storage capacity to ensure against inadequate supply of water for livestock and or wildlife, habitat degradation, water quality, water quantity, crops, and undesirable plant productivity and health.

Scenario Feature Measure: Gallons of Tank Storage Capacity

Scenario Unit: Gallon

Scenario Typical Size: 3,000

Scenario Cost: $3,769.38 **Scenario Cost/Unit:** $1.26

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	6	$337.26
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	2	$321.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	32	$738.56
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	6	$225.12
Materials						
Tank, Poly Enclosed Storage, >1,000	1075	Water storage tanks. Includes materials and shipping only.	Gallon	$0.63	3000	$1,890.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 636 - Water Harvesting Catchment

Scenario: #7 - Steel Tank with Liner, Small, 24K gal or less

Scenario Description:

Install a small (typically 24,000 gal or less) bottomless steel tank with a liner to collect rain water from an impervious surface (not an existing roof). Stored water can be used with watering facilities, irrigation systems, or other conservation practices. The tank shall be constructed of approved materials that stores adequate quantity and quality of water for storage and or direct drinking access. Additional components may be needed to channel water from the impervious surface to the storage tank. All components used will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation.

Resource concerns addressed include: Inadequate water quantity for livestock, wildlife or crops; habitat degradation, water quality, and undesirable plant productivity and health.
Associated Practices: 614 - Watering Facility; 516 - Livestock Pipeline; 558 - Roof Runoff Structure; 620 - Underground Outlet; 430 - Irrigation Pipeline; 441 - Micro Irrigation; 533 - Pumping Plant; 342 - Critical Area Planting; 382 - Fencing

Before Situation:

An impervious surface currently exists, but there is no storage available. Water is not available in sufficent quantity or at the required times to provide for wildlife, livestock watering, irrigation, or for other conservation practices. This practice applies to all land uses where there is a need for new or improved watering facilities for livestock, wildlife and or other conservation practices; where water is not available in sufficient quantities at specific locations; and habitat, water quality, plant productivity and health needs to be improved.

After Situation:

A 12,000 gallon storage tank constructed using a bottomless steel tank with a liner is installed with all tank materials, tank plumbing and float valve and other miscellaneous components is installed to collect water from an impervious surface. Tank will provide adequate water storage capacity to ensure against inadequate supply of water for livestock and or wildlife, habitat degradation, water quality, water quantity, crops, and undesirable plant productivity and health.

Scenario Feature Measure: Gallons of Tank Storage Capacity

Scenario Unit: Gallon

Scenario Typical Size: 12,000

Scenario Cost: $19,572.29 **Scenario Cost/Unit:** $1.63

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	16	$899.36
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	4	$149.24
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	120	$2,769.60
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	17	$379.61
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	24	$989.52
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	3.7	$142.27
Tank, Galvanized Steel Bottomless w/liner Livestock, > 6,000 gallon	1072	Includes tank materials, shipping, and float valve, no liner	Gallon	$1.17	12000	$14,040.00
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	1	$76.41
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	4.7	$126.29

Practice: 636 - Water Harvesting Catchment

Scenario: #8 - Steel Tank with Liner, Large, >24K gal

Scenario Description:

Install a large (typically >24,000 gal) bottomless steel tank with a liner to collect rain water from an impervious surface (not an existing roof). Stored water can be used with watering facilities, irrigation systems, or other conservation practices. The tank shall be constructed of approved materials that stores adequate quantity and quality of water for storage and or direct drinking access. Additional components may be needed to channel water from the impervious surface to the storage tank. All components used will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation.

Resource concerns addressed include: Inadequate water quantity for livestock, wildlife or crops; habitat degradation, water quality, and undesirable plant productivity and health.
Associated Practices: 614 - Watering Facility; 516 - Livestock Pipeline; 558 - Roof Runoff Structure; 620 - Underground Outlet; 430 - Irrigation Pipeline; 441 - Micro Irrigation; 533 - Pumping Plant; 342 - Critical Area Planting; 382 - Fencing

Before Situation:

An impervious surface currently exists, but there is no storage available. Water is not available in sufficent quantity or at the required times to provide for wildlife, livestock watering, irrigation, or for other conservation practices. This practice applies to all land uses where there is a need for new or improved watering facilities for livestock, wildlife and or other conservation practices; where water is not available in sufficient quantities at specific locations; and habitat, water quality, plant productivity and health needs to be improved.

After Situation:

An 89,000 gallon storage tank constructed using a bottomless steel tank with a liner is installed with all tank materials, tank plumbing and float valve and other miscellaneous components is installed to collect water from an impervious surface. Tank will provide adequate water storage capacity to ensure against inadequate supply of water for livestock and or wildlife, habitat degradation, water quality, water quantity, crops, and undesirable plant productivity and health.

Scenario Feature Measure: Gallons of Tank Storage Capacity

Scenario Unit: Gallon

Scenario Typical Size: 89,000

Scenario Cost: $110,503.20 **Scenario Cost/Unit:** $1.24

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	8	$298.48
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	20	$1,124.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	120	$2,769.60
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	17	$379.61
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	24	$989.52
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$38.45	10.6	$407.57
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	1	$76.41
Tank, Galvanized Steel Bottomless w/liner Livestock, > 6,000 gallon	1072	Includes tank materials, shipping, and float valve, no liner	Gallon	$1.17	89000	$104,130.00
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	12.2	$327.81

Practice: 638 - Water & Sediment Control Basin

Scenario: #1 - Embankment

Scenario Description:

Typical scenario is for the construction of 700 CY earthen embankment. Outlet is typically an underground outlet. An earthen embankment or combination ridge and channel generally constructed across the slope and minor watercourses to form a sediment trap and water detention basin. Work is done with dozer, scraper, or road grader. Costs include all equipment necessary to excavate, shape, grade and compact the Water and Sediment Control Basin and mobilization of equipment. This practice is utilized to reduce watercourse and gully erosion, trap sediment, reduce and manage onsite and downstream runoff. Sheet and rill erosion will be controlled by other conservation practices.

Before Situation:

Farming fields with excessive slope length has resulted in multiple rills and/or ephemeral gullies that will continue to worsen over time. The excessive erosion may lead to deterioration of receiving waters due to excessive sedimentation and nutrient transport. Resource concern addressed includes soil erosion and water quality by trapping sediment and/or reduce erosion in a field to protect riparian areas and water bodies from sediment deposition. Surface water causes erosion and the sediment (and potentially pesticides) to be transported into the riparian areas and water bodies downstream.

After Situation:

Water and Sediment Control Basin is constructed with 700 CY of excavation/earthfill with dozer, scraper and/or road grader. Rill and/or gully erosion is reduced. Include Underground Outlet (620) or Structure for Water Control (587) as appropriate to control inflow and outflows. Include Critical Area Planting (342) where necessary to prevent erosion following construction activities.

Scenario Feature Measure: CY of WASCOB Embankment

Scenario Unit: Cubic Yard

Scenario Typical Size: 700

Scenario Cost: $3,634.51 **Scenario Cost/Unit:** $5.19

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	700	$3,080.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	1	$41.23
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 638 - Water & Sediment Control Basin

Scenario: #2 - Embankment, Topsoil Stockpiled

Scenario Description:

Typical scenarios for the construction of 700 CY earthen embankment. Prior to building the embankment, 6 inches of topsoil is removed and stockpiled. Outlet is typically an underground outlet. An earthen embankment or combination ridge and channel generally constructed across the slope and minor watercourses to form a sediment trap and water detention basin. Topsoil is replaced following construction of the embankment. Costs include all equipment necessary to strip and stock pile topsoil, excavate, shape, grade and compact the Water and Sediment Control Basin, spread and replace topsoil after construction and mobilization of equipment. Seeding not included. This practice is utilized to reduce watercourse and gully erosion, trap sediment, reduce and manage onsite and downstream runoff. Sheet and rill erosion will be controlled by other conservation practices. Work is done with dozer, scraper, or road grader.

Before Situation:

Site has shallow topsoil which, if removed by earthwork for construction of embankment, will significantly impact yields. Farming fields with excessive slope length has resulted in multiple rills and/or ephemeral gullies that will continue to worsen over time. The excessive erosion may lead to deterioration of receiving waters due to excessive sedimentation and nutrient transport. Resource concern addressed includes soil erosion and water quality by trapping sediment and/or reduce erosion in a field to protect riparian areas and water bodies from sediment deposition. Surface water causes erosion and the sediment (and potentially pesticides) is being transported into the riparian areas and water bodies downstream.

After Situation:

Water and Sediment Control Basin is constructed with 700 CY of excavation/earthfill with dozer, scraper and/or road grader. Rill and/or gully erosion is reduced. Include Underground Outlet (620) or Structure for Water Control (587) as appropriate to control inflow and outflows. Include Critical Area Planting (342) where necessary to prevent erosion following construction activities.

Scenario Feature Measure: CY of WASCOB Embankment

Scenario Unit: Cubic Yard

Scenario Typical Size: 700

Scenario Cost: $3,840.91 **Scenario Cost/Unit:** $5.49

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	700	$3,080.00
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	240	$206.40
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	1	$41.23
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 638 - Water & Sediment Control Basin

Scenario: #3 - Excavated basin

Scenario Description:

An excavated water and sediment control basin in an existing drainage way on a farm for purpose of trapping sediment and preserving the capacity of reservoirs, ditches, canals, diversions, waterways and streams and to prevent undesirable deposition on bottom lands and other developed lands. This practice is utilized to reduce watercourse and gully erosion, trap sediment, reduce and manage onsite and downstream runoff. Sheet and rill erosion will be controlled by other conservation practices. The basin is created solely by excavation. Excavated material is spoiled, not placed in a designed embankment. Earthen spillway is constructed as needed. Resource concerns addressed include excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition. Surface water causes the sediment (and potentially pesticides and nutrients) to be transported into the riparian areas and water bodies downstream. Outlets can be underground outlets, pipe drop structures, soil infiltration, stabilized channels or combination. Work is done with dozer, scraper, or road grader. Costs include all equipment necessary to excavate, shape, grade and compact the Water and Sediment Control Basin and mobilization of equipment.

Before Situation:

Farming fields with excessive slope length has resulted in multiple rills and/or ephemeral gullies that will continue to worsen over time. The excessive erosion may lead to deterioration of receiving waters due to excessive sedimentation and nutrient transport. Resource concern addressed includes soil erosion and water quality by trapping sediment and/or reduce erosion in a field to protect riparian areas and water bodies from sediment deposition. Surface water causes erosion and the sediment (and potentially pesticides) to be transported into the riparian areas and water bodies downstream.

After Situation:

The typical sediment basin is constructed by excavating 120 cubic yards and spreading the spoil outside the pool area using small tractors with front-end-loaders and farm trucks for hauling, or similar machinery. Associated practice(s): Other practices that may need to be implemented along with sediment basin to address all of the site specific resource concerns include: Critical Area Planting (342) and Mulching (484) where necessary to prevent erosion following construction activities. Rill and/or gully erosion is reduced. Include Underground Outlet (620) or Structure for Water Control (587) as appropriate to control inflow and outflows.

Scenario Feature Measure: Excavated volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 120

Scenario Cost: $1,492.07 **Scenario Cost/Unit:** $12.43

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	120	$433.20
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	120	$284.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	3	$517.83

Practice: 642 - Water Well

Scenario: #2 - Drilled, <200 feet deep

Scenario Description:

Typical construction is for the installation of a well, in areas where sufficient water is known to occur within 200 feet of the ground surface. The well shall be drilled, dug, driven, bored, jetted or otherwise constructed to an aquifer for water supply. The purpose of the practice is to provide water for livestock or frost protection. The representative well depth is 150 feet with 6" diameter PVC casing. Scenario assumes 100 feet of blank casing and 50 feet of perforated casing/plastic screen.

Before Situation:

Livestock have insufficient water or are fenced from their water source. Water source other than direct diversions from fisheries stream required for frost protection.

After Situation:

Sufficient water is available for livestock or frost protection. Utilize Pumping Plant (533) and Pipeline (516) as associated practices. Use Critical Area Seeding (342) where necessary to prevent erosion following construciton activities.

Scenario Feature Measure: No.

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $10,260.20 **Scenario Cost/Unit:** $10,260.20

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Rotary Drill Rig with Operator	1595	Rotary drill rig including equipment and power unit costs and labor.	Hour	$184.21	15	$2,763.15
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	30	$692.40
Materials						
Test, Pump Test	1817	High-volume pumping of well for at least 24 hours. Labor and equipment.	Each	$5,245.65	1	$5,245.65
Well Screen, plastic, 6"	1999	6" PVC well screen. Materials only.	Foot	$18.26	50	$913.00
Well Casing, Plastic, 6"	1804	PVC or ABS non-threaded well casing, 6". Materials only.	Foot	$6.46	100	$646.00

Practice: 642 - Water Well

Scenario: #3 - Drilled, 200-400 feet deep

Scenario Description:

Typical construction is for the installation of a well, in areas where sufficient water is known to occur within 400 feet of the ground surface. The well shall be drilled, dug, driven, bored, jetted or otherwise constructed to an aquifer for water supply. The purpose of the practice is to provide water for livestock or frost protection. An average well depth is 300 feet with 6" diameter PVC casing. Scenario assumes 250 feet of blank casing and 50 feet of perforated casing/plastic screen.

Before Situation:

Livestock have insufficient water or are fenced from their water source. Water source other than direct diversions from fisheries stream required for frost protection.

After Situation:

Sufficient water is available for livestock or frost protection. Utilize Pumping Plant (533) and Pipeline (516) as associated practices. Use Critical Area Seeding (342) where necessary to prevent erosion following construciton activities.

Scenario Feature Measure: No.

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $14,684.75 **Scenario Cost/Unit:** $14,684.75

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Rotary Drill Rig with Operator	1595	Rotary drill rig including equipment and power unit costs and labor.	Hour	$184.21	30	$5,526.30
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	60	$1,384.80
Materials						
Well Screen, plastic, 6"	1999	6" PVC well screen. Materials only.	Foot	$18.26	50	$913.00
Test, Pump Test	1817	High-volume pumping of well for at least 24 hours. Labor and equipment.	Each	$5,245.65	1	$5,245.65
Well Casing, Plastic, 6"	1804	PVC or ABS non-threaded well casing, 6". Materials only.	Foot	$6.46	250	$1,615.00

Practice: 642 - Water Well

Scenario: #4 - Drilled, 401-800 feet deep

Scenario Description:

Typical construction is for the installation of a well, in areas where sufficient water is known to occur within 800 feet of the ground surface. The well shall be drilled, dug, driven, bored, jetted or otherwise constructed to an aquifer for water supply. The purpose of the practice is to provide water for livestock or frost protection. The representative well depth is 600 feet with 6" diameter PVC casing. Scenario assumes 550 feet of blank casing and 50 feet of perforated casing/plastic screen.

Before Situation:

Livestock have insufficient water or are fenced from their water source. Water source other than direct diversions from fisheries stream required for frost protection.

After Situation:

Sufficient water is available for livestock or frost protection. Utilize Pumping Plant (533) and Pipeline (516) as associated practices. Use Critical Area Seeding (342) where necessary to prevent erosion following construciton activities.

Scenario Feature Measure: No.

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $23,533.85 **Scenario Cost/Unit:** $23,533.85

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Rotary Drill Rig with Operator	1595	Rotary drill rig including equipment and power unit costs and labor.	Hour	$184.21	60	$11,052.60
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	120	$2,769.60
Materials						
Well Screen, plastic, 6"	1999	6" PVC well screen. Materials only.	Foot	$18.26	50	$913.00
Test, Pump Test	1817	High-volume pumping of well for at least 24 hours. Labor and equipment.	Each	$5,245.65	1	$5,245.65
Well Casing, Plastic, 6"	1804	PVC or ABS non-threaded well casing, 6". Materials only.	Foot	$6.46	550	$3,553.00

Practice: 642 - Water Well

Scenario: #4 - Drilled, >800 feet deep

Scenario Description:

Typical construction is for the installation of a well, in areas where sufficient water is known to occur at depths exceeding 800 feet. The well shall be drilled, dug, driven, bored, jetted or otherwise constructed to an aquifer for water supply. The purpose of the practice is to provide water for livestock or frost protection. An average well depth is 1000 feet with 6" diameter PVC casing. Scenario assumes 800 feet of blank casing and 200 feet of perforated casing/plastic screen.

Before Situation:

Livestock have insufficient water or are fenced from their water source. Water source other than direct diversions from fisheries stream required for frost protection.

After Situation:

Sufficient water is available for livestock or frost protection. Utilize Pumping Plant (533) and Pipeline (516) as associated practices. Use Critical Area Seeding (342) where necessary to prevent erosion following construciton activities.

Scenario Feature Measure: No.

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $35,922.65 **Scenario Cost/Unit:** $35,922.65

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Rotary Drill Rig with Operator	1595	Rotary drill rig including equipment and power unit costs and labor.	Hour	$184.21	100	$18,421.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	200	$4,616.00
Materials						
Well Casing, Plastic, 6"	1804	PVC or ABS non-threaded well casing, 6". Materials only.	Foot	$6.46	900	$5,814.00
Test, Pump Test	1817	High-volume pumping of well for at least 24 hours. Labor and equipment.	Each	$5,245.65	1	$5,245.65
Well Screen, plastic, 6"	1999	6" PVC well screen. Materials only.	Foot	$18.26	100	$1,826.00

Practice: 644 - Wetland Wildlife Habitat Management

Scenario: #4 - Water Level Drawdown, Low Intensity

Scenario Description:

The resource concern is addressed by providing shallow water habitat for wildlife such as sandhill cranes, shorebirds, waterfowl, wading birds, mammals, fish, reptiles, amphibians, and other species that require shallow water for at least part of their life cycle. Water control outlet structures are closed and sites are fall/winter flooded up to a depth of 18" with an average depth of 9". Water is then maintained by natural flooding and/or precipitation. In spring, water control structures are removed gradually over the course of 4 weeks to provide critical habitat. The "low" intensity scenario does not require any supplemental artificial floodwater.

Resource Concerns: Inadequte Habitat For Fish and Wildlife, Excess/Insuffienent Water

Before Situation:

There is inadequate habitat to provide optimum resting, nesting, and feeding habitat for waterfowl, shorebirds, and other wildlife (amphibians, reptiles, mammals, invertebrates, etc.).

After Situation:

A single or series of shallow water areas that are managed per standard and specification. Water levels are regulated to maintain temporary wildlife habitat. Timing and duration of flooding and de-watering is dependent on specific species requirements. Water is pumped into area to be flooded. Flooded sites vary from mudflats to water depths of 18" with an average depth of 9". The hydrologic conditions of ponding and saturation (frequency, depth, duration, timing) provides optimum seasonal habitat for waterfowl, shorebirds, and other wildlife (amphibians, reptiles, mammals, invertebrates, etc.). If needed and dikes or water control structures are not currently present on the fields planned to be flooded, these practices may be planned under Structure for Water Control (587), Dike (356), and Pumping Plant (533). Depending on local conditions, other Conservation Practices may also be required.

Scenario Feature Measure: Acre of shallow water

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $362.34 **Scenario Cost/Unit:** $9.06

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	6	$223.86
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	6	$138.48

Practice: 644 - Wetland Wildlife Habitat Management

Scenario: #5 - Water Management, High Intensity

Scenario Description:

Seasonal shallow water is provided for target species by maintaining a specified water depth for for a perscribed duration. Sites are flooded and desired water level is then maintained by natural flooding and/or precipitation PLUS artificial flooding as needed to maintain the target water level throughout the critical habitat period. In spring, water is removed gradually over the course of 4 weeks to provide critical mud flat habitat. This high-level managmenet is applied to all lands where very specific conditions needed to address previously identified degraded plant conditions or inadequate habitat for fish and/or wildlife have been identified as a primary concern. For rice, fields are flooded immediately post-harvest and water depth is managed at 4-18 inches until at least February 1st. For other cropland, water is managed for a depth of 2-10 inches; fields are flooded for a minimum of 60 days between September 15th and March 15th. Facilitating practices may include Structure for Water Control (587), Pumping Plant (533), and Dike (356), or other habitat management practices (643, 645, 657).

Resource Concerns: Inadequte Habitat For Fish and Wildlife, Excess/Insuffienent Water

Before Situation:

The site has a reliable water source and some existing infrastructure to provide seasonal water, but current management does not provide optimal water depth, frequency, or duration for target species. The potential benefits to target fauna and flora is not being captured. The purchase of water, supply of water and intensive managment of season water, coupled with monitoring, adaptive managment from highly trained individuals will fully address the identifed degraded plant conditions and/or inadequate habitat for fish and/or wildlife.

After Situation:

A single or series of shallow water areas that are managed per standard and specification. Water levels are regulated to maintain temporary wildlife habitat. Timing and duration of flooding and de-watering is dependent on specific species requirements. Water is pumped into area to be flooded. Flooded sites vary from mudflats to water depths of 12" with an average depth of 6". The hydrologic conditions of ponding and saturation (frequency, depth, duration, timing) provides optimum seasonal habitat for waterfowl, shorebirds, and other wildlife (amphibians, reptiles, mammals, invertebrates, etc.).

Scenario Feature Measure: Acre of shallow water

Scenario Unit: Acre

Scenario Typical Size: 60

Scenario Cost: $6,407.70 **Scenario Cost/Unit:** $106.80

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	30	$6,407.70

Practice: 644 - Wetland Wildlife Habitat Management

Scenario: #6 - Seasonal Floodup

Scenario Description:

Seasonal Floodup is the application of water to fallow fields, fields that were already harvested, or fields that are not in production for any reason. In this scenario, fields are flooded for a minimum of 30 days between August 15th and October 1 (fall) or April 1 and July 15 (spring). If applied in the fall, this creates shallow water habitat (1-4 inches) for early fall migrants that are returning from the breeding grounds to the north. If applied in the spring/summer months, this provides nesting and brood-rearing habitats for local nesting shorebirds and waterfowl. Palyment includes field preparation: chop, stomp, burn, or light disking only allowed, and mosquito abatement as needed.

Before Situation:

The site has a reliable water source and some existing infrastructure to provide seasonal water, but current management does not provide optimal water depth or duration during critical periods. The potential benefits to target fauna and flora is not being captured.

After Situation:

Water levels are regulated to provide temporary wildlife habitat during the critical period. Timing and duration of flooding and de-watering is dependent on specific species requirements. Flooded sites vary from mudflats to water depths of 6" with an average depth of 3". The hydrologic conditions of ponding and saturation (frequency, depth, duration, timing) provides optimum seasonal habitat for waterfowl, shorebirds, and other wildlife (amphibians, reptiles, mammals, invertebrates, etc.).

Scenario Feature Measure: Acre of shallow water

Scenario Unit: Acre

Scenario Typical Size: 60

Scenario Cost: $6,407.70 **Scenario Cost/Unit:** $106.80

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$213.59	30	$6,407.70

Practice: 644 - Wetland Wildlife Habitat Management

Scenario: #9 - Winter Management, Corn

Scenario Description:

This practice is designed to enhance foraging habitat value in post-harvest corn fields for Greater Sandhill Cranes. Cranes feed on waste corn and this practice keeps these food resources accessible on the soil surface. Practice applies in areas designated as critical habitat for Greater Sandhill Cranes only.

Before Situation:

Typical post-harvest management on corn fields results in 20 inch stalks staining in the fields with immediate flooding for decomposition. Flooding makes waste corn inaccessible to Cranes, and they cannot navigate within tall stalks. The field is in an area of critical habitat for wintering Sandhill Cranes but is not being managed to allow bird use.

After Situation:

Fields are harvested with a chopper, which cuts the stalks into 6 inch pieces and typically knocks them down so most of the stalk is in contact with the soil. Fields using typical harvest techniques have rolled the tall stalks to lay them down. All field prep is completed within 4 weeks of harvest. Fields are not flooded until after January 1st to ensure food resources are available for migrating Sandhill Cranes.

Scenario Feature Measure: Acres of management

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $423.20 **Scenario Cost/Unit:** $10.58

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	40	$423.20

Practice: 644 - Wetland Wildlife Habitat Management

Scenario: #10 - Winter Mangement, Rice

Scenario Description:

This practice is designed to enhance foraging habitat value in post-harvest rice fields for Greater Sandhill Cranes. Cranes forage in rice fields that are left unchopped and not flooded following harvest. For food resources to be available all tillage and flooding is prohibited until January 1, and the use of a stripper header is prohibited. Practice applies in areas designated as critical habitat for Greater Sandhill Cranes only.

Before Situation:

Typical post-harvest management on rice fields results in extensive tillage followed by immediate flooding for decomposition. Much of the waste seed is burried, and flooding makes waste rice inaccessible to Cranes. The field is in an area of critical habitat for wintering Sandhill Cranes but is not being managed to allow bird use.

After Situation:

Fields are harvested with Standard equipment, but stalks are left standing. No additional post-harvest management (tillage or flooding) occurs until after January 1st. Food resources are available for migrating Sandhill Cranes.

Scenario Feature Measure: Acres of management

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $1,237.46 **Scenario Cost/Unit:** $30.94

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	40	$423.20
Foregone Income						
FI, Rice	1974	Rice is Primary Crop	Acre	$407.13	2	$814.26

Practice: 645 - Upland Wildlife Habitat Management

Scenario: #1 - Habitat Monitoring and Management, Low Intensity and Complexity

Scenario Description:

This scenario is applied to all landuse types including those with wildlife as a modifier, where any resource concern is identified for wildlife, and where very-low intensity and complexity of monitoring or management will treat the identified resource concern. Only 1-2 monitoring efforts are needed and each requiring less than 2 people and 4 hours per effort. The adaptive management actions such as cutting of limbs that are impeding access of birds into nest boxs, replacing damaged fence markers, cleaning of nest structures and debris around other structures requires only hand labor and less than 16 hours of labor per year on a typical land unit of 40 acres.

Before Situation:

Wildlife habitat is deficient due to the absence of annual monitoring and adaptive management actions of very-low intensity and complexity.

After Situation:

Widlife habitat is improved by implementation of annual adaptive management actions of very- low intensity and complexity.

Scenario Feature Measure: Monitoring efforts and adaptive management actions

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $470.57 **Scenario Cost/Unit:** $11.76

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	3	$111.93
Rangeland/grassland field monitoring kit	967	Miscellaneous tools needed to complete rangeland/grassland monitoring. Materials may include camera, clippers, plot frame, scale, tape measure, etc. Includes materials and shipping only.	Each	$45.96	1	$45.96
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	2	$12.64
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	13	$300.04

Practice: 645 - Upland Wildlife Habitat Management

Scenario: #2 - Habitat Monitoring and Management, Medium Intensity and Complexity

Scenario Description:

This scenario is applied to all landuse types including those with wildlife as a modifier, where any resource concern is identified for wildlife, and where medium intensity and complexity of monitoring or management will treat the identified resource concern. Two or three monitoring efforts are needed and each requiring less than 2 people and less than 8 hours per effort. Two or three adaptive management efforts are required (such as cutting of limbs that are impeding access of birds into nest boxes, replacing damaged fence markers, maintaining nest boxes, removing debris around other structures, etc). The adaptive mgmt requires hand labor and the occasional use of light equipment. A crew of 2 is needed for the hand labor efforts and the crew will require less than 16 total hours of labor per mgmt effort on a land unit of 40 acres. Mowing of roads and trail is required to provide access for monitoring and management.

Before Situation:

Wildlife habitat is deficient due to the absence of annual monitoring and adaptive management actions of medium intensity and complexity.

After Situation:

Wildlife habitat is improved by implementation of annual adaptive management actions of medium intensity and complexity.

Scenario Feature Measure: Monitoring efforts and adaptive management actions

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $1,097.47 **Scenario Cost/Unit:** $27.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Rangeland/grassland field monitoring kit	967	Miscellaneous tools needed to complete rangeland/grassland monitoring. Materials may include camera, clippers, plot frame, scale, tape measure, etc. Includes materials and shipping only.	Each	$45.96	1	$45.96
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	4	$25.28
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	6	$223.86
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$50.98	1.5	$76.47
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	30	$692.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	1.5	$33.50

Practice: 645 - Upland Wildlife Habitat Management

Scenario: #3 - Habitat Monitoring and Management, High Intensity and Complexity

Scenario Description:

This scenario is applied to all landuse types including those with wildlife as a modifier, where any resource concern is identified for wildlife, and where high intensity and complexity of monitoring or management will treat the identified resource concern. In most cases, client is working with partner natural resource specialists in most cases to evaluate and summarize data for adaptive management. Two - four monitoring efforts are needed and each requiring 2 people and less than 8 hours per effort. Monitoring of native plant response and/or associated wildlife usage. The adaptive management actions (2 - 5 efforts) such as cutting of limbs that are impeding access of wildlife into important habitat areas, maintenance of desireable plant communities, replacing/fixing damaged wildlife structures, cleaning of nest structures and debris around other structures requires hand labor and light equipment, requiring a 2-person crew less than 1 day per effort. Typical land unit size is 40 acres.

Before Situation:

Wildlife habitat is deficient due to the absence of annual monitoring and adaptive management actions of high intensity and complexity.

After Situation:

Wildlife habitat is improved by implementation of annual adaptive management actions of high intensity and complexity.

Scenario Feature Measure: Monitoring efforts and adaptive management actions

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $4,197.66 **Scenario Cost/Unit:** $104.94

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	4	$457.92
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	8	$50.56
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	7	$261.17
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$50.98	1.5	$76.47
Rangeland/grassland field monitoring kit	967	Miscellaneous tools needed to complete rangeland/grassland monitoring. Materials may include camera, clippers, plot frame, scale, tape measure, etc. Includes materials and shipping only.	Each	$45.96	1	$45.96
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	4	$150.08
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	20	$2,198.80
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	1.5	$33.50
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	40	$923.20

Practice: 645 - Upland Wildlife Habitat Management

Scenario: #4 - Habitat Monitoring and Management, High Intensity and Complexity, with FI

Scenario Description:

This scenario is applied to all landuse types including those with wildlife as a modifier, where any resource concern is identified for wildlife, and where high intensity and complexity of monitoring or management will treat the identified resource concern. Land is being removed from agricultural production to restore as permanent wildlife habitat. Two - four monitoring efforts are needed and each requiring 2 people and less than 8 hours per effort. Monitoring of native plant response and/or associated wildlife usage. The adaptive management actions (2 - 5 efforts) such as cutting of limbs that are impeding access of wildlife into important habitat areas, maintenance of desireable plant communities, replacing/fixing damaged wildlife structures, cleaning of nest structures and debris around other structures requires hand labor and light equipment, requiring a 2-person crew less than 1 day per effort. Typical land unit size is 40 acres.

Before Situation:

Wildlife habitat is deficient due to the absence of annual monitoring and adaptive management actions of high intensity and complexity. Land is currently in agricultural production.

After Situation:

Wildlife habitat is improved by implementation of annual adaptive management actions of high intensity and complexity. Land is removed from agricultural production.

Scenario Feature Measure: Monitoring efforts and adaptive management actions

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $7,927.45 **Scenario Cost/Unit:** $198.19

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Rangeland/grassland field monitoring kit	967	Miscellaneous tools needed to complete rangeland/grassland monitoring. Materials may include camera, clippers, plot frame, scale, tape measure, etc. Includes materials and shipping only.	Each	$45.96	1	$45.96
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	4	$457.92
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	8	$50.56
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	7	$261.17
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$50.98	1.5	$76.47
Foregone Income						
FI, Hay, Alfalfa	2121	Alfalfa Hay is Primary Crop	Ton	$31.29	60	$1,877.40
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$17.21	6.67	$114.79
FI, Oats Dryland	1969	Dryland Oats is Primary Crop	Acre	$173.76	10	$1,737.60
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	20	$2,198.80
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	4	$150.08
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	40	$923.20
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	1.5	$33.50

Practice: 645 - Upland Wildlife Habitat Management

Scenario: #5 - Fence Removal for Wildlife

Scenario Description:

Removal of 1-2 strands of wire to modify an existing fence to make it wildlife friendly. Removal of second wire from the top or the bottom wire provides for less obstructed movement of wildlife throughout pasture/rangeland.Scenario is based on 1/4 mile of fence to remove 1 strand of wire. Strands will be removed for the entire length between two H-braces to maintain structure/support. For replacement of wires or fence reconstruction use practice for Fence (382)
Resource concerns: Inadequate habitat for fish and wildlife--habitat degradation

Before Situation:

Wildlife get tangled in the top 2 wires when they are too close together, or in the bottom wire if it is too close to the ground. Fence is having an adverse effect on wildlife movement across corridors.

After Situation:

1-2 strands of wire are removed. Restrictions on wildlife passage through corridors is reduced.

Scenario Feature Measure: Feet of fence

Scenario Unit: Foot

Scenario Typical Size: 1,320

Scenario Cost: $60.39 **Scenario Cost/Unit:** $0.05

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	1	$37.31
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	1	$23.08

Practice: 647 - Early Successional Habitat Development and Management

Scenario: #2 - Root Separation

Scenario Description:

Deep tillage for restoration of woodland areas (typically aspen) when habitat assessment indicates degraded Habitat for Fish or Wildlife. Typical scenario is two passes with a deep chisel plow with operator plus additional project manager, common hand tools and equipment; installation is greater than a quarter mile off of a driveable road; and terrain is moderate to difficult grade. Thinning undesireable species and/or pruning (if necessary) will be done under facilitating practices. Facilitating practices may include but not limited to: 314, 660, 666, 384.

Before Situation:

A habitat assessment (using State Office approved habitat assessment method, protocol or tool) has indicated a need for woody vegetation management to meet Inadequate Habitat for Fish or Wildlife planning criteria. Aspen stands are not properly regenerating and are being invaded and degraded by undesireable vegetation.

After Situation:

Deep chisel plowing through existing stand severs the lateral roots and stimulates new growth. Regeneration improves plant and animal habitat and reduces invasive and undesireable species.

Scenario Feature Measure: Acres of treated area

Scenario Unit: Acre

Scenario Typical Size: 4

Scenario Cost: $819.82 **Scenario Cost/Unit:** $204.96

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	8	$50.56
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	8	$126.16
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	10	$412.30
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80

Practice: 647 - Early Successional Habitat Development and Management

Scenario: #3 - Mowing, Simple

Scenario Description:

This scenario address inadequate habitat for fish and wildlife where setting back succession by mowing incoming woody species will improve habitat for the target species. Mowing can be used to increase structural diversity by creating areas of shorter vegetation prefered by some species or certain life stages of species. Mowing upland habitats which are of low intensity and low complexity, when habitat assessment indicates degraded Habitat for Fish or Wildlife. Typical "Simple/Easy" scenario is general labor with minimal supervision or skilled labor without supervision; common hand tools and equipment; installation is within a quarter mile of a driveable road; and terrain is gentle to moderate. Complexity is defined by the combination of skill level, equipment needed and ease of accesability for createing and installing these structures. This practice may be installed alone or in combination with facilitating practices. Where the management of woody plants is require to create or maintain early successional habitat conservation practice 314 brush management or 666 forest stand improvement should be used. Where chemical control of weeds, including invasives, is required to reduce competition for the desired plant community conservation practice 315 herbaceous weed control should be used. Where the seedbank is inadequate for natural regeneration and seeding is required use conservation practice 550 range seeding or 327 Conservation Cover. Where the need is to create early successional habitat within or at the edge of woodland or forest use conservation practice 666 forest stand improvement to remove trees.

Before Situation:

A habitat assessment (using State Office approved habitat assessment method, protocol or tool) has indicated a need for vegetation management with low complexity to bring Inadequate Habitat for Fish or Wildlife up to planning criteria. Wetland habitat limiting factors include quality, quantity and continuity of forage, cover, shelter, space and water avalability. The project location is within a quarter mile of a driveable road and terrain is gentle to moderate. The site is static or trending to later successional plant community. The disturbance regeme to maintain an earlier successional plant community is lacking. Pastures are often monotypic, lacking in diversity. Competition for sunlight from dense grass stands prevents seedling establishment. Stands are often dense and inhibit the movements of young wildlife such as game bird chicks. Area lacks diversity in the height of vegetation.

After Situation:

Early successsional habitat maintained. Mowing improves plant and animal habitat and reduces invasive and undesireable species. The practice is installed using general labor with minimal supervision or skilled labor without supervision with use of common hand tools and small equipment; Mowing has provided more sun light for forb establishment. The heterogeneity of the habitat structure has been increased.

Scenario Feature Measure: Acres of treated area

Scenario Unit: Acres

Scenario Typical Size: 10

Scenario Cost: $403.26 **Scenario Cost/Unit:** $40.33

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$50.98	2	$101.96
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	2	$44.66
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 647 - Early Successional Habitat Development and Management

Scenario: #4 - Mowing, Difficult

Scenario Description:

Mowing upland habitats which are of high intensity and high complexity, when habitat assessment indicates degraded Habitat for Fish or Wildlife. Complexity is defined by the combination of skill level, equipment needed and ease of accesability for createing and installing these structures. Typical "difficult" scenario is equipment with operator plus additional general labor, common hand tools and equipment; installation is greater than a quarter mile of a driveable road; and terrain is moderate to difficult grade. This practice may be installed alone or in combination with facilitating practices. Facilitating practices may include but not limited to: 382, 391, 647, 660 and 666.

Before Situation:

A habitat assessment (using State Office approved habitat assessment method, protocol or tool) has indicated a need for vegetation management with high complexity to bring Inadequate Habitat for Fish or Wildlife up to planning criteria. Wetland habitat limiting factors include quality, quantity and continuity of forage, cover, shelter, space and water avalability. The project location is within a quarter mile of a driveable road and terrain is gentle to moderate.

After Situation:

Mowing improves plant and animal habitat and reduces invasive and undesireable species. The practice is installed using general labor with minimal supervision or skilled labor without supervision with use of common hand tools and small equipment;

Scenario Feature Measure: Acres of treated area

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $824.85 **Scenario Cost/Unit:** $82.48

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$50.98	4.25	$216.67
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	4.25	$94.90
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 647 - Early Successional Habitat Development and Management

Scenario: #6 - Disking, Simple

Scenario Description:

This scenario is used to improve the quality and/or quantity of forage for at-risk wildlife populations in existing mixed herbaceous stands composed of grasses and forbs. Management actions are selected based on inventory-identified limiting factors on existing forage areas. Typically, forage quality is limited due to low density of forbs within an existing herbaceous stand. Repeat biomass removal or mowing prior to existing grasses reaching flowering and/or to removed decadent plant material s needed to prevent grass competition with forbs to ensure adequate sunlight and nutrients for desired forbs within the stand. Enhancement of forage quality will provide a short term improvement in wildlife forage availability, with support practices supplying long term permanent native forage sources. For sites managed with both mechanical harvest and with livestock grazing, a grazing management plan will be applied to ensure forage availability during the season of critical use by at-risk wildlife. Payment will be made following the last biomass harvest of the season. The primary resource concern addressed is Inadequate Habitat - habitat degradation. Typical support practices include 327 Conservation Cover, 315 Herbaceous Weed Control, 314 Brush Management, 528 Prescribed Grazing, 612 Tree/Shrub Establishment, 391 Riparian Forest Buffer & 657 Wetland Restoration.

Before Situation:

The site is static or trending to higher successional plant species. The disturbance regeme to maintain a lower successional stage is lacking. Pastures are often monotypic, lacking in diversity. Bare ground for seedling establishment is absent. Stands are often dense and inhibit the movements of younger wildlife species suchh as game bird chicks. A habitat assessment (using State Office approved habitat assessment method, protocol or tool) has indicated a need for vegetation management with low complexity to bring Inadequate Habitat for Fish or Wildlife up to planning criteria. Habitat limiting factors include quality, quantity and continuity of forage, cover, shelter, space and water avalability. The project location is within a quarter mile of a driveable road and terrain is gentle to moderate.

After Situation:

The application of this scenario improves wildlife habitat for species requiring early successional plant communities by reducing competition and creating bare ground for the establishment of early successional plants. Additionally, brood rearing habitat is improved both by the resultant food resources and the increased openess of the plant community that allows chicks to negotiate the terrain and exploit those food resources.

Scenario Feature Measure: Acres of treated area

Scenario Unit: Acres

Scenario Typical Size: 10

Scenario Cost: $468.24 **Scenario Cost/Unit:** $46.82

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	20	$211.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 647 - Early Successional Habitat Development and Management

Scenario: #7 - Disking, Difficult

Scenario Description:

This practice addresses inadequate wildlife habitat for species requiring early successional habitat. This scenario provides early successional habitat by setting back succession and manipulating species composition by disking vegetation and creating bare ground. Disking upland habitats which are of low intensity and low complexity, when habitat assessment indicates degraded Habitat for Fish or Wildlife. Complexity is defined by the combination of skill level, equipment needed and ease of accesability for createing and installing these structures. Typical "Difficult" scenario is where terrain is rough, and/or material is heavy biomass requireing multiple passes. This practice may be installed alone or in combination with facilitating practices. Where the management of woody plants is require to create or maintain early successional habitat conservation practice 314 brush management or 666 forest stand improvement should be used. Where chemical control of weeds, including invasives, is required to reduce competition for the desired plant community conservation practice 315 herbaceous weed control should be used. Where the seedbank is inadequate for natural regeneration and seeding is required, use conservation practice 550 range seeding or 327 Conservation Cover. Where the need is to create early successional habitat within or at the edge of woodland or forest use conservation practice 666 forest stand improvement to remove trees.

Before Situation:

The site is static or trending to higher successional plant species. The disturbance regeme to maintain a lower successional stage is lacking. Pastures are often monotypic, lacking in diversity. Bare ground for seedling establishment is absent. Stands are often dense and inhibit the movements of younger wildlife species suchh as game bird chicks. A habitat assessment (using State Office approved habitat assessment method, protocol or tool) has indicated a need for vegetation management with low complexity to bring Inadequate Habitat for Fish or Wildlife up to planning criteria. Habitat limiting factors include quality, quantity and continuity of forage, cover, shelter, space and water avalability. The project location is within a quarter mile of a driveable road and terrain is gentle to moderate.

After Situation:

The application of this scenario improves wildlife habitat for species requiring early successional plant communities by reducing competition and creating bare ground for the establishment of early successional plants. Additionally, brood rearing habitat is improved both by the resultant food resources and the increased openess of the plant community that allows chicks to negotiate the terrain and exploit those food resources.

Scenario Feature Measure: Acres of treated area

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $1,401.18 **Scenario Cost/Unit:** $140.12

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	10	$105.80
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.77	20	$315.40
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 649 - Structures for Wildlife

Scenario: #1 - Nesting Box, Small

Scenario Description:

A structure is provided to support the nesting and rearing of smaller targeted species, such as bees and birds, and is directly mounted to a tree, building or other structure. These structures are designed to meet targeted species biology and life history needs.

Before Situation:

These structures are targeted for areas that lack sufficient overall habitat conditions to support viable populations of targeted species. Increased predation of target and non-targeted species may or may not be a problem. A suitable location to mount the box is available.

After Situation:

The installation of nesting and rearing boxes support the life-cycle needs of targeted speces, such as birds, bats and pollinators. Because of suitable location and conditions the nesting box can be directly mounted such as on a tree or building, thereby eliminating the need for mounting poles and predator guards. Species such as cavity dwelling birds and pollinators use this approach, but this treatment is not limited to those species. These structures/features enhance habitat, cover, and improve species survivability.

Scenario Feature Measure: Number

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $53.57 **Scenario Cost/Unit:** $53.57

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	1	$23.08
Materials						
Habitat Box, Bird	251	Bluebird nesting box to increase nesting success. Each is 1-1/2" x 6" x 12-1/2" w/ 1-1/2" diameter opening. Includes materials and shipping.	Each	$30.49	1	$30.49

Practice: 649 - Structures for Wildlife

Scenario: #2 - Nesting Box, Small, with wood pole

Scenario Description:

Constructing a nest box and mounting on a wooden pole. A structure is provided to support the nesting and rearing of targeted species, such as pollinators and birds. Trees, buildings or other structures are not available. These structures are designed to meet targeted species biology and life history needs. Addresses Resource Concern: Inadequate Cover/Shelter.

Before Situation:

These structures are targeted for areas that lack sufficient overall habitat conditions to support viable populations of targeted species. Increased predation of target and non-targeted species may or may not be a problem.

After Situation:

The installation nesting and rearing boxes support the life-cycle needs of targeted speces, such as blue birds and waterfowl. Location and conditions suggest that predator guards are not needed. These structures/features enhance habitat, cover, and improve species survivability.

Scenario Feature Measure: Number

Scenario Unit: Number

Scenario Typical Size: 1

Scenario Cost: $100.36 **Scenario Cost/Unit:** $100.36

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formless, non reinforced	36	Non reinforced concrete cast-in-placed without forms by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	0.1	$16.09
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.39	0.5	$4.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	1.5	$34.62
Materials						
Habitat Box, Bird	251	Bluebird nesting box to increase nesting success. Each is 1-1/2" x 6" x 12-1/2" w/ 1-1/2" diameter opening. Includes materials and shipping.	Each	$30.49	1	$30.49
Post, Wood, CCA treated, 6" x 8'	12	Wood Post, End 6" X 8', CCA Treated. Includes materials and shipping only.	Each	$14.96	1	$14.96

Practice: 649 - Structures for Wildlife

Scenario: #3 - Nesting Box, Large

Scenario Description:

A structure is provided to support the nesting and rearing of larger targeted species such as waterfowl, bats and barn owls, and is directly mounted to a tree, building or other structure. These structures are designed to meet targeted species biology and life history needs. Addresses Resource Concern: Inadequate Cover/Shelter.

Before Situation:

These structures are targeted for areas that lack sufficient overall habitat conditions to support viable populations of targeted species. Increased predation of target and non-targeted species may or may not be a problem. A suitable location to mount the box is available.

After Situation:

The installation of nesting and rearing boxes support the life-cycle needs of targeted speces, such as birds, bats and pollinators. Because of suitable location and conditions the nesting box can be directly mounted such as on a tree or building, thereby eliminating the need for mounting poles and predator guards. Species such as cavity dwelling birds and pollinators use this approach, but this treatment is not limited to those species. These structures/features enhance habitat, cover, and improve species survivability.

Scenario Feature Measure: Number

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $94.63 **Scenario Cost/Unit:** $94.63

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	1	$23.08
Materials						
Habitat Box, waterfowl	1449	Wood Duck Box, typically 24" x 11" x 12" with 4" wide oval entrance, single. Includes material and shipping only.	Each	$71.55	1	$71.55

Practice: 649 - Structures for Wildlife

Scenario: #4 - Nesting Box, Large, with steel pole

Scenario Description:

Constructing a nest box on a steel pole with a predator guard where needed. A structure is provided to support the nesting and rearing of larger targeted species such as waterfowl, bats and barn owls. These structures are designed to meet targeted species biology and life history needs. Addresses Resource Concern: Inadequate Cover/Shelter.

Before Situation:

These structures are targeted for areas that lack sufficient overall habitat conditions to support viable populations of targeted species. Increased predation of target and non-targeted species may also be a problem.

After Situation:

The installation of pole mounted nesting and rearing boxes support the life-cycle needs of targeted speces, such as bats and waterfowl. Predator guards provide needed protection of target species during nesting and rearing. These structures/features enhance habitat, cover, and reduce predation.

Scenario Feature Measure: Number

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $363.55 **Scenario Cost/Unit:** $363.55

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.39	0.5	$4.20
Concrete, CIP, formless, non reinforced	36	Non reinforced concrete cast-in-placed without forms by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	0.1	$16.09
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	1.5	$34.62
Materials						
Pipe, steel, galvanized, threaded, 1¼ ", schedule 40	256	Spec. A-53, includes coupling and clevis hanger assembly sized for covering, 10' OC	Foot	$20.78	10	$207.80
Habitat Box, waterfowl	1449	Wood Duck Box, typically 24" x 11" x 12" with 4" wide oval entrance, single. Includes material and shipping only.	Each	$71.55	1	$71.55
Predator Guard	1461	Predator guards (i.e. stove pipes, cone, hole guard, etc.) for habitat boxes. Materials only. Includes material and shipping only.	Each	$29.29	1	$29.29

Practice: 649 - Structures for Wildlife

Scenario: #5 - Raptor Perch Pole

Scenario Description:

A structure is provided to improve wildlife habitat by providing a raptor perch. These structures are designed to meet targeted species biology and life history needs. Poles are typically 12 to 15 feet above the ground surface, and buried 3 ft or more. Resource Concern: Inadequate Space, Habitat Framentation

Before Situation:

These structures are targeted for areas that lack sufficient overall habitat conditions to support viable populations of targeted species. Insufficient perch locations are available.

After Situation:

The installation of a raptor perch pole enhances the overall habitat needs of targeted species. These structures/features enhance habitat and improve species survivability.

Scenario Feature Measure: Number

Scenario Unit: Number

Scenario Typical Size: 1

Scenario Cost: $589.43 **Scenario Cost/Unit:** $589.43

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, formless, non reinforced	36	Non reinforced concrete cast-in-placed without forms by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	0.1	$16.09
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	1	$23.08
Materials						
Pipe, steel, galvanized, threaded, 2", schedule 40	257	Spec. A-53, includes coupling and clevis hanger assembly sized for covering, 10' OC	Foot	$30.57	18	$550.26

Practice: 649 - Structures for Wildlife

Scenario: #6 - Burrowing Owl Burrow (set of 2)

Scenario Description:

A structure is provided to improve wildlife habitat by providing 2 burrowing owl burrows. These structures are designed to meet targeted species biology and life history needs. Two nesting locations are provided per site. Each nesting site has two points of access. The two nest locations may also be connected. Resource Concerns: Inadequate Cover/Shelter, Threatened and Endangered Fish and Wildlife Species: Species of Concern.

Before Situation:

These structures are targeted for areas that lack sufficient overall habitat conditions to support viable populations of targeted species. Insufficient natural burrow locations are available.

After Situation:

The installation of a burrowing owl burrow enhances the overall habitat needs of targeted species. These structures/features enhance habitat and improve species survivability.

Scenario Feature Measure: Number

Scenario Unit: Number

Scenario Typical Size: 1

Scenario Cost: $392.92 **Scenario Cost/Unit:** $392.92

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	2	$112.42
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	2	$44.66
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	2	$46.16
Materials						
Bucket, 5 gal	1758	5 gallon plastic bucket. Materials only.	Each	$2.74	2	$5.48
Pipe, HDPE, 4", PCPT, Single Wall	1270	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 4" diameter - ASTM F405. Material cost only.	Foot	$0.45	60	$27.00
Pipe, PVC, 6", SCH 40	980	Materials: - 6" - PVC - SCH 40 - ASTM D1785	Foot	$6.55	24	$157.20

Practice: 649 - Structures for Wildlife

Scenario: #7 - Brush and Rock Piles

Scenario Description:

A brush pile or rock pile provides improved wildlife habitat by providing resting and escape cover. These structures are located and constructed to meet targeted species biology and life history needs. While size varies, brush piles are typically 10 ft in diameter and 6 ft high at the center. Multiples brush piles are better than one larger pile, and two to four piles per acre of area adjacent to woodlands is desirable. Piles are typically 200 to 300 ft apart. Stumps, logs, rocks and pipes are typically placed at the bottom with limbs and leaves placed on top, thereby allowing easy access to the bottom of the pile. These piles can provide nesting habitat, resting areas, concealment, and protection from some predators for birds, rabbits, and other small mammals. Rock piles provide shelter and basking areas for amphibians and reptiles such as frogs, lizards, salamanders and snakes. Large rocks are typically placed at the bottom. Often depressions are dug in the ground surface and covered with flat rocks to create temporary pools for breeding frogs and salamanders. Rocks absorb heat in the day and radiate heat at night. Materials for brush and rock piles are collected locally.

Before Situation:

These structures are targeted for areas that lack sufficient overall habitat conditions to support viable populations of targeted species. Insufficient ground cover is available for resting, basking, and escape cover. Existing brushy cover is is lacking or not well distributed.

After Situation:

The installation of a brush piles and rock piles enhances the overall habitat needs of numerous terrestrial species. These structures/features enhance habitat and improve species survivability. By providing resting, basking, and escape cover, larger open spaces are more effectively used by ground nesting birds, amphibians, reptiles,and small mammals. Increased cover reduces predation.

Scenario Feature Measure: Number of Piles

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $271.98 **Scenario Cost/Unit:** $271.98

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	2	$86.64
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	4	$25.28
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	2	$44.66
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	5	$115.40

Practice: 649 - Structures for Wildlife

Scenario: #8 - Escape Ramp

Scenario Description:

Retrofit an existing watering trough/tank with an appropriately designed and installed wildlife escape ramp to reduce wildlife mortality and improve wildlife habitat. Typical ramps are built according to 614 practice standard and guidance in "Water for Wildlife" publication: http://www.batcon.org/pdfs/water/bciwaterforwildlife.pdf

Before Situation:

These structures are targeted for containers (tank, trough, or other watertight container) or small basins provisioning livestock water that currently restrict birds, small mammals, amphibians and other wildlife species from the ability to escape these confined structures once entered.

After Situation:

Watering facilities and basins equipped with escape ramps facilitate movement of the trapped wildlife species across these ramps and safely exist from the watering facility or basin. These structures are constructed along side of the watering facility extending from the to the bottom of the container to the top inside edge. Appropriate placement at an angle and flush to the container wall enhances the successful use of escaping animal.

Scenario Feature Measure: Each Ramp

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $47.55 **Scenario Cost/Unit:** $47.55

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	1	$23.08
Materials						
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.47	1	$24.47

Practice: 649 - Structures for Wildlife

Scenario: #9 - Fence Markers, Vinyl Undersill

Scenario Description:

Existing fences are retrofitted with vinyl markers that increase wire visibility and reduce mortality due to collision for wildlife species of concern like sage-grouse. Markers are installed approximately every 3 feet along top wire. Scenario is typically implemented along fences in potential high risk areas (red areas in SGI Fence Collision Risk Model) or where a known problem exists.

Before Situation:

Wire fences located in high risk areas of sage-grouse breeding or winter concentration grounds pose a collision threat to sage-grouse. Collisions contribute to mortality for a declining species.

After Situation:

Fences pose little-to-no risk for sage-grouse. This infrastructure threat is considered ameliorated. [This wholly benefical practice can minimize risk of wildife injury or death associated with fences, according to USFWS SGI Conference Report.]

Scenario Feature Measure: feet of fence marked

Scenario Unit: Foot

Scenario Typical Size: 1,320

Scenario Cost: $198.95 **Scenario Cost/Unit:** $0.15

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	1	$30.75
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	5	$115.40
Materials						
Vinyl Undersill Strips	241	Marking material using the "undersill" strips of vinyl siding made by Georgia Pacific. Priced per foot of fence per each wire. Materials only.	Foot	$0.04	1320	$52.80

Practice: 649 - Structures for Wildlife

Scenario: #10 - Nesting Islands (set of 3)

Scenario Description:

This practice involves constructing, maintaining, and monitoring loafing structures to provide nesting/loafing cover for waterbirds, reptiles, and amphibians. This practice applies to croplands grown to rice or other flooded cropland capable of water level management. A habitat appraisal guide has identified that nesting/loafing cover is a limiting factor for shorebirds, waterbirds, waterfowl, or other wetland wildlife and where natural recovery of that habitat element is either unlikely or will take many years to naturally develop. Each island will be a minimum of 800 sqft above the waterline with slopes of between 8:1 and 10:1 with a one foot freeboard. There will be one created island per 10 acres with a minimum of three islands per project. Vegetated areas can be used for breeding waterfowl; encourage non-vegetated areas for breeding shorebirds.
Resource Concern: Inadequate Habitat for Fish and Wildlife.

Before Situation:

This practice applies to croplands grown to rice or other crops capable of being managed for shallow water management objectives, where a habitat appraisal guide has identified that nesting/loafing cover is a limiting factor for shorebirds, waterbirds, waterfowl, or other wetland wildlife and where natural recovery of that habitat element is either unlikely or will take many years to naturally develop.

After Situation:

3 islands constructed to a minimum of 800 sqft above the waterline with slopes of between 8:1 and 10:1 with a one foot freeboard. There will be one created island per 10 acres. Three island minimum per project. Creating islands provides suitable nesting/ loafing areas withing the flooded agricultural fields and offsets the lack of protected uplands for nesting or loafing shorebirds, waterfowl, reptiles, and amphibians.

Scenario Feature Measure: 3 Nesting Islands

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $4,749.64 **Scenario Cost/Unit:** $4,749.64

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$187.13	20	$3,742.60
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	20	$750.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 649 - Structures for Wildlife

Scenario: #11 - Snag Creation

Scenario Description:

Create snags from existing live trees to provide nesting, foraging, perching, thermal cover, and display habitat for target species such as cavity nesting birds (woodpeckers, songbirds, wood duck, etc), small mammals (shrew, chipmunk, flying squirrel, bats, etc.), amphibians and reptiles and bumble bees. Trees must be at least 12" DBH. Resulting snag will be a minimum of 25' tall. Snag creation methods may include girdling, chemical injection, or high topping.

Before Situation:

These structures are targeted for areas that lack sufficient snag habitat conditions to support viable populations of targeted species. Insufficient cavity nests, foraging, and perching habitat exists on the planning unit. Existing snag habitat is lacking or not well distributed.

After Situation:

Snag creation enhances the overall habitat condition for numerous terrestrial species. These structures/features enhance habitat and improve species survivability. By providing cavity nesting sites, invertebrate foraging area, perching/hunting opportunities, and thermal cover/escape cover, larger open spaces are more effectively used by cavity nesting birds and pollinators, amphibians, reptiles,and small mammals. Increased cover reduces predation.

Scenario Feature Measure: Number of snags

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $26.24 **Scenario Cost/Unit:** $26.24

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	0.5	$3.16
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	1	$23.08

Practice: 649 - Structures for Wildlife

Scenario: #12 - Downed Large Wood-Upland

Scenario Description:

Large log is placed on the upland or riparian forest floor to provide cover, denning, thermal regulation, and/or forage sites for wildlife species such as small mammals, amphibians, and game birds. Large wood is defined as a minimum log diameter of 12" and 20 ft long lenght. Forest terrian is moderate with existing forest road infrastructure. Log sections are cut on site or hauled. Installation of downed logs deemed necessary following a Wildlife Habitat Evaulation score below planning critiera level. Primary Resouce concern is Inadequate Habitat for Fish or Wildlife-habitat degradation. This practice may be installed alone or in combination with facilitating practices. Facilitating practices may include but not limited to: 382, 391,612, 660 and 666.

Before Situation:

A habitat assessment (using State Office approved habitat assessment method, protocol or tool) has indicated a need for increased structural complexity in the forest understory to bring one or more habitat limiting factors under Inadequate Habitat for Fish or Wildlife, up to planning criteria. Upland habitat limiting factors include quality, quantity and continuity of forage, cover, shelter, space and water avalability. The structures can be installed within a quarter mile of a driveable road and terrain is gentle to moderate.

After Situation:

Installation of downed large wood brings the identified deficient habitat limiting factors up to planning criteria. The practice is installed using general labor with minimal supervision or skilled labor without supervision with use of common hand tools and small equipment;

Scenario Feature Measure: Number of stems large wood

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $173.31 **Scenario Cost/Unit:** $173.31

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	1.5	$64.98
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	1.5	$34.62
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	1.5	$33.50
Materials						
Log, un-anchored	2035	Price of log picked up at the Mill. Includes material only.	Ton	$40.21	1	$40.21

Practice: 649 - Structures for Wildlife

Scenario: #13 - Wetland Basking Structure

Scenario Description:

Constructing, installing, maintaining, and monitoring basking structures to provide basking/loafing cover. It is applied in wetlands and ponds where a habitat evaluation has revealed that basking/loafing cover is a limiting factor for turtles, amphibians, or other wetland wildlife and where natural recovery of that habitat element is either unlikely or will take many years. Basking structures usually consist of a large dead tree, preferrable conifer were appropriate, placed in a wetland/pond in direct sunlight. An ideal basking log will have equal surface area exposed to the sun and submerged under water as a place for turtles and amphibians to hide if startled. Structures are anchored to reduce movement.

Before Situation:

Existing habitat in wetlands and ponds possess inadequated basking/loafing cover for turtles, amphibians, or other wetland wildlife. Natural recovery of that habitat element is either unlikely or will take many years.

After Situation:

Basking Structure is installed by placing a large log a minimum of 12" diameter into a wetland or pond in an open canopy area. The bottom half of the log is submerged and the top half is in direct sunlight. enough structures are installed so that basking habitat has been increased and/or restored to the area.

Scenario Feature Measure: each

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $1,491.28 **Scenario Cost/Unit:** $1,491.28

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$54.81	2	$109.62
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	2	$44.66
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$65.35	2	$130.70
Log, un-anchored	2035	Price of log picked up at the Mill. Includes material only.	Ton	$40.21	30	$1,206.30

Practice: 650 - Windbreak/Shelterbelt Renovation

Scenario: #1 - Sod Release

Scenario Description:

Reduce competition from sod around trees/shrubs within a windbreak/shelterbelt. Apply appropriate herbicide to stress or kill competing sod vegetation between and/or within tree/shrub row. A herbicide application is completed to significantly reduce competition from sod (grass) in the windbreak. Resouce concerns: Degrade plant condition- undesirable plant productivity and health; Livestock Production- Inadequate livestock shelter.

Before Situation:

1000 feet of livestock shelterbelt, 3 row mix of deciduous and conifer trees/shrubs deteriorating due to being sod bound.

After Situation:

Integrity of windbreak restored. Domestic animal protection restored.

Scenario Feature Measure: Length of Renovation

Scenario Unit: Linear Feet

Scenario Typical Size: 1,000

Scenario Cost: $671.26 **Scenario Cost/Unit:** $0.67

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	2	$74.62
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	1	$5.83
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	3	$329.82
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	3	$69.24
Materials						
Herbicide, Sethoxydim	339	A selective post emergence herbicide used to control annual and perennial grass weeds. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$19.14	1	$19.14
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: 650 - Windbreak/Shelterbelt Renovation

Scenario: #2 - Thinning

Scenario Description:

Windbreak is thinned by hand w/chainsaw and cut stumps have herbicide applied to prevent undesirable sprouting. Slash is treated using Woody Residue Treatment (384) when needed. Resouce concern is degraded plant condition- undesirable plant productivity and health.

Before Situation:

Windbreak functionality has decreased. Windbreak tree and/or shrub species are overly dense and do not provide the desired wind protection.

After Situation:

Integrity of windbreak restored, function and health improved.

Scenario Feature Measure: Length of Renovation

Scenario Unit: Linear Feet

Scenario Typical Size: 500

Scenario Cost: $867.17 **Scenario Cost/Unit:** $1.73

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	10	$63.20
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$57.01	2	$114.02
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	1	$37.31
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	3	$329.82
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	10	$230.80
Materials						
Herbicide, Triclopyor	338	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$42.30	0.5	$21.15
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	1	$70.87

Practice: 650 - Windbreak/Shelterbelt Renovation

Scenario: #3 - Pruning

Scenario Description:

Windbreak is pruned by hand (hand tools + chainsaw) to improve shape and form of trees and/or shrubs so that the overall effectiveness of the windbreak will improve. Slash is treated using associated practice 384-Woody Residue Treatment to prevent potential insect, disease, fire and operability problems.

Before Situation:

The windbreak tree and or shrub species have become to 'leggy' (grown to tall) or are growing beyond the bounds of the designated windbreak area. Overall density of windbreak is lower than desired optimum. Resource concern is Degrade plant condition- undesirable plant productivity and health; Livestock Production-Inadequate livestock shelter.

After Situation:

Integrity of windbreak restored; impacts of wind reduced. 500 feet of windbreaks or shelterbelts

Scenario Feature Measure: Length of Renovation

Scenario Unit: Linear Feet

Scenario Typical Size: 500

Scenario Cost: $755.73 **Scenario Cost/Unit:** $1.51

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Pruning tools, hand tools	1318	Pruning tools, hand tools, shears, loppers, pole saw, handsaw. Material costs only. Labor not included.	Hour	$4.77	2	$9.54
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	8	$50.56
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	3	$111.93
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	11	$253.88
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	3	$329.82

Practice: 650 - Windbreak/Shelterbelt Renovation

Scenario: #4 - Removal, Chain Saw, Replanting

Scenario Description:

Windbreak renovation requires the removal of degraded or inappropriate trees or shrubs within a windbreak; typically using a chain saw and/or other hand tools followed by replanting. This may include removal of entire rows, including stumps or roots, or selected trees/shrubs in order to prepare for the necessary planting of a replacement row within the windbreak, improve the health of the remaining rows, and/or allow for supplemental planting to expand the windbreak. Scenario includes supplemental planting to fill in gaps as needed. For treatment of slash, use associated Practice 384-Woody Residue Treatment when needed. Resource concerns: Degraded plant condition-undesirable plant productivity and health; Livestock Production-Inadequate livestock shelter, Soil erosion-wind.

Before Situation:

Plant (trees and/or shrubs) health has degraded decreasing the effectiveness of the original windbreak design. Plants lack leaf cover, have dead branches, gaps of no live green material and some are completley dead. Wind now moves freely thru areas that lack any leaves.

After Situation:

Integrity and function of windbreak restored. 500 feet of windbreak/shelterbelt renovated. Trees/Shrubs have been planted to supplement the areas cleared.

Scenario Feature Measure: Length of Renovation

Scenario Unit: Linear Feet

Scenario Typical Size: 500

Scenario Cost: $1,309.25 **Scenario Cost/Unit:** $2.62

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	6	$37.92
Pruning tools, hand tools	1318	Pruning tools, hand tools, shears, loppers, pole saw, handsaw. Material costs only. Labor not included.	Hour	$4.77	2	$9.54
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	3	$111.93
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	3	$329.82
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	13	$300.04
Materials						
Tree, conifer, seedling, containerized, 15 cu. in.	1520	Containerized conifer stock, 15 cubic inches (e.g. 2.0" x 6"). Includes materials and shipping only.	Each	$0.60	25	$15.00
Tree, hardwood, seedling or transplant, bare root, 16-36"	1510	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.86	25	$21.50
Tree, conifer, seedling or transplant, potted, 1/2 to 1 gal.	1536	Potted conifer, 1/2 to 1 gal. Includes materials and shipping only.	Each	$4.42	25	$110.50
Tree shelter, solid tube type, 3-1/4" x 24"	1559	3-1/4" x 36" tree tube for protection from animal damage. Materials only.	Each	$1.67	125	$208.75
Shrub, seedling or transplant, bare root, 36-60"	1508	Bare root shrubs 3 to 5 foot tall. Includes materials and shipping only.	Each	$1.73	25	$43.25
Tree, hardwood, seedling or transplant, potted, 1/2 to 1 gal.	1531	Potted hardwood tree, 1/2 to 1 gal. Includes materials and shipping only.	Each	$4.84	25	$121.00

Practice: 650 - Windbreak/Shelterbelt Renovation

Scenario: #5 - Removal, <8 inches DBH with Skidsteer, Replanting

Scenario Description:

Renovate a windbreak or shelterbelt using heavy equipment to remove selected trees with average DBH < 8 Inches and replant with appropriate trees/shrubs to fill in gaps. Typically trees and shrubs are cleared by a Skidsteer using a tree sheer or saw. All slash material from cutting and pruning treated is either scattered and crushed, piled and crushed, chipped or removed from the treatment area. Use associated Practice: 384-Woody Residue Treatment where needed. Resource concerns include: Degraded plant condition-undesirable plant productivity and health; Livestock Production-Inadequate livestock shelter, Soil erosion-wind.

Before Situation:

Plant (trees and/or shrubs) health has degraded decreasing the effectiveness of the original windbreak design. Plants lack leaf cover, have dead branches, gaps of no live green material and some are completley dead. Wind now moves freely thru areas that lack any leaves.

After Situation:

Integrity and function of windbreak restored. Typical length - 500'. Trees/Shrubs have been planted to supplement the areas cleared.

Scenario Feature Measure: Length of Renovation

Scenario Unit: Linear Feet

Scenario Typical Size: 500

Scenario Cost: $1,894.73 **Scenario Cost/Unit:** $3.79

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	6	$259.92
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	5	$115.40
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	3	$329.82
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	7	$156.31
Materials						
Tree, conifer, seedling or transplant, potted, 1/2 to 1 gal.	1536	Potted conifer, 1/2 to 1 gal. Includes materials and shipping only.	Each	$4.42	25	$110.50
Tree shelter, solid tube type, 3-1/4" x 24"	1559	3-1/4" x 36" tree tube for protection from animal damage. Materials only.	Each	$1.67	125	$208.75
Shrub, seedling or transplant, bare root, 36-60"	1508	Bare root shrubs 3 to 5 foot tall. Includes materials and shipping only.	Each	$1.73	25	$43.25
Tree, conifer, seedling, containerized, 15 cu. in.	1520	Containerized conifer stock, 15 cubic inches (e.g. 2.0" x 6"). Includes materials and shipping only.	Each	$0.60	25	$15.00
Tree, hardwood, seedling or transplant, bare root, 16-36"	1510	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.86	25	$21.50
Tree, hardwood, seedling or transplant, potted, 1/2 to 1 gal.	1531	Potted hardwood tree, 1/2 to 1 gal. Includes materials and shipping only.	Each	$4.84	25	$121.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 650 - Windbreak/Shelterbelt Renovation

Scenario: #6 - Removal, > 8 inches DBH with Dozer, Replanting

Scenario Description:

Windbreak renovation requires the removal of degraded or inappropriate trees with an average DBH >8" within a windbreak and replant with appropriate trees/shrubs to fill in gaps. Typically a dozer is used to remove either entire rows, including stumps or roots, or selected trees/shrubs within the windbreak. Use associated Practice: 384-Woody Residue Treatment where needed. Resource concerns include Degraded plant condition- undesirable plant productivity and health; Livestock Production-Inadequate livestock shelter, Soil erosion- wind.

Before Situation:

Plant (trees and/or shrubs) health has degraded decreasing the effectiveness of the original windbreak design. Plants lack leaf cover, have dead branches, gaps of no live green material and some are completley dead. Wind now moves freely thru areas that lack any leaves.

After Situation:

Integrity and function of windbreak restored. Wind impacts are reduced by renovating 500 foot windbreaks or shelterbelts using heavy equipment to remove selected trees with average DBH > 8 inches. Typically trees and shrubs are cleared by dozer (D-6 or equivalent) using a brush rake or blade. All slash material from cutting and pruning is either scattered and crushed, piled and crushed, chipped or removed from the treatment area. Trees/Shrubs have been planted to supplement the areas cleared.

Scenario Feature Measure: Length of Renovation

Scenario Unit: Linear Feet

Scenario Typical Size: 500

Scenario Cost: $2,466.53 **Scenario Cost/Unit:** $4.93

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	6	$748.68
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	5	$115.40
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	7	$262.64
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	3	$329.82
Materials						
Tree shelter, solid tube type, 3-1/4" x 24"	1559	3-1/4" x 36" tree tube for protection from animal damage. Materials only.	Each	$1.67	125	$208.75
Tree, conifer, seedling or transplant, potted, 1/2 to 1 gal.	1536	Potted conifer, 1/2 to 1 gal. Includes materials and shipping only.	Each	$4.42	25	$110.50
Tree, hardwood, seedling or transplant, bare root, 16-36"	1510	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.86	25	$21.50
Tree, conifer, seedling, containerized, 15 cu. in.	1520	Containerized conifer stock, 15 cubic inches (e.g. 2.0" x 6"). Includes materials and shipping only.	Each	$0.60	25	$15.00
Tree, hardwood, seedling or transplant, potted, 1/2 to 1 gal.	1531	Potted hardwood tree, 1/2 to 1 gal. Includes materials and shipping only.	Each	$4.84	25	$121.00
Shrub, seedling or transplant, bare root, 36-60"	1508	Bare root shrubs 3 to 5 foot tall. Includes materials and shipping only.	Each	$1.73	25	$43.25
Mobilization						

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99

Practice: 650 - Windbreak/Shelterbelt Renovation

Scenario: #7 - Supplemental Planting, Container

Scenario Description:

Parts of the windbreak being renovated have died. Supplemental plantings of containerized trees/shrubs will improve the effectiveness and longevity of the windbreak without the need for removal of degraded trees. Resource concerns include Soil erosion - Wind erosion, Degraded plant condition -Inadequate structure and composition, and Livestock production limitation - Inadequate livestock shelter.

Before Situation:

Dead trees/shrubs are inhibiting windbreak effectiveness or windbreak allows too much air passage to serve intended purpose.

After Situation:

The integrity and function of the windbreak is restored. A one (1.0) acre windbreak/shelterbelt is expanded through the planting of containerized tree and shrub seedlings at a average spacing of 8' (shrubs 4'-6', deciduous/conifer trees 8'-12') within row and 15'-20' between rows. Planting is achieved through hand planting.

Scenario Feature Measure: Area of Renovation

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $1,569.46 **Scenario Cost/Unit:** $1,569.46

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	9	$104.58
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	3	$111.93
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	3	$329.82
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	11	$253.88
Materials						
Shrub, seedling or transplant, bare root, 18"-36"	1507	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.58	100	$58.00
Tree, hardwood, seedling or transplant, potted, 1/2 to 1 gal.	1531	Potted hardwood tree, 1/2 to 1 gal. Includes materials and shipping only.	Each	$4.84	25	$121.00
Tree, hardwood, seedling or transplant, potted, 1 qt.	1529	Potted hardwood tree, 1 quart. Includes materials and shipping only.	Each	$3.20	25	$80.00
Tree, conifer, seedling or transplant, potted, 1 qt.	1534	Potted conifer tree, 1 quart. Includes materials and shipping only.	Each	$3.05	25	$76.25
Tree, conifer, seedling or transplant, potted, 1/2 to 1 gal.	1536	Potted conifer, 1/2 to 1 gal. Includes materials and shipping only.	Each	$4.42	25	$110.50
Stake, bamboo, 3/8" x 36"	1584	3/8" x 36" bamboo stakes to anchor items in place. Inlcudes materials and shipping only.	Each	$0.11	350	$38.50
Cable ties, plastic	1575	Plastic cable ties (typ. 8-12") to assist in securing items. Materials only.	Each	$0.05	350	$17.50
Tree shelter, mesh tree tube, 24"	1555	24" tall vexar or other open weave tubular tree shelter to protect from animal damage. Materials only.	Each	$0.52	350	$182.00
Tree, conifer, seedling, containerized, 10 cu. in.	1519	Containerized conifer stock, 10 cubic inches (approx 6" plug), 1.7" x 6"). Includes materials and shipping only.	Each	$0.57	150	$85.50

Practice: **650 - Windbreak/Shelterbelt Renovation**

Scenario: **#8 - Supplemental Planting, Bare Root**

Scenario Description:

Parts of the windbreak being renovated have died. Supplemental plantings of bare root trees/shrubs are planted by hand to improve the effectiveness and longevity of the windbreak without the need for removal of degraded trees. Resource concerns include Soil erosion - Wind erosion, Degraded plant condition - Inadequate structure and composition, and Livestock production limitation - Inadequate livestock shelter.

Before Situation:

Dead trees/shrubs are inhibiting windbreak effectiveness or windbreak allows too much air passage to serve intended purpose.

After Situation:

The integrity and function of the windbreak is restored. A one (1.0) acre windbreak/shelterbelt is expanded through the planting of bare root tree and shrub seedlings at a average spacing of 8' (shrubs 4'-6', deciduous/conifer trees 8'-12') within row and 15'-20' between rows. Planting is achieved through hand planting.

Scenario Feature Measure: Area of Renovation

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $598.58 **Scenario Cost/Unit:** $598.58

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	6	$69.72
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	2	$219.88
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	6	$138.48
Materials						
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.50	200	$100.00
Tree, conifer, seedling, bare root, 1-1	1513	Bare root conifer trees, 1-1 (2 years old). Includes materials and shipping only.	Each	$0.47	150	$70.50

Practice: 650 - Windbreak/Shelterbelt Renovation

Scenario: #9 - Coppicing

Scenario Description:

Coppicing of selected trees and understory vegetation in a windbreak/shelterbelt is needed to ensure that species composition and stand structure continue to serve their intended purpose. Resouce concern is Degraded plant condition- undesirable plant productivity and health.

Before Situation:

Species composition, stocking rate, and stand structure do not serve intended purpose.

After Situation:

The integrity and function of the windbreak is restored. One acre of windbreak/shelterbelt renovation carried out through manipulating species composition, stand structure, and stocking by the cutting of selected trees and understory vegetation for coppicing and by removing or disposing of slash so as to not interfere with the intended purpose. This manipulation does not include pruning.

Scenario Feature Measure: Area of Renovation

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $1,202.48 **Scenario Cost/Unit:** $1,202.48

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	8	$346.56
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	2	$46.16
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	10	$223.30
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	3	$329.82
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 654 - Road / Trail / Landing Closure and Treatment

Scenario: #1 - Light, Reshaping

Scenario Description:

Reshaping to natural conditions. This scenario includes using light equipment such as small backhoe and skidsteer for the installation of water control devices such as water bars, rolling dips, controlling access, use of woody residue and pulling drainages. This practice addresses one or more resource concerns: Excessive Sediment in surface waters, Habitat Degradation, and Concentrated Flow Erosion. Since not all segments of the road/trail system may require this level of treatment, this scenario applies only to those segments that are causing the resource concerns. For landing sites, an additional road length may be added to the quantities to include the area of landing addressed assuming a 14' width (i.e. for a landing that is 50x50 sq ft, add 178' of road length to the total quantity).

Before Situation:

The legacy trail/road are severely affecting wetland/riparian areas, slope stability, and water quality. The trail/roads can no longer serve its intended use and is incapable of handling needed equipment and traffic. Alternative access is possible, therefore abandonment and rehabilitation is the best way to address the resource concerns and problems that are being created.

After Situation:

The resource concerns are addressed by the abandonment of the road and its drainage elements, and by re-seeding to native grasses. The typical scenario includes using light equipment such as a backhoe for the installation of water control devices such as water bars, rolling dips, controlling access, use of woody residue and pulling drainages on 500 feet of road on 35% hill slopes and a moderate grade. Native vegetation is re-established by seeding. Some light hand work may be needed to clear site for the equipment.

Scenario Feature Measure: length

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $2,069.21 **Scenario Cost/Unit:** $4.14

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Water Bars	1500	Installation of graded trail water controlling structures such as water bars, broad based dips for erosion control. Typical cross section is 1.5 feet high with 4:1 side slopes yielding about 0.33 CY/ft of length.	Foot	$3.02	85	$256.70
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$54.18	4	$216.72
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$41.75	4	$167.00
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.09	3	$18.27
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	1	$10.20
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.52	1	$11.52
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$29.71	4	$118.84
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	6	$253.38
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	7	$174.72
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	12	$267.96
Materials						
One Species, Cool Season, Native Perennial Grass	2312	Native, cool season perennial grass. Includes material and shipping only.	Acre	$150.04	0.5	$75.02

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$249.44	2	$498.88

Practice: 654 - Road / Trail / Landing Closure and Treatment

Scenario: #2 - Heavy, <35% hillslope

Scenario Description:

The practice includes permanent road/trail/landing closure, treatment, or removal and hydrological reconnection of the hillslope to applicable drainage networks in areas requiring heavy equipment with hillslopes 35% or less. The treatment will prohibit future access. Tree/Shrub Site Prep and Planting is not included, however is recommended as an associated practice. When completed, there is no additional maintenance with heavy equipment needed. This practice addresses one or more resource concerns: Excessive Sediment in surface waters and Concentrated Flow Erosion. Since not all segments of the road/trail system may require this level of treatment, this scenario applies only to those segments that are causing the resource concerns. For landing sites, an additional road length may be added to the quantities to include the area of landing addressed assuming a 14' width (i.e. for a landing that is 50x50 sq ft, add 178' of road length to the total quantity).

Before Situation:

The legacy trail/road is severely affecting wetlands, riparian areas, slope stability, water quality and possibly T&E species. The trail/road can no longer serve its intended use and is incapable of handling needed equipment and traffic. Alternative access is possible. Therefore abandonment and site restoration are the best approaches to address the resource concerns and problems that are being created.

After Situation:

The resource concerns are addressed by the abandonment of the road and its drainage elements, and by re-seeding to native grasses. Road abandonment meets local and state requirements. The typical scenario includes decommissioning 500 ft of an 18-foot wide trail/road with a landing on 30% forest slopes, using heavy equipment such as a bulldozer or similar equipment (excavator or road grader with ripper) to re-shape and obliterate the road base and landings in order to re-establish native vegetation. It also includes restoring hydrology with the removal of culverts and drainage fills. Necessary erosion control measures such as water bars are installed. Some hand-work may be necessary to clear the site for the equipment. The work will be supervised by a consultant forester, land manager, or other resource professional.

Scenario Feature Measure: length

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $4,002.78 **Scenario Cost/Unit:** $8.01

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	1	$10.20
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$110.36	3	$331.08
Water Bars	1500	Installation of graded trail water controlling structures such as water bars, broad based dips for erosion control. Typical cross section is 1.5 feet high with 4:1 side slopes yielding about 0.33 CY/ft of length.	Foot	$3.02	225	$679.50
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.52	1	$11.52
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$35.97	8	$287.76
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$41.75	3	$125.25
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$65.02	6	$390.12
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.09	4	$24.36
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	10	$249.60

Labor

Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	3	$66.99
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.48	13	$500.24
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	6	$253.38

Materials

One Species, Cool Season, Native Perennial Grass	2312	Native, cool season perennial grass. Includes material and shipping only.	Acre	$150.04	0.5	$75.02

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$249.44	4	$997.76

Practice: 654 - Road / Trail / Landing Closure and Treatment

Scenario: #3 - Heavy, >35% hillslope

Scenario Description:

The practice includes permanent road/trail/landing closure and treatment and the hydrological reconnection of the hillslope to applicable drainage networks in areas requiring heavy equipment with hillslopes > 35%. The treatment will limit future access. Tree/Shrub Site Prep and Planting is not included, however it is recommended as an associated practice. When completed, there is no additional maintenance with heavy equipment needed. This practice addresses one or more resource concerns: Excessive Sediment in surface waters and Concentrated Flow Erosion. Since not all segments of the road/trail system may require this level of treatment, this scenario applies only to those segments that are causing the resource concerns. For landing sites, an additional road length may be added to the quantities to include the area of landing addressed assuming a 14' width (i.e. for a landing that is 50x50 sq ft, add 178' of road length to the total quantity). For landing sites, an additional road length may be added to the quantities to include the area of landing addressed assuming a 14' width (i.e. for a landing that is 50x50 sq ft, add 178' of road length to the total quantity).

Before Situation:

The legacy trail/road is severely affecting wetlands, riparian areas, unstable slopes, water quality, and possibly T&E species. The trail/road can no longer serve its intended use and is incapable of handling needed equipment and traffic. Alternative access was possible. Therefore abandonment and site restoration are the best approaches to address the resource concerns and problems that are being created.

After Situation:

The resource concerns are addressed by the abandonment of the road and its drainage elements, and by re-seeding to native grasses and forbs. Road abandonment meets local and state requirements. The typical scenario includes decommissioning a 24-foot wide, earthen road with landings on forest slopes over 35%, using a bulldozer or other heavy equipment such as an excavator, dozer and/or road grader with ripper to re-shape and obliterate the road base and landings in order to re-establish native vegetation. It also includes restoring hydrology with the removal of culverts, drainage fills, as well as stabilizing cuts & fills. Necessary erosion control measures such as outsloping, rolling dips, or water bars are installed. The steep slopes make this scenario costly due to the increased time needed to apply the measures and the need for additional water control devices or cut & fill stabilization. Some hand-work may be necessary to clear the site for the equipment. The work will be supervised by a consultant forester, land manager, or other resource professional.

Scenario Feature Measure: length

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $6,505.64 **Scenario Cost/Unit:** $13.01

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$35.97	8	$287.76
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.09	2	$12.18
Water Bars	1500	Installation of graded trail water controlling structures such as water bars, broad based dips for erosion control. Typical cross section is 1.5 feet high with 4:1 side slopes yielding about 0.33 CY/ft of length.	Foot	$3.02	480	$1,449.60
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.52	1	$11.52
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	1	$10.20
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$184.47	6	$1,106.82
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$41.75	6	$250.50
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$65.02	8	$520.16
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$54.18	4	$216.72

Labor

Labor

Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	8	$337.84
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	10	$249.60
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	8	$178.64
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.48	22	$846.56

Materials

One Species, Cool Season, Native Perennial Grass	2312	Native, cool season perennial grass. Includes material and shipping only.	Acre	$150.04	0.5	$75.02

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$476.26	2	$952.52

Practice: 654 - Road / Trail / Landing Closure and Treatment

Scenario: #4 - Catastrophic, >35% hillslope

Scenario Description:

The post-catastrophic practice includes road/trail/landing closure and treatment and the hydrological reconnection of the hillslope to applicable drainage networks in areas requiring heavy equipment with hillslopes > 35%. The treatment will limit future access. Tree/Shrub Site Prep and Planting is not included, however it is recommended as an associated practice. When completed, there is no additional maintenance with heavy equipment needed. This practice addresses one or more resource concerns: Excessive Sediment in surface waters and Concentrated Flow Erosion. Since not all segments of the road/trail system may require this level of treatment, this scenario applies only to those segments that are causing the resource concerns. For landing sites, an additional road length may be added to the quantities to include the area of landing addressed assuming a 14' width (i.e. for a landing that is 50x50 sq ft, add 178' of road length to the total quantity). For landing sites, an additional road length may be added to the quantities to include the area of landing addressed assuming a 14' width (i.e. for a landing that is 50x50 sq ft, add 178' of road length to the total quantity).

Before Situation:

The trail/road used for the catastrophic event is severely affecting wetlands, riparian areas, unstable slopes, water quality, and possibly T&E species. The trail/road can no longer serve its intended use and is incapable of handling needed equipment and traffic. Alternative access was possible. Therefore abandonment and site restoration are the best approaches to address the resource concerns and problems that are being created.

After Situation:

The resource concerns are addressed by the abandonment of the road and its drainage elements, and by re-seeding to native grasses and forbs. Road abandonment meets local and state requirements. Since the road may have been temporary or re-opened to address the event, the road bed and cut slopes are easer to disassemble than a legacy road.The typical scenario includes decommissioning a 24-foot wide, earthen road with landings or turnouts on forest slopes over 35%, using a bulldozer or other heavy equipment such as an excavator, dozer and/or road grader with ripper to re-shape and obliterate the road base and landings in order to re-establish native vegetation. It also includes restoring hydrology with the removal of drainage fills, as well as stabilizing cuts & fills. Necessary erosion control measures such as outsloping, rolling dips, or water bars are installed. The steep slopes make this scenario costly due to the increased time needed to apply the measures and the need for additional water control devices or cut & fill stabilization. Some hand-work may be necessary to clear the site for the equipment. The work will be supervised by a consultant forester, land manager, or other resource professional.

Scenario Feature Measure: length

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $5,689.10 **Scenario Cost/Unit:** $11.38

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$184.47	4	$737.88
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$35.97	8	$287.76
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.09	2	$12.18
Water Bars	1500	Installation of graded trail water controlling structures such as water bars, broad based dips for erosion control. Typical cross section is 1.5 feet high with 4:1 side slopes yielding about 0.33 CY/ft of length.	Foot	$3.02	480	$1,449.60
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.52	1	$11.52
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$65.02	8	$520.16
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$41.75	6	$250.50
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	1	$10.20
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.48	16	$615.68

Labor

Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	8	$337.84
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	8	$178.64
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	10	$249.60

Materials

One Species, Cool Season, Native Perennial Grass	2312	Native, cool season perennial grass. Includes material and shipping only.	Acre	$150.04	0.5	$75.02

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$476.26	2	$952.52

Practice: 654 - Road / Trail / Landing Closure and Treatment

Scenario: #5 - Light, Vegetative

Scenario Description:

Minimal re-shaping to natural conditions using light equipment and the establishment of permanent vegetation. This scenario includes using smaller equipment (ag tractor/skidsteer/small dozer/backhoe) for the installation of water control devices such as water bars and rolling dips, controlling access, and pulling drainages. Use associated practice, 484-Mulching, where needed to protect the newly seeded site with straw mulch. This practice addresses one or more resource concerns: Excessive Sediment in surface waters, Wildlife Habitat Degradation, and Concentrated Flow Erosion. Since not all segments of the road/trail system may require this level of treatment, this scenario applies only to those segments that are causing the resource concerns. For landing sites, an additional road length may be added to the quantities to include the area of landing addressed assuming a 14' width (i.e. for a landing that is 50x50 sq ft, add 178' of road length to the total quantity).

Before Situation:

Legacy trail/road is not necessary and is affecting wetlands, riparian areas, water quality, and possibly T&E species. The trail/road can no longer serve its intended use and is incapable of handling needed equipment and traffic. Alternative access was possible; therefore abandonment and site restoration are the best approaches to address the resource concerns and problems that are being created.

After Situation:

The re-vegetated, eliminated road addressed the resource concern. This scenario includes using smaller equipment (ag tractor/skidsteer/small dozer/backhoe) for the installation of water control devices such as water bars and rolling dips, controlling access, and pulling drainages on 500 feet of 12' wide road on 5%-35% hill slopes and little grade. Soil amendments are applied as per the FOTG guidance.

Scenario Feature Measure: length of landing/trail(s)

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $1,463.31 **Scenario Cost/Unit:** $2.93

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Lime application	953	Lime application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$9.30	1	$9.30
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$41.75	1	$41.75
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	1	$10.20
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.21	1	$6.21
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.52	1	$11.52
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$29.71	2	$59.42
Water Bars	1500	Installation of graded trail water controlling structures such as water bars, broad based dips for erosion control. Typical cross section is 1.5 feet high with 4:1 side slopes yielding about 0.33 CY/ft of length.	Foot	$3.02	100	$302.00
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.20	1	$15.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	8	$199.68
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	4	$89.32

Materials

Materials

Nitrogen (N), Ammonium Nitrate	69	Price per pound of N supplied by Ammonium Nitrate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.66	15	$9.90
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.28	10	$2.80
Lime, ENM	75	Fertilizer: Limestone Spread on field.	Ton	$52.79	1	$52.79
One Species, Cool Season, Native Perennial Grass	2312	Native, cool season perennial grass. Includes material and shipping only.	Acre	$150.04	1	$150.04
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.43	10	$4.30

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$249.44	2	$498.88

Practice: 654 - Road / Trail / Landing Closure and Treatment

Scenario: #6 - Riparian Zone, <35% hillslope

Scenario Description:

The practice includes permanent road/trail/landing closure, treatment, or removal in riparian areas adjacent to a watercourse where heavy equipment is required and hillslopes are 35% or less. Treatment will reconnect hydrology of the hillslope to applicable drainage networks and re-establish slopes and site to pre road conditions. Exposed soil is mulched and/or seeded (see associated practices 484-Mulching and 342-Critical Area Planting). The treatment will prohibit future access. Tree/Shrub Site Prep and Planting is not included, however is recommended as an associated practice. When completed, there is no additional maintenance with heavy equipment needed. This practice addresses one or more resource concerns: Excessive Sediment in surface waters and Concentrated Flow Erosion. Since not all segments of the road/trail system may require this level of treatment, this scenario applies only to those segments that are causing the resource concerns. For landing sites, an additional road length may be added to the quantities to include the area of landing addressed assuming a 14' width (i.e. for a landing that is 50x50 sq ft, add 178' of road length to the total quantity).

Before Situation:

The legacy trail/road is severely affecting wetlands, riparian areas, slope stability, water quality and possibly T&E species. The trail/road can no longer serve its intended use and is incapable of handling needed equipment and traffic. Alternative access is possible, therefore abandonment and site restoration are the best approaches to address the resource concerns and problems that are being created.

After Situation:

The resource concerns are addressed by the abandonment of the road and its drainage elements, and by re-seeding to native grasses. Site topography is restored to the pre-road conditions. Road abandonment meets local, state, and federal regulatory requirements. The typical scenario includes decommissioning a 500 ft of an 18-foot wide trail/road with a landing on 30% forest slopes, using heavy equipment such as a bulldozer or similar equipment (excavator or road grader with ripper) to re-shape and obliterate the road base and landings in order to re-establish pre-road slopes and native vegetation. It also includes restoring hydrology with the removal of culverts and drainage fills as well as stabilizing cuts and fills. Necessary erosion control measures such as outsloping or rolling dips are installed. Some hand-work may be necessary to clear the site for the equipment. Exposed soil surfaces near streams are mulched or covered with natural materials, such as slash or straw using associated practice 484-Mulching. The work will be supervised by a consultant forester, land manager, or other resource professional.

Scenario Feature Measure: length

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $5,089.58 **Scenario Cost/Unit:** $10.18

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.09	8	$48.72
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.52	1	$11.52
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$35.97	16	$575.52
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$41.75	6	$250.50
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$110.36	6	$662.16
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$65.02	12	$780.24
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	1	$10.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	16	$399.36
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	8	$178.64

Labor

Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.48	22	$846.56
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	6	$253.38

Materials

One Species, Cool Season, Native Perennial Grass	2312	Native, cool season perennial grass. Includes material and shipping only.	Acre	$150.04	0.5	$75.02

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$249.44	4	$997.76

Practice: 654 - Road / Trail / Landing Closure and Treatment

Scenario: #7 - Riparian Zone, >35% hillslope

Scenario Description:

The practice includes permanent road/trail/landing closure and treatment in riparian areas adjacent to a watercourse where heavy equipment is required and hillslopes are >35%. Treatment will reconnect hydrology of the hillslope to applicable drainage networks, and stabilize cuts and fills that have sedimentation potential to streams. Exposed soil is mulched and/or seeded (see associated practices 484-Mulching and 342-Critical Area Planting). The treatment will limit future access. Tree/Shrub Site Prep and Planting is not included, however it is recommended as an associated practice. When completed, there is no additional maintenance with heavy equipment needed. This practice addresses one or more resource concerns: Excessive Sediment in surface waters and Concentrated Flow Erosion. Since not all segments of the road/trail system may require this level of treatment, this scenario applies only to those segments that are causing the resource concerns. For landing sites, an additional road length may be added to the quantities to include the area of landing addressed assuming a 14' width (i.e. for a landing that is 50x50 sq ft, add 178' of road length to the total quantity). For landing sites, an additional road length may be added to the quantities to include the area of landing addressed assuming a 14' width (i.e. for a landing that is 50x50 sq ft, add 178' of road length to the total quantity).

Before Situation:

The legacy trail/road is severely affecting wetlands, riparian areas, stream ecosystems, unstable slopes, water quality, and possibly T&E species. The trail/road can no longer serve its intended use and is incapable of handling needed equipment and traffic. Alternative access was possible. Therefore abandonment and site restoration are the best approaches to address the resource concerns, regulatory issues, and problems that are being created.

After Situation:

The resource concerns are addressed by the abandonment of the road adjacent to watercourses, and its drainage elements, and by re-seeding to native grasses, forbs, and/or riparian plants. Road abandonment meets local, state, and federal regulatory requirements. The typical scenario includes decommissioning a 24-foot wide, earthen road with landings on forest slopes over 35%, using a bulldozer or other heavy equipment such as an excavator or road grader with ripper to re-shape and obliterate the road base and landings in order to re-establish slopes and site to pre-road conditions and to re-establish native vegetation. It also includes restoring hydrology with the removal of culverts and drainage fills as well as stabilize cuts and fills. Necessary erosion control measures such as outsloping and rolling dips are installed. The steep slopes in riparian zones make this scenario costly due to the increased time needed to apply the measures and the need for additional water and erosion control devices. Some hand-work may be necessary to clear the site for the equipment. Exposed soil surfaces near streams are mulched or covered with natural materials, such as slash or straw using associated practice 484-Mulching. The work will be supervised by a consultant forester, land manager, or other resource professional.

Scenario Feature Measure: length

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $8,621.14 **Scenario Cost/Unit:** $17.24

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$184.47	12	$2,213.64
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	1	$10.20
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$35.97	8	$287.76
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.52	1	$11.52
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$65.02	16	$1,040.32
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$54.18	8	$433.44
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$41.75	12	$501.00
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.09	4	$24.36

Labor

Labor

General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	20	$499.20
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	16	$357.28
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.48	40	$1,539.20
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	16	$675.68

Materials

One Species, Cool Season, Native Perennial Grass	2312	Native, cool season perennial grass. Includes material and shipping only.	Acre	$150.04	0.5	$75.02

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$476.26	2	$952.52

Practice: 654 - Road / Trail / Landing Closure and Treatment

Scenario: #8 - Catastrophic Event Riparian Zone, >35% hillslope

Scenario Description:

The post-catastrophic practice includes road/trail/landing closure and treatment in riparian areas adjacent to a watercourse where heavy equipment is required and hillslopes are >35%. Treatment will reconnect hydrology of the hillslope to applicable drainage networks, and stabilize cuts and fills that have sedimentation potential to streams. Exposed soil is mulched and/or seeded (see associated practices 484-Mulching and 342-Critical Area Planting). The treatment will limit future access. Tree/Shrub Site Prep and Planting is not included, however it is recommended as an associated practice. When completed, there is no additional maintenance with heavy equipment needed. This practice addresses one or more resource concerns: Excessive Sediment in surface waters and Concentrated Flow Erosion. Since not all segments of the road/trail system may require this level of treatment, this scenario applies only to those segments that are causing the resource concerns. For landing sites, an additional road length may be added to the quantities to include the area of landing addressed assuming a 14' width (i.e. for a landing that is 50x50 sq ft, add 178' of road length to the total quantity). For landing sites, an additional road length may be added to the quantities to include the area of landing addressed assuming a 14' width (i.e. for a landing that is 50x50 sq ft, add 178' of road length to the total quantity).

Before Situation:

The trail/road used for the catastrophic event is severely affecting wetlands, riparian areas, stream ecosystems, unstable slopes, water quality, and possibly T&E species. The trail/road no longer serves its intended use. Alternative access was possible. Abandonment and site restoration are the best approaches to address the resource concerns, regulatory issues, and problems that are being created.

After Situation:

The resource concerns are addressed by the abandonment of the road adjacent to watercourses, and its drainage elements, and by re-seeding to native grasses, forbs, and/or riparian plants. Since the road may have been temporary or re-opened to address the event, the road bed and cut slopes are easer to disassemble than a legacy road. Road abandonment meets local, state, and federal regulatory requirements. The typical scenario includes decommissioning a 24-foot wide, recently built earthen road on forest slopes over 35%, using a bulldozer or other heavy equipment such as an excavator or road grader with ripper to re-shape and obliterate the road base and landings in order to re-establish slopes and site to pre-road conditions and to re-establish native vegetation. It also includes restoring hydrology with the removal of drainage fills as well as stabilize cuts and fills. Necessary erosion control measures such as outsloping and rolling dips are installed. The steep slopes in riparian zones make this scenario costly due to the increased time needed to apply the measures and the need for additional water and erosion control devices. Some hand-work may be necessary to clear the site for the equipment. Exposed soil surfaces near streams are mulched or covered with natural materials, such as slash or straw using associated practice 484-Mulching. The work will be supervised by a consultant forester, land manager, or other resource professional.

Scenario Feature Measure: length

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $7,408.42 **Scenario Cost/Unit:** $14.82

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$65.02	16	$1,040.32
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.52	1	$11.52
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.20	1	$10.20
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$35.97	8	$287.76
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.09	4	$24.36
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$184.47	8	$1,475.76
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$54.18	8	$433.44
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$41.75	8	$334.00

Labor

Labor

General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.96	20	$499.20
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	16	$357.28
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$38.48	32	$1,231.36
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.23	16	$675.68

Materials

One Species, Cool Season, Native Perennial Grass	2312	Native, cool season perennial grass. Includes material and shipping only.	Acre	$150.04	0.5	$75.02

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$476.26	2	$952.52

Practice: 655 - Forest Trails and Landings

Scenario: #1 - Trail Layout

Scenario Description:

The use of professional assistance in trail design, assessment or redesign, location and layout. Installation costs are not included. Resource concerns include Concentrated flow erosion, and Excessive sediment in surface waters.

Before Situation:

Access to a forested tract is not available for the occasional travel by the landowner or manager for the purposes of monitoring, conservation activity or for the removal of forest products. Improperly designed and installed trails will cause soil erosion and water quality (sedimentation) problems. The trail will be assessed and/or installed as part a management operation such as conservation practice installation, timber harvesting, rehabilitation after a catistrophic event, and fire control. The access trail will not include extensive water control measures more common to access roads such as gravelling or ditching.

After Situation:

A trail system is assessed, designed and laid out that provides access to the forested tract and does not cause excessive erosion or water quality concerns.

Scenario Feature Measure: Length of trail designed

Scenario Unit: Feet

Scenario Typical Size: 5,280

Scenario Cost: $1,099.40 **Scenario Cost/Unit:** $0.21

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	10	$1,099.40

Practice: 655 - Forest Trails and Landings

Scenario: #2 - Trail and Landing Installation

Scenario Description:

Construction of forest trails and landings for the purpose of providing access to a gently sloping forested tract, Access will allow the application of other conservation practices, monitoring and the removal of forest products, usually after a catistrophic event. It is not, however, to be used if the installation is done to enable a commercial operation such as timber harvesting. Installation will include removal of trees and brush as needed, a minimum amount of blading and soil disturbance, and the installing of substantial water control measures such as water bars, broad-based dips, wing ditches, outsloping, etc. It will not include long-term, permanent measures more common to access roads such as gravelling or ditching. Installation will be supervised by a consultant forester, land manager, or other resource professional. Resource concerns include Excessive sediment in surface waters, Sheet & rill erosion, and Concentrated flow erosion

Before Situation:

Access to the tract is not available for occasional travel by the landowner or manager for the purposes of monitoring, installing conservation practices and/or the removal of forest products. Improperly installed trails and landings will cause soil erosion and water quality problems.

After Situation:

A trail system is installed that provides access to the forested tract and does not cause excessive erosion or water quality concerns.

Scenario Feature Measure: Length of trail treated

Scenario Unit: Feet

Scenario Typical Size: 2,000

Scenario Cost: $4,956.65 **Scenario Cost/Unit:** $2.48

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	10	$674.50
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	24	$1,039.68
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	8	$50.56
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	16	$596.96
Water Bars	1500	Installation of graded trail water controlling structures such as water bars, broad based dips for erosion control. Typical cross section is 1.5 feet high with 4:1 side slopes yielding about 0.33 CY/ft of length.	Foot	$3.10	225	$697.50
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	20	$461.60
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	34	$759.22
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	6	$247.38
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 655 - Forest Trails and Landings

Scenario: #3 - Access Rehab 10%-40% Hillside Slope

Scenario Description:

Repair and rehabilitation of a compacted earth trail in existing alignment (typically constructed using side cast methods) in areas where the hillside slope (slope across the road prism) is 10%-40%. Typical length of trail is 1,000 feet, 20% repaired. The extent of construction work over an existing alignment is assumed to average 20% of the work for a new installation. A properly constructed, well defined trail will address resource concerns related with compaction, emissions of fugitive dust, and excessive sediment in surface water. It also will improve the plant productivity, vigor and health and substantially reduce the chance of wild fire. Short term air quality deterioration may result if proper dust control measures are not implemented during the practice installation. Costs include excavation, shaping, grading, and all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

An agricultural or forestry enterprise with an existing access trail which is beyond its useful lifespan can no longer be used as intended without rehabilitation. If left in its current condition, it will result in continued compaction, excessive sediment in surface water and emissions of fugitive dusts. This scenario is applicable where the resource activity areas with an existing but dilapidated access road consist of relatively dry lands with steep sloped terrain.

After Situation:

The damaged portions of the trail will be repaired to a minimum of a full 14 feet width at the top, 50% in embankment and 50% in excavation less than 3 feet in height, (average 2 ft), typical side slopes 2:1. Out of total excavation, 80% is considered common earth excavation and 20% hard dig or rocks. Typical length is 1,000 of trail treated with 200' of rehabilitation. A properly repaired access trail will greatly reduce or eliminate compaction in land use areas where it is harmful, reduce emissions of fugitive dust and also reduce excessive sediment in surface water by reducing uncontrolled sediment transport and improving drainage of irrigated lands. Planned grades will include all dips and water bars. If brush clearing of land in the alignment area is required, use Land Clearing (460). Pipe culverts installed as part of access road should be covered by either Structures for Water Control (587), Stream Crossings (578) or Fish Passage (396) depending on the type of structure. Diversions constructed as part of access trail should be covered by Diversion (362). When seeding or revegetation is required, use Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of trail

Scenario Unit: Feet

Scenario Typical Size: 1,000

Scenario Cost: $3,072.36 **Scenario Cost/Unit:** $3.07

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	2	$134.90
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	110	$260.70
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	185	$667.85
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	75	$372.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	185	$814.00
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	2	$76.28
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 655 - Forest Trails and Landings

Scenario: #4 - Access Rehab >40% Hillside Slope

Scenario Description:

Repair and rehabilitation of compacted earthtrail in existing alignment typically constructed using bench cut methods in areas where (slope across the road prism) is >40%. The extent of construction work over an existing alignment is assumed to average 20% of the work for a new installation. A properly constructed, well defined access trail will address resource concerns related with compaction, emissions of fugitive dust, and excessive sediment in surface water. It also will improve the plant productivity, vigor and health and substantially reduce the chance of wild fire. Short term air quality deterioration may result if proper dust control measures are not implemented during the practice installation. Costs include excavation, shaping, grading, and all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

An agricultural or forestry enterprise with an existing access trail which is beyond its useful lifespan can no longer be used as intended without rehabilitation. If left in its current condition, it will result in continued compaction, excessive sediment in surface water and emissions of fugitive dusts. This scenario is applicable where the resource activity areas with an existing but dilapidated access road consist of relatively dry lands with steep sloped terrain.

After Situation:

The trail will be a minimum of 14 feet wide at the top, cut in embankment excavated material is end hauled off site and placed in a stable location. Cut is more than 3 feet in height, average 5 ft typical cut and fill side slopes 2:1. Out of total excavation, 80% is considered common earth and 20% hard dig or rocks. A properly constructed, well defined access trail will greatly reduce or eliminate compaction in land use areas where it is harmful, reduce emissions of fugitive dust, stop soil erosion, and also reduce excessive sediment in surface water by reducing uncontrolled sediment transport and improving drainage of irrigated lands. Planned grades will include all dips and water bars. If brush clearing of land in the alignment area is required, use Land Clearing (460). Pipe culverts installed as part of access road should be covered by either Structures for Water Control (587), Stream Crossings (578) or Fish Passage (396) depending on the type of structure. Diversions constructed as part of access road should be covered by Diversion (362). When seeding or revegetation is required, use Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of Trail

Scenario Unit: Foot

Scenario Typical Size: 1,000

Scenario Cost: $3,526.44 **Scenario Cost/Unit:** $3.53

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	259.5	$936.80
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	155.5	$368.54
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.96	104	$515.84
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	5	$281.05
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	5	$187.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 655 - Forest Trails and Landings

Scenario: #5 - Trail Erosion Control w/o Vegetation, Slopes < 35%

Scenario Description:

Rehabilitation of existing forest access trail segments on a 20% slope and a 4% grade by addressing legacy resource issues for long-term use. Typically the trail is a single lane (18-foot wide, including cut and fill), seasonal prism requiring sustained erosion control measures installed by using heavy equipment such as dozers, graders, backhoes, and/or excavators. The purpose is to hydrologically disconnect the existing trail/landing system from streams and natural drainages. This scenario includes designing and installing measures such as cross drains, rock drains, relief drains, out sloping (or changing surface drainage), rolling dips and water bars and ditch outs as needed, and applies to only those segments of the trail system that have resource concerns requiring rehabilitation. Some hand work (chainsaw) will be needed to allow the use of the equipment. Installation will be supervised. Other practices such as Stream Crossing, and Critical Area Planting, Access Road, and Structure for Water Control can be adjacent/appurtenant but not part of this practice scenario. Treatments are for long-term reduction of sediment, restoration of fish habitat, creation of fire access, and the removal of routes off unstable slopes. Resource concerns include: Excessive sedimentation in surface waters, Concentrated flow erosion, Sheet and rill erosion, and Degradation of wildlife species.

Before Situation:

Trails are delivering sediment to waterways, impacting riparian areas and wetlands and possibly affecting T&E species. The system's usefulness for access is also being compromised by inadequate erosion and drainage control systems. However rehabilitation over abandonment is an acceptable course of action.

After Situation:

Trails and landings provide long-term access and do not adversely affect the resources concerns.

Scenario Feature Measure: Length of trail treated

Scenario Unit: Feet

Scenario Typical Size: 2,000

Scenario Cost: $8,057.84 **Scenario Cost/Unit:** $4.03

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Water Bars	1500	Installation of graded trail water controlling structures such as water bars, broad based dips for erosion control. Typical cross section is 1.5 feet high with 4:1 side slopes yielding about 0.33 CY/ft of length.	Foot	$3.10	250	$775.00
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	18	$1,214.10
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	18	$2,060.64
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	9	$56.88
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	18	$671.58
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	10	$412.30
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	20	$461.60
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	38	$1,425.76
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 655 - Forest Trails and Landings

Scenario: #6 - Trail Erosion Control w/o Vegetation, Slopes >35%

Scenario Description:

Rehabilitation of existing forest access trails and landings by addressing legacy resource issues such as sedimentation, for long-term use. Typically the trail is a single lane, existing 18-foot wide including cut and fill seasonal road prism on a moderately steep (45%) slope on forestland requiring sustained erosion control measures applied by using heavy equipment such as dozers, backhoes, graders, excavators, rock and rollers. The purpose is to hydrologically disconnect existing trail/landing system from the streams and natural drainages. This includes the design and installation of cross drains, rock drains, relief drains, out sloping (or changing road surface drainage), rolling dips and water bars and ditch outs as needed This scenario applies to only those segments of the trail system that have resource concerns requiring rehabilitation. A typical water bar or rolling dip installed in this scenario is on a 75 to 100 foot spacing with a depth of about 1 foot. A layer of aggregate rock is compacted into a 20 foot length of road around the deepest section of the dip. Some hand work (chainsaw) will be needed to allow the use of the equipment. The work will be supervised. Other practices such as Stream Crossing, and Critical Area Planting, Access Road and Structure for Water Control can be adjacent/appurtenant but not part of this practice scenario . Resource concerns include: Excessive sedimentation in surface waters, Concentrated flow erosion, Sheet and rill erosion, and Degradation of wildlife species.

Before Situation:

Trails are delivering sediment to waterways, impacting riparian/wetlands and/or possibly affecting fish/T&E species. The usefulness of the trail/landing system is being adversely affected by erosion.

After Situation:

Trails and landings provide access and do not adversely affect the resources concerns.

Scenario Feature Measure: Length of trail treated

Scenario Unit: Feet

Scenario Typical Size: 2,000

Scenario Cost: $15,217.56 **Scenario Cost/Unit:** $7.61

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	22	$2,745.16
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	22	$4,210.14
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	9	$56.88
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	22	$820.82
Water Bars	1500	Installation of graded trail water controlling structures such as water bars, broad based dips for erosion control. Typical cross section is 1.5 feet high with 4:1 side slopes yielding about 0.33 CY/ft of length.	Foot	$3.10	1000	$3,100.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	10	$412.30
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	48	$1,800.96
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	24	$553.92
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	20	$537.40
Mobilization						

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 655 - Forest Trails and Landings

Scenario: #7 - Post Catastrophic Event Trail Erosion Control, Slopes >35%

Scenario Description:

Rehabilitation of forest access trail segments used for rehabilitation or management of a catastrophic event on a 40% slope and a 4% grade by addressing resource issues for long-term use. Typically the trail is a single lane (18-foot wide, including cut and fill), seasonal prism requiring sustained erosion control measures installed by using heavy equipment such as dozers, graders, backhoes, and/or excavators. The purpose is to hydrologically disconnect the existing trail/landing system from streams and natural drainages where fire fighting or other post catastrophic mgt acttivities did not install or reinstall long-term erosion features. This scenario includes designing and installing measures such as cross drains, rock drains, relief drains, out sloping (or changing surface drainage), rolling dips and water bars and ditch outs as needed, and applies to only those segments of the trail system that have resource concerns requiring rehabilitation. Some hand work (chainsaw) will be needed to allow the use of the equipment. Installation will be supervised. Other practices such as Stream Crossing, and Critical Area Planting, Access Road, and Structure for Water Control can be adjacent/appurtenant but not part of this practice scenario. Treatments are for long-term reduction of sediment, restoration of fish habitat, creation of fire access, and the removal of routes off unstable slopes. Resource concerns include: Excessive sedimentation in surface waters, Concentrated flow erosion, Sheet and rill erosion, and Degradation of wildlife species.

Before Situation:

After a catastrophic event, like a fire, trails used in managing the event are damaged and are delivering sediment to waterways, impacting riparian areas and wetlands and possibly affecting T&E species. The system's usefulness for long-term rehabilaltation is also being compromised by inadequate erosion and drainage control systems. The cost of re-installing or installing long-term erosion controls are less expensive than a legacy road due to recent use and scale of activities.

After Situation:

Trails and landings provide access and do not adversely affect the resources concerns.

Scenario Feature Measure: Length of trail treated

Scenario Unit: Feet

Scenario Typical Size: 2,000

Scenario Cost: $12,086.18 **Scenario Cost/Unit:** $6.04

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	16	$1,996.48
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$191.37	16	$3,061.92
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	8	$50.56
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	24	$895.44
Water Bars	1500	Installation of graded trail water controlling structures such as water bars, broad based dips for erosion control. Typical cross section is 1.5 feet high with 4:1 side slopes yielding about 0.33 CY/ft of length.	Foot	$3.10	800	$2,480.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	8	$329.84
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	24	$553.92
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	32	$1,200.64
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$26.87	20	$537.40
Mobilization						

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 655 - Forest Trails and Landings

Scenario: #8 - Grading and Shaping with Vegetative Establishment

Scenario Description:

Rehabilitation of existing forest access trails and landings on a medium slope by addressing rutting, erosion, and sedimentation. Typically the trail is a single, existing 18-foot wide (including cut and fill) seasonal road prism on gently sloping terrain requiring sustained erosion control measures applied with heavy equipment such as dozers, graders, backhoes, and/or excavators. The purpose is to hydrologically disconnect the existing trail/landing system from streams and natural drainages and to establish a vegetative cover. This scenario includes designing and installation measures such as cross drains, rock drains, relief drainage, out sloping (or changing surface drainage), rolling dips and water bars and ditch outs as needed, and applies to only those segments of the trail system that have resource concerns requiring rehabilitation. It also includes seedbed preparation, seeding and soil amendments determined to be needed. Some hand work (chainsaw) will be needed to allow the use of the equipment. The work will be supervised. Other practices such as Stream Crossing, and Critical Area Planting. Access Road and Structure for Water Control can be adjacent/appurtenant but not part of the practice scenario. Treatments are for long-term reduction of sediment, restore fish habitat, create fire access and to move routes off unstable slopes. Resource concerns include: Excessive sediment in surface waters, Concentrated and Sheet & rill flow erosion, Soil compaction, and Habitat degradation.

Before Situation:

Trail/landings are delivering sediment to waterways, impacting riparian/wetlands and/or possibly affecting fish/T&E species. The usefulness of the trail/landing system is being adversely affected by erosion.

After Situation:

A trail system is installed that provides access to the forested tract and does not cause excessive erosion or water quality concerns.

Scenario Feature Measure: Length of trail treated

Scenario Unit: Feet

Scenario Typical Size: 2,000

Scenario Cost: $8,883.18 **Scenario Cost/Unit:** $4.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.21	16	$899.36
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	1	$6.47
Lime application	953	Lime application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$9.65	1	$9.65
Seeding Operation, Broadcast, Ground	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$11.99	1	$11.99
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	10	$307.50
Truck, water	1448	Water tanker truck. Equipment only. Labor not included.	Hour	$166.78	6	$1,000.68
Water Bars	1500	Installation of graded trail water controlling structures such as water bars, broad based dips for erosion control. Typical cross section is 1.5 feet high with 4:1 side slopes yielding about 0.33 CY/ft of length.	Foot	$3.10	300	$930.00
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	8	$50.56
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	16	$693.12
Motor Grader, 200 HP	1782	Motor Grader or Maintainer, 200 hp. Typical of equipment with HP in range of 170-240. Equipment cost, does not include labor.	Hour	$158.43	10	$1,584.30
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.58	1	$10.58
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	10	$375.20

Labor

Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	40	$893.20
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	18	$415.44
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	6	$247.38

Materials

Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.82	55	$45.10
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.51	40	$20.40
Lime, ENM	75	Fertilizer: Limestone Spread on field.	Ton	$58.25	1	$58.25
One Species, Warm Season, Introduced Perennial Grass (seed or sprigs)	2323	Introduced, warm season perennial grass seed or sprig. Includes material and shipping only.	Acre	$64.09	1	$64.09
Nitrogen (N), Ammonium Nitrate	69	Price per pound of N supplied by Ammonium Nitrate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.00	70	$0.00

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 655 - Forest Trails and Landings

Scenario: #9 - Temporary Stream Crossing

Scenario Description:

The design and installation of a temporary stream crossing that will meet the immediate forest management/conservation needs. Afterwards the crossing will be restored and stabilized. Improperly designed and/or installed stream crossings will, in the long term, adversely affect water quality and aquatic life. Approaches will also be stabilized for the use of the crossing and stabilized afterwards as necessary. Installation will be supervised. Permanent and/or high-traffic crossings will be designed and installed according to the Stream Crossing (578) Standard. Resource concerns include: Excessive sediment in surface waters and Habitat degradation.

Before Situation:

Access to a forested tract is not available for the installation of conservation practices or removal of forest products due to the lack of a suitable stream crossing(s).

After Situation:

Access was available to address other resource concerns/management needs and the stream is restored to its previous or better condition.

Scenario Feature Measure: Number of crossings

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $1,362.83 **Scenario Cost/Unit:** $1,362.83

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	2	$228.96
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	2	$86.64
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	1	$37.31
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	4	$92.32
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	4	$89.32
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	4	$150.08
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	4	$164.92
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 656 - Constructed Wetland

Scenario: #1 - Small, less than 0.1 ac

Scenario Description:

Construction of a small wetland to treat contaminated agricultural runoff. Typical size is <0.1 acres, with an 18" depth. This practice scenario includes the basic earthwork and native and/or organic wetland vegetation. All other components, such as water control structures, dikes or upstream sediment basins, must be paid for under facilitating practices. Soil, water and tissue sampling are required. The purpose of the practice is to address resource concerns related to water quality degradation due to excess nutrient and pathogens. Associated practices: Structure for Water Control (587); Sediment Basin (350); Dike (356); Pond Sealing or Lining, Compacted Clay Treatment (521D); Pond Sealing or Lining, Flexible Membrane (521A); Fence (382); Grade Stabilization Structure (410); Pumping Plant (533); Waste Transfer (634)

Before Situation:

Contaminated agricultural runoff causes excess ponding and/or water quality degradation.

After Situation:

A wetland (typical size 2000 sq foot, 20' x 100') is constructed with an average 18" depth. The constructed wetland treats the effluent by reducing excess nutrients and adding oxygen through wetland plants and functions before the effluent is transported to a waste storage facility or discharged off site, as permitted by regulation. Only the earthwork and wetland vegetation are considered in this scenario. Any structures or sediment basins will be designed under a separate practice.

Scenario Feature Measure: Area of Constructed Wetland

Scenario Unit: Square Foot

Scenario Typical Size: 2,000

Scenario Cost: $1,393.56 **Scenario Cost/Unit:** $0.70

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$308.64	0.05	$15.43
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	37	$31.82
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	74	$181.30
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	4	$92.32
Materials						
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	1	$26.14
Test, Standard Water Test, Well Water	309	Well Water Suitability test. Includes materials and shipping only.	Each	$40.64	8	$325.12
Native Aquatic Plants, Emergent or Submerged	2336	Native aquatic emergent or submerged. All required materials for establishing vegetation. Includes material and shipping.	Each	$1.37	325	$445.25
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	2	$19.54
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 656 - Constructed Wetland

Scenario: #2 - Medium, 0.1 to 0.5 ac

Scenario Description:

Construction of a medium wetland to treat contaminated agricultural runoff. Typical size is 0.1-0.5 acres, with an 18" depth. This practice scenario includes the basic earthwork and native and/or organic wetland vegetation. All other components, such as water control structures, dikes or upstream sediment basins, must be paid for under facilitating practices. Soil, water and tissue sampling are required. The purpose of the practice is to address resource concerns related to water quality degradation due to excess nutrient and pathogens. Associated practices: Structure for Water Control (587); Sediment Basin (350); Dike (356); Pond Sealing or Lining, Compacted Clay Treatment (521D); Pond Sealing or Lining, Flexible Membrane (521A); Fence (382); Grade Stabilization Structure (410); Pumping Plant (533); Waste Transfer (634)

Before Situation:

Contaminated agricultural runoff causes excess ponding and/or water quality degradation.

After Situation:

A wetland (typical size 0.25 acres, 45' x 240') is constructed with an average 18" depth. Only the earthwork and wetland vegetation are considered in this scenario. Any structures or sediment basins will be designed under a separate practice. The constructed wetland is sited near the property boundary, but still takes cropland out of production. The constructed wetland treats the effluent by reducing excess nutrients and adding oxygen through wetland plants and functions before the effluent is transported to a waste storage facility or discharged off site, if permitted by regulation.

Scenario Feature Measure: Area of Constructed Wetland

Scenario Unit: Acre

Scenario Typical Size: 0

Scenario Cost: $4,071.88 **Scenario Cost/Unit:** #Div/0!

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	400	$980.00
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	200	$172.00
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$308.64	0.25	$77.16
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$170.63	0.25	$42.66
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	14	$323.12
Materials						
Test, Standard Water Test, Well Water	309	Well Water Suitability test. Includes materials and shipping only.	Each	$40.64	8	$325.12
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	1	$26.14
Native Aquatic Plants, Emergent or Submerged	2336	Native aquatic emergent or submerged. All required materials for establishing vegetation. Includes material and shipping.	Each	$1.37	1350	$1,849.50
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	2	$19.54
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 656 - Constructed Wetland

Scenario: #3 - Large, more than 0.5 ac

Scenario Description:

This practice scenario includes the basic earthwork and native and/or organic wetland vegetation needed to create a constructed wetland to treat contaminated agricultural runoff for a large site (i.e. >0.5 ac). All other components, such as water control structures, dikes or upstream sediment basins, must be paid for under facilitating practices. Soil, water and tissue sampling are required. The purpose of the practice is to address resource concerns related to water quality degradation due to excess nutrient and pathogens. Associated practices: Structure for Water Control (587); Sediment Basin (350); Dike (356); Pond Sealing or Lining, Compacted Clay Treatment (521D); Pond Sealing or Lining, Flexible Membrane (521A); Fence (382); Grade Stabilization Structure (410); Pumping Plant (533); Waste Transfer (634)

Before Situation:

Contaminated agricultural runoff causes excess ponding and/or water quality degradation.

After Situation:

A wetland (typical size 1 acre, 95' x 460') is constructed with an average 18" depth. Only the earthwork and wetland vegetation are considered in this scenario. Any structures or sediment basins will be designed under a separate practice. The constructed wetland is sited near the property boundary, but still takes cropland out of production (1/2 of the wetland acreage). The constructed wetland treats the effluent by reducing excess nutrients and adding oxygen through wetland plants and functions before the effluent is transported to a waste storage facility or discharged off site, if permitted by regulation.

Scenario Feature Measure: Area of Constructed Wetland

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $11,368.10 **Scenario Cost/Unit:** $11,368.10

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$308.64	1	$308.64
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	809	$695.74
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.45	1619	$3,966.55
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	36	$830.88
Materials						
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	2	$19.54
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	1	$26.14
Test, Standard Water Test, Well Water	309	Well Water Suitability test. Includes materials and shipping only.	Each	$40.64	8	$325.12
Native Aquatic Plants, Emergent or Submerged	2336	Native aquatic emergent or submerged. All required materials for establishing vegetation. Includes material and shipping.	Each	$1.37	3605	$4,938.85
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 657 - Wetland Restoration

Scenario: #1 - Tile Decomissioning

Scenario Description:

Wetland hydrology is restored by decomissiong a subsurface drain tile system. The Tract is removed from agricultural production. Any necessary planting will be contracted under Conservation Cover (327), Restoration of Rare and Declining Habitats (643), Wetland Wildlife Habitat Management (644). Earthwork for deleveling should be contracted under another 657 scenario or Wetland Wildlife Habitat Management (644) .

Resource Concerns: SOIL QUALITY DEGRADATION - Organic matter depletion; WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, Pesticides transported to surface and ground waters, Excessive sediment in surface waters; DEGRADED PLANT CONDITION - Undesirable plant productivity and health; INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

Before Situation:

The site has been drained with a tile drain system and is in agricultural production.

After Situation:

The drain tiles have been rendered non-functional by excavating at least 50 foot lengths of tile mains and laterals, and backfilling with excavated earth, which is compacted with the excavator bucket. Restoration of hydrology and plant community functions will improve the WATER QUALITY and DEGRADED PLANT CONDITION concerns listed above. The hydrologic and vegetative practices will address the SOIL QUALITY DEGRADATION and INADEQUATE HABITAT FOR FISH AND WILDLIFE concerns.

Scenario Feature Measure: Acres of Tract

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $21,514.16 **Scenario Cost/Unit:** $537.85

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$56.21	32	$1,798.72
Foregone Income						
FI, Wheat Irrigated	1964	Irrigated Wheat is Primary Crop	Acre	$463.99	40	$18,559.60
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	32	$714.56
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 657 - Wetland Restoration

Scenario: #2 - Levee or Dike Removal

Scenario Description:

Wetland hydrology is restored by removing a levee or dike. The Tract is removed from agricultural production. Any necessary planting will be contracted under Conservation Cover (327), Restoration of Rare and Declining Habitats (643), Wetland Wildlife Habitat Management (644), Tree and Shrub Establishment (612). Earthwork for deleveling should be contracted under another 657 scenario or Wetland Wildlife Habitat Management (644), or Grade Stabilization Structure (410).

Resource Concerns: SOIL QUALITY DEGRADATION - Organic matter depletion; WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, Pesticides transported to surface and ground waters, Excessive sediment in surface waters; DEGRADED PLANT CONDITION - Undesirable plant productivity and health; INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

Before Situation:

A levee and/or dike prevents floodwater from entering the tract. Hydrology that once supported wetlands is now diverted and the Tract is in agricultural production. Average dike size is 5' height, 10' width, 2:1 sideslopes.

After Situation:

The levee/dike has been removed and the hydrology of the site is restored. Excavated spoil is placed adjacent to the features on the wetland and adjacent non-wetland area with a maximum depth of 24 inches. Facilitating practices may include Grade Stabilization Structure and Tree and Shrub Planting. Restoration of hydrology and plant community functions improve the water quality, soil quality, plant condition, and improve habitat for fish and wildlife.

Scenario Feature Measure: Acres of Tract

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $90,242.33 **Scenario Cost/Unit:** $2,256.06

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$187.13	80	$14,970.40
Truck, dump, 8 CY	1401	Dump truck for moving bulk material. Typically capacity is 12 ton or 8 cubic yards. Includes equipment only.	Hour	$58.47	80	$4,677.60
Excavation, common earth, wet, side cast, large equipment	1228	Bulk excavation and side casting of wet common earth with hydraulic excavator or dragline with greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$4.22	9778	$41,263.16
Foregone Income						
FI, Wheat Irrigated	1964	Irrigated Wheat is Primary Crop	Acre	$463.99	40	$18,559.60
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	160	$6,003.20
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	80	$3,298.40
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	3	$1,469.97

Practice: 657 - Wetland Restoration

Scenario: #3 - Estuarine Levee Removal

Scenario Description:

Wetland hydrology is restored by removing a levee or dike. This scenario is for use on Tracts subject to tidally induced water fluctuations. The Tract is removed from agricultural production. Any necessary planting will be contracted under Conservation Cover (327), Restoration of Rare and Declining Habitats (643), Wetland Wildlife Habitat Management (644), Tree and Shrub Establishment (612). Earthwork for deleveling should be contracted under another 657 scenario or Wetland Wildlife Habitat Management (644), or Grade Stabilization Structure (410).

Resource Concerns: SOIL QUALITY DEGRADATION - Organic matter depletion; WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, Pesticides transported to surface and ground waters, Excessive sediment in surface waters; DEGRADED PLANT CONDITION - Undesirable plant productivity and health; INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

Before Situation:

The wetland has been converted to agricultural production by construction of a dike to prevent tidal flows. The dike has a culvert with a flapgate to allow surface water to flow out, but prevents tide water from entering. Average dike size is 8 feet high above the current marsh surface. The dike has side slopes of 2:1, with a 12 foot top.

After Situation:

The levee/dike has been removed and the hydrology of the site is restored. Excavated spoil is placed adjacent to the features on the wetland and adjacent non-wetland area with a maximum depth of 24 inches. Facilitating practices may include Grade Stabilization Structure and Tree and Shrub Planting. Restoration of hydrology and plant community functions improve the water quality, soil quality, plant condition, and improve habitat for fish and wildlife.

Scenario Feature Measure: Acres of Tract

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $215,184.87 **Scenario Cost/Unit:** $5,379.62

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	160	$19,964.80
Excavation, clay, large equipment, 1500 ft	1217	Bulk excavation of clay with scrapers with average haul distance of 1500 feet. Includes equipment and labor.	Cubic Yard	$6.46	16427	$106,118.42
Excavation, common earth, wet, side cast, large equipment	1228	Bulk excavation and side casting of wet common earth with hydraulic excavator or dragline with greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$4.22	5475	$23,104.50
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$121.69	320	$38,940.80
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	480	$18,009.60
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	160	$6,596.80
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	5	$2,449.95

Practice: 657 - Wetland Restoration

Scenario: #4 - Ditch Plug

Scenario Description:

Wetland hydrology is restored by pluging ditches that are draining surface hydrology and channelizing overland flow. Typical scenario is for four ditch plugs on a 40 acre wetland. The Tract is removed from agricultural production. Any necessary planting will be contracted under Conservation Cover (327), Restoration of Rare and Declining Habitats (643), Wetland Wildlife Habitat Management (644), Tree and Shrub Establishment (612). Earthwork for deleveling should be contracted under another 657 scenario or Wetland Wildlife Habitat Management (644), or Grade Stabilization Structure (410).

Resource Concerns: SOIL QUALITY DEGRADATION - Organic matter depletion; WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, Pesticides transported to surface and ground waters, Excessive sediment in surface waters; DEGRADED PLANT CONDITION - Undesirable plant productivity and health; INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

Before Situation:

The wetland has been converted to agricultural production, and the tract drained with a surface ditch. The ditch is 4' average depth, and 12 feet average width.

After Situation:

The ditch has been plugged by the installation of a 50' long section of compacted clay fill, and the deposition has been removed down to the original topsoil layer. A herbaceous plant community has been seeded. Facilitative practices include Conservation Cover. Restoration of hydrology and plant community functions will improve the WATER QUALITY and DEGRADED PLANT CONDITION concerns listed above. The hydrologic and vegetative practices will address the SOIL QUALITY DEGRADATION and INADEQUATE HABITAT FOR FISH AND WILDLIFE concerns.

Scenario Feature Measure: Acres of Tract

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $25,274.00 **Scenario Cost/Unit:** $631.85

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$121.69	16	$1,947.04
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$187.13	16	$2,994.08
Foregone Income						
FI, Wheat Irrigated	1964	Irrigated Wheat is Primary Crop	Acre	$463.99	40	$18,559.60
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	16	$600.32
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	16	$659.68
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 657 - Wetland Restoration

Scenario: #5 - Deleveling

Scenario Description:

A 100 acre tract is removed from agricultural production and restored to a depressional wetland or depressional wetland complex. Typical scenario is for 2 scrapers and 1 dozer creating shallow (6-24 inch) depressional areas. May be used in combination with a leveel removal or ditch plug scenario of this same practice. Other facilitating practices may include: fence (382), wetland wildlife habitat management (644), critical area planting (342), conservation cover (327), pumping plant (533), tree and shrub establishment (612), herbaceous weed cnotrol (315), dike (356).

Resource Concerns: SOIL QUALITY DEGRADATION - Organic matter depletion; WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, Pesticides transported to surface and ground waters, Excessive sediment in surface waters; DEGRADED PLANT CONDITION - Undesirable plant productivity and health; INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

Before Situation:

The wetland has been converted to agricultural production through land leveling and smoothing, or other diversion of water. Wetlands may have received sediment deposition to alter the microtopography. Tract may or may not be irrigated.

After Situation:

The "natural" topography of the parcel has been restored through deleveling or sediment removal from historic basins. The parcel is removed from agricultural production and planted to native wetland vegetation. Restoration of hydrology and plant community functions improve the WATER QUALITY and DEGRADED PLANT CONDITION concerns listed above. The hydrologic and vegetative practices address the SOIL QUALITY DEGRADATION and INADEQUATE HABITAT FOR FISH AND WILDLIFE concerns.

Scenario Feature Measure: Acres of Tract

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $141,391.57 **Scenario Cost/Unit:** $1,413.92

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Scraper, self propelled, 21 CY	1208	Self propelled earthmoving scraper with 21 CY capacity. Does not include labor.	Hour	$366.39	240	$87,933.60
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	120	$14,973.60
Foregone Income						
FI, Wheat Irrigated	1964	Irrigated Wheat is Primary Crop	Acre	$463.99	40	$18,559.60
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	360	$13,507.20
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	120	$4,947.60
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	3	$1,469.97

Practice: 657 - Wetland Restoration

Scenario: #6 - Riverine Channel and Slough Restoration

Scenario Description:

A 100 acre tract is removed from agricultural production and restored to a depressional wetland or depressional wetland complex. Typical scenario is for 1 scrapers and 2 dozers creating and restoring historic sloughs and channels. May be used in combination with a levee removal or ditch plug scenario of this same practice. Other facilitating practices may include: fence (382), wetland wildlife habitat management (644), critical area planting (342), conservation cover (327), pumping plant (533), tree and shrub establishment (612), herbaceous weed cnotrol (315), dike (356).

Resource Concerns: SOIL QUALITY DEGRADATION - Organic matter depletion; WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, Pesticides transported to surface and ground waters, Excessive sediment in surface waters; DEGRADED PLANT CONDITION - Undesirable plant productivity and health; INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

Before Situation:

The wetland has been converted to agricultural production through land leveling and smoothing, or other diversion of water. Wetland channels were filled. Tract may or may not be irrigated.

After Situation:

The "natural" topography of the parcel has been restored through excavation of historic channels. The parcel is removed from agricultural production and planted to native wetland vegetation. Restoration of hydrology and plant community functions improve the WATER QUALITY and DEGRADED PLANT CONDITION concerns listed above. The hydrologic and vegetative practices address the SOIL QUALITY DEGRADATION and INADEQUATE HABITAT FOR FISH AND WILDLIFE concerns.

Scenario Feature Measure: Acres of Tract

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $190,979.37 **Scenario Cost/Unit:** $1,909.79

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Scraper, self propelled, 21 CY	1208	Self propelled earthmoving scraper with 21 CY capacity. Does not include labor.	Hour	$366.39	160	$58,622.40
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$187.13	320	$59,881.60
Foregone Income						
FI, Wheat Irrigated	1964	Irrigated Wheat is Primary Crop	Acre	$463.99	100	$46,399.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	160	$6,596.80
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	480	$18,009.60
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	3	$1,469.97

Practice: 657 - Wetland Restoration

Scenario: #7 - Complex Restoration

Scenario Description:

Wetland hydrology is restored by removing a levee or dike, deleveling project area, and channel/slough restoration. This scenario is to be used when more than one restoration technique is required on the same area. The Tract is removed from agricultural production. Any necessary planting will be contracted under Conservation Cover (327), Restoration of Rare and Declining Habitats (643), Wetland Wildlife Habitat Management (644), Tree and Shrub Establishment (612).

Resource Concerns: SOIL QUALITY DEGRADATION - Organic matter depletion; WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, Pesticides transported to surface and ground waters, Excessive sediment in surface waters; DEGRADED PLANT CONDITION - Undesirable plant productivity and health; INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

Before Situation:

The parcel has been leveled/smoothed to remove natural topography, channels have been filled, and a levee and/or dike prevents floodwater from entering the tract. Hydrology that once supported wetlands is now diverted and the Tract is in agricultural production. Average dike size is 5' height, 10' width, 2:1 sideslopes.

After Situation:

The "natural" topography of the parcel has been restored through deleveling, sediment removal from historic basins and channel/slough restoration. The parcel is removed from agricultural production and planted to native wetland vegetation. The levee/dike has been removed and the hydrology of the site is restored. Excavated spoil is placed adjacent to the features on the wetland and adjacent non-wetland area with a maximum depth of 24 inches. Facilitating practices may include Grade Stabilization Structure and Tree and Shrub Planting. Restoration of hydrology and plant community functions improve the water quality, soil quality, plant condition, and improve habitat for fish and wildlife.

Scenario Feature Measure: Acres of Tract

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $496,786.01 **Scenario Cost/Unit:** $4,967.86

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$124.78	320	$39,929.60
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$187.13	400	$74,852.00
Scraper, self propelled, 21 CY	1208	Self propelled earthmoving scraper with 21 CY capacity. Does not include labor.	Hour	$366.39	560	$205,178.40
Excavation, common earth, wet, side cast, large equipment	1228	Bulk excavation and side casting of wet common earth with hydraulic excavator or dragline with greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$4.22	9778	$41,263.16
Truck, dump, 8 CY	1401	Dump truck for moving bulk material. Typically capacity is 12 ton or 8 cubic yards. Includes equipment only.	Hour	$58.47	240	$14,032.80
Foregone Income						
FI, Wheat Irrigated	1964	Irrigated Wheat is Primary Crop	Acre	$463.99	100	$46,399.00
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	320	$13,193.60
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	64	$1,477.12
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	1520	$57,030.40
Mobilization						

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	7	$3,429.93

Practice: **658 - Wetland Creation**

Scenario: **#1 - Wetland Wildlife Pond**

Scenario Description:

A wetland is created on an upland area at a location where surface runoff may be intercepted and ponded by excavation. Resource concerns are WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, Pesticides transported to surface and ground waters, Excessive sediment in surface waters; INDEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation. Other facilitating practices may include: fence (382), wetland wildlife habitat management (644), critical area planting (342), conservation cover (327), pumping plant (533), tree and shrub establishment (612), herbaceous weed control (315), dike (356).

Before Situation:

The site is in cropland on an upland, non floodplain site (interfluve).

After Situation:

An excavation with an average depth of 12" has created a shallow depression in a broad swale which intercepts surface runoff. The excavated material has been spread on adjacent areas. The INADEQUATE HABITAT FOR FISH AND WILDLIFE resource concern has been addressed with the provision of seasonal open water for terrestrial, aquatic, and waterfowl species.

Scenario Feature Measure: Acres of Wetland

Scenario Unit: Acre

Scenario Typical Size: 5

Scenario Cost: $22,418.72 **Scenario Cost/Unit:** $4,483.74

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	8067	$19,118.79
Foregone Income						
FI, Wheat Irrigated	1964	Irrigated Wheat is Primary Crop	Acre	$463.99	5	$2,319.95
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	2	$979.98

Practice: 659 - Wetland Enhancement

Scenario: #1 - Simple, Small Project

Scenario Description:

A former or degraded wetland area is to be enhanced beyond the original (historic) conditions. The typical size is 15 acres of wetland as the actual project area. Small/simple Scenario is based on average 12" of excavation from 5 acres within the larger 15 ac project area to increase the depth and duration of surface hydrology for portions of the project area. Excavation may be in one or more areas, not exceeding 36" depth. Project may include removing soil material and/or deepening existing wetlands and swales. Enhancement activies will improve habitat for wetland dependent wildlife species requiring additional hydrology for all or portions of their life cycles. This activity is not appropriate for natural well functioning wetlands or wetlands. Additional review from State Biologist is required in areas where the hydrology is dominated by groundwater (HGM Class = Slope) or where hydrology is perched due to shallow restrictive layers in the soil. Facilitating practices may include those to establish vegetation or water control/pumping structures.

Resource Concerns are: WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, WATER QUALITY DEGRADATION - Excessive sediment in surface waters, DEGRADED PLANT CONDITION - Undesirable plant productivity and health, DEGRADED PLANT CONDITION, Inadequate strucuture and composition, INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

Before Situation:

The site lacks sufficient micro- and macrotopographic features needed for a specific wetland habitat for target wildlife species. Typically the site has been previously manipulated and utilized for agricultural, livestock or forest production. Original (historic) conditions are not sufficient to support the species specific wildlife objectives. Enhancement possibilites of the site is relatively simple and small in size.

After Situation:

Appropriate equipment were used to modify a wetland area and construct planned topographic features essential for identified species. As a result of the installation, the topograpic relief needed to provide the varied wetland wildlife habitat needs is provided.

Scenario Feature Measure: Acres of Project

Scenario Unit: Acre

Scenario Typical Size: 15

Scenario Cost: $43,484.57 **Scenario Cost/Unit:** $2,898.97

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$187.13	13.33	$2,494.44
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	8066	$29,118.26
Foregone Income						
FI, Corn Irrigated	1960	Irrigated Corn is Primary Crop	Acre	$504.42	5	$2,522.10
FI, Wheat Irrigated	1964	Irrigated Wheat is Primary Crop	Acre	$463.99	5	$2,319.95
FI, Vegetables	2033	Vegetables is Primary Crop	Acre	$1,093.36	5	$5,466.80
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	13.33	$500.14
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	13.33	$549.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 659 - Wetland Enhancement

Scenario: #2 - Moderate Project

Scenario Description:

A former or degraded wetland area is to be enhanced beyond the original (historic) conditions. The typical size is 30 acres of wetland as the actual project area. the Moderate Project Scenario is based on average 12"-24" of excavation from 30 ac project area to increase the depth and duration of surface hydrology for portions of the project area. Project may include removing soil material and/or deepening existing wetlands and swales of varying depth and type. Enhancement activies will improve habitat for wetland dependent wildlife species requiring additional hydrology for all or portions of their life cycles. This activity is not appropriate for natural well functioning wetlands. Additional review from State Biologist is required in areas where the hydrology is dominated by groundwater (HGM Class = Slope) or where hydrology is perched due to shallow restrictive layers in the soil.
Facilitating practices may include those to establish vegetation or water control/pumping structures.

Resource Concerns are: WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, WATER QUALITY DEGRADATION - Excessive sediment in surface waters, DEGRADED PLANT CONDITION - Undesirable plant productivity and health, DEGRADED PLANT CONDITION, Inadequate strucuture and composition, INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

Before Situation:

Wetland areas on the site still exist but have been previously manipulated and utilized for agriculture, livestock, or forest production. Swales and wetland areas are degraded due to sedimentation and improper agricultural management practices. The functions and values of the wetlands can be enhanced by improving micro- and macrotopographic features needed for a specific wetland habitat for target wildlife species. Current conditions are not sufficient to support the species specific wildlife objectives.

After Situation:

Wetland areas on the site are removed from agriculture, livestock, or forest production. The functions and values of the wetlands are enhanced by improving micro- and macrotopographic features needed for a specific wetland habitat for target wildlife species. Enhanced conditions are sufficient to support the species specific wildlife objectives.

Scenario Feature Measure: Acres of Project

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $116,542.98 **Scenario Cost/Unit:** $3,884.77

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	24000	$86,640.00
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	60	$4,047.00
Foregone Income						
FI, Vegetables	2033	Vegetables is Primary Crop	Acre	$1,093.36	10	$10,933.60
FI, Wheat Irrigated	1964	Irrigated Wheat is Primary Crop	Acre	$463.99	10	$4,639.90
FI, Corn Irrigated	1960	Irrigated Corn is Primary Crop	Acre	$504.42	10	$5,044.20
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	60	$2,473.80
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	60	$2,251.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 659 - Wetland Enhancement

Scenario: #3 - Complex Project

Scenario Description:

A former or degraded wetland area is to be enhanced beyond the original (historic) conditions. The typical size is 30 acres of wetland as the actual project area. Complex projects may include removing depositional soil material and/or enhancing existing depressional, slope, and/or wetland/upland mosaic landscapes. Site specific complexities (such as accessibility or excessive wetness) exist. Scenario based on 12"-36" of excavation from 30 ac project area to increase the depth and duration of surface hydrology for portions of the project area. Enhancement activies will improve habitat for wildlife species requiring wetlands for all or portions of their life cycles. This activity is not appropriate for natural well functioning wetlands. Additional review from State Biologist is required in areas where the hydrology is dominated by groundwater (HGM Class = Slope) or where hydrology is perched due to shallow restrictive layers in the soil. Facilitating practices may include those to establish vegetation or water control/pumping structures.

Resource Concerns are: WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, WATER QUALITY DEGRADATION - Excessive sediment in surface waters, DEGRADED PLANT CONDITION - Undesirable plant productivity and health, DEGRADED PLANT CONDITION, Inadequate strucuture and composition, INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

Before Situation:

Wetland areas on the site still exist but have been previously manipulated and utilized for agriculture, livestock, or forest production. Swales and wetland areas are degraded due to sedimentation and improper agricultural management practices. The functions and values of the wetlands can be enhanced by improving micro- and macrotopographic features needed for a specific wetland habitat for target wildlife species. Current conditions are not sufficient to support the species specific wildlife objectives.

After Situation:

Wetland areas on the site are removed from agriculture, livestock, or forest production. The functions and values of the wetlands are enhanced by improving micro- and macrotopographic features needed for a specific wetland habitat for target wildlife species. Enhanced conditions are sufficient to support the species specific wildlife objectives.

Scenario Feature Measure: Acres of Project

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $148,346.98 **Scenario Cost/Unit:** $4,944.90

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	32000	$115,520.00
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.45	80	$5,396.00
Foregone Income						
FI, Vegetables	2033	Vegetables is Primary Crop	Acre	$1,093.36	10	$10,933.60
FI, Corn Irrigated	1960	Irrigated Corn is Primary Crop	Acre	$504.42	10	$5,044.20
FI, Wheat Irrigated	1964	Irrigated Wheat is Primary Crop	Acre	$463.99	10	$4,639.90
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	80	$3,001.60
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	80	$3,298.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 660 - Tree/Shrub Pruning

Scenario: #1 - Fire Hazard

Scenario Description:

Pruning trees of branches in a forest stand where wildfires are considered a high and very high hazard. Hand tools and power tools are used to cut branches from trees. If slash treatment is needed, refer to associated practice 384-Woody Residue Treatment. Resource concerns include Degraded plant condition-wildfire hazard and Undesirable plant productivity and health.

Before Situation:

The forest stand is well to over-stocked, generally with 200 to 300+ trees per acre. Branches are touching understory vegetation or are in close proximity to forest floor where a ground fire can ignite the lower branches and move into the upper canopy. Wildfire hazard is very high.

After Situation:

The typical forest pruning treatment is 20 acres. Trees are pruned to the desirable height (generally 8-16') based on desired separation space between ground vegetation and tree crown. Pruned branches are treated if they are a hazard, see Woody Residue Treatment standard.

Scenario Feature Measure: area of treatment

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $5,976.14 **Scenario Cost/Unit:** $298.81

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	120	$758.40
Pruning tool, pole saw	1319	Gasoline powered pole chainsaw. Labor not included.	Hour	$8.03	40	$321.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	180	$4,154.40
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	18	$742.14

Practice: 660 - Tree/Shrub Pruning

Scenario: #2 - Stand Improvement, Low Height, 10ft or less

Scenario Description:

Branches are pruned from trees to a height of 8-10 feet to improve the quality of the stem wood. Pruning is done by hand with chain saws, tree loppers, hand shears, or hand saws. Trees are identified for pruning. Trees are growing at a fast pace, with leader growth on trees anywhere from 1.5 feet to 4 feet in length. For treatment of slash, refer to associated practice 384-Woody Residue Treatment. Degraded plant condition - undesirable plant productivity and health is the resource concern.

Before Situation:

Trees are retaining lower limbs along the entire tree bole, reducing wood quality. Pruning height will be based on overall stand diameter and height. Stand has been thinned and crop trees are identified for pruning. Degrade plant condition- undesirable plant productivity and health is the resource concern.

After Situation:

The typical forest pruning treatment is 20 acres. Trees are pruned to the desirable height of 8-10 feet. Pruned branches are treated if they are a hazard, see Woody Residue Treatment standard.

Scenario Feature Measure: area of treatment

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $3,905.01 **Scenario Cost/Unit:** $195.25

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Pruning tools, hand tools	1318	Pruning tools, hand tools, shears, loppers, pole saw, handsaw. Material costs only. Labor not included.	Hour	$4.77	20	$95.40
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	80	$505.60
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	110	$2,538.80
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	17	$700.91
Materials						
Tree Marking Paint	313	Trees to be cut through tree marking are physically identified through the application of paint on the tree. Typically one quart of paint is used to mark one acre of trees. Includes materials and shipping only.	Acre	$6.43	10	$64.30

Practice: 660 - Tree/Shrub Pruning

Scenario: #3 - Stand Improvement, High Height, >10ft

Scenario Description:

Branches are pruned from trees up to a height of 18 feet or more to improve the quality of the stem wood. Pruning is done by hand with pole saws or with gas pole saw. Crop trees are identified for pruning. The forest is on highly productive soils. Trees are growing at a fast pace, with leader growth on trees anywhere from 1.5 feet to 4 feet in length. If slash treatment is needed, refer to associated practice 384-Woody Residue Treatment. Degrade plant condition - undesirable plant productivity and health is the resource concern.

Before Situation:

Trees are retaining limbs mostly along the mid to upper section of the tree bole, reducing quality. Lower branches (0-8 feet) may have already been pruned, have naturally self pruned to differing heights. Pruning height is at least to eighteen (18) feet above the ground. Degrade plant condition- undesirable plant productivity and health is the resource concern.

After Situation:

The typical forest pruning treatment is 20 acres. Trees are pruned to the height of 18 feet or more. Pruned branches are treated so they do not become a fire or health hazard.

Scenario Feature Measure: area of treatment

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $8,394.20 **Scenario Cost/Unit:** $419.71

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Pruning tool, pole saw	1319	Gasoline powered pole chainsaw. Labor not included.	Hour	$8.03	200	$1,606.00
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	10	$63.20
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	30	$1,236.90
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	235	$5,423.80
Materials						
Tree Marking Paint	313	Trees to be cut through tree marking are physically identified through the application of paint on the tree. Typically one quart of paint is used to mark one acre of trees. Includes materials and shipping only.	Acre	$6.43	10	$64.30

Practice: 660 - Tree/Shrub Pruning

Scenario: #4 - Wildlife, Mast Increase

Scenario Description:

Pruning of hard/soft mast trees and shrubs to stimulate increased fruit/nut production and for wildlife food. Selected trees (roughly 10 per acre) are re-invigorated with new branching and an increase in mast production. Primarily done around old agricultural fields, in old orchards, or in forested areas. Is usually done with a chainsaw or handsaw to open the canopy and remove dead branches to increase airflow and sunlight penetration. Resource concerns are inadequate habitat for fish and wildlife - habitat degredation and plant condition-undesirable plant productivity and health

Before Situation:

Trees have reduced mast production due to tree reaching maturity or heavy shade. Pruning is needed to remove older branches, dead material and increase sunlight into the canopy. New branching will be stimulated, increasing mast production.

After Situation:

Selected trees (10 per acre) are re-invigorated with new branching and an increase in mast production.

Scenario Feature Measure: area of treatment

Scenario Unit: Acre

Scenario Typical Size: 2

Scenario Cost: $507.96 **Scenario Cost/Unit:** $253.98

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	5	$31.60
Pruning tools, hand tools	1318	Pruning tools, hand tools, shears, loppers, pole saw, handsaw. Material costs only. Labor not included.	Hour	$4.77	10	$47.70
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	15	$346.20
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46

Practice: 660 - Tree/Shrub Pruning

Scenario: #5 - Multistory Cropping, Understory, Erosion Concerns

Scenario Description:

Pruning trees and/or shrubs is accomplished to extend the lifespan and productivity of trees and or shrubs. Pruning reduces the time periods of replacement by 2/3rds, exposing less bare soil. Soil erosion and sedimentation is a great concern if trees or shrubs are removed. Pruning is accomplished by hand with hand tools and/or chainsaw. Trees and or shrubs are growing where the average rainfall is very high, with cooler temperatures and deep steep soils. Resouce concerns are degraded plant condition-undesireable plant productivity and health, soil erosion-sheet and rill.

Before Situation:

Trees and/or shrubs are showing signs of reduced health (thinning crowns/less branching) and fruit production. Loss of trees or shrubs will occur within a few years. Severe soil erosion and sedimentation is a great concern if trees or shrubs are removed.

After Situation:

Tree/shrub pruning is completed on trees and/or shrubs. Cut vegetative material is left on the ground providing cover, and increasing organic matter.

Scenario Feature Measure: individual tree/shrub pruned

Scenario Unit: Each

Scenario Typical Size: 800

Scenario Cost: $817.70 **Scenario Cost/Unit:** $1.02

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Pruning tools, hand tools	1318	Pruning tools, hand tools, shears, loppers, pole saw, handsaw. Material costs only. Labor not included.	Hour	$4.77	4	$19.08
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	10	$63.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	14	$323.12
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	10	$412.30

Practice: 660 - Tree/Shrub Pruning

Scenario: #6 - MultiStory Cropping, Overstory

Scenario Description:

Overstory tree crowns are pruned to increase desireable growth and sunlight to understory shrubs and low growing trees that have been purposely established to grow on the same acre of ground. Resource concern is degraded plant condition - undesirable plant productivity and health and wildlife habitat degradation. Associated Practice 384-Woody Residue Treatment

Before Situation:

The overstory trees are expanding their crowns, providing to much shade on the understory plants. The shade is affecting the growth and production of the understory plants. Pruning of branches, leaves, frawns, etc. are needed to maintain the desired amount of sunlight reaching the understory.

After Situation:

Pruning of the overstory tree crowns is completed, allowing the proper amount of sunlight to reach the understory vegetation, maintaining their growth, health and vigor, and wildlife benefits.

Scenario Feature Measure: Overstory Trees Pruned

Scenario Unit: each

Scenario Typical Size: 120

Scenario Cost: $1,033.30 **Scenario Cost/Unit:** $8.61

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Pruning tools, hand tools	1318	Pruning tools, hand tools, shears, loppers, pole saw, handsaw. Material costs only. Labor not included.	Hour	$4.77	8	$38.16
Pruning tool, pole saw	1319	Gasoline powered pole chainsaw. Labor not included.	Hour	$8.03	6	$48.18
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	10	$63.20
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	8	$329.84
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	24	$553.92

Practice: 666 - Forest Stand Improvement

Scenario: #1 - Pre-commercial Thinning, Hand tools, Light

Scenario Description:

Adjusting the stocking of a young, non-merchantable, light stand of trees. A light stand is one that has up to 500 TPA on slopes less than 35%. The operation is supervised by a forester and is carried out using hand tools such as chainsaws. Additional treatment of slash is not normally needed, except in high wildfire hazard areas. In cases where additional treatment of slash is needed, refer to associated practice Woody Residue Treatment (384). Resource concerns include Undesirable plant productivity and health; Wildfire hazard; and Inadequate structure and composition; and Wildlife habitat degradation.

Before Situation:

The stocking of a stand of trees that are too small to make a commercial thinning exceeds the recommended fully stocked level for the species and site. The effect is much slower growth than is reasonable or expected for the site, increased susceptibility to insects and disease, and an unacceptable devastating wildfire risk.

After Situation:

After adjusting the stocking to an acceptable level using hand tools such as chainsaws, stand growth, condition, and overall quality is improved. In addition, wildlife habitat is improved with the resulting increase of sunlight reaching the forest floor.

Scenario Feature Measure: Area treated

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $2,851.34 **Scenario Cost/Unit:** $285.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	10	$373.10
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	30	$189.60
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	42	$969.36
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	12	$1,319.28

Practice: 666 - Forest Stand Improvement

Scenario: #2 - Pre-commercial Thinning, Hand tools, Heavy

Scenario Description:

Adjusting the stocking of a young, non-merchantable, heavy stand of trees. Heavy stand is a stand that has 300-500 Trees per Acre (TPA) on slopes greater than 35%, or any stands with greater than 500 TPA. The operation is supervised by a forester and is carried out using hand tools such as chainsaws. When additional treatment of slash is needed, refer to associated practice Woody Residue Treatment (384). Resource concerns include Undesirable plant productivity and health; Wildfire hazard; and Inadequate structure and composition; and Wildlife habitat degradation.

Before Situation:

The stocking of a stand of trees that are too small to make a commercial thinning exceeds the recommended fully stocked level for the species and site. The effect is much slower growth than is reasonable or expected for the site, increased susceptibility to insects and disease, and an unacceptable devastating wildfire risk.

After Situation:

Chainsaws are used, but the topography and/or density of the stand requires more time to complete the task compared to less dense stands on more level terrain. After adjusting the stocking to an acceptable level, stand growth, condition, and overall quality is improved. In addition, wildlife habitat is improved with the resulting increase of sunlight reaching the forest floor.

Scenario Feature Measure: Area treated

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $4,467.60 **Scenario Cost/Unit:** $446.76

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	60	$379.20
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	12	$447.72
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	72	$1,661.76
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	18	$1,978.92

Practice: 666 - Forest Stand Improvement

Scenario: #3 - Timber Stand Improvement, Single Stem Treatment

Scenario Description:

Altering the composition and stocking of a stand of trees by means of individual stem treatment such as injection, basal bark spraying, or hack and squirt. The trees to be retained are marked by a forester. Resource concerns include: Undesirable plant productivity and health; Wildlife habitat degradation; Wildfire hazard; and Inadequate structure and composition.

Before Situation:

The existing condition of the stand cannot meet the landowners objectives because the composition consists of unwanted species and the stocking exceeds the recommended level. The species and quality of the trees to be controlled makes a commercial operation unfeasible; therefore single stem treatment is necessary.

After Situation:

The composition of the stand can meet the landowners objectives and the growth, condition and quality of the remaining trees is improved. Stand improvement is carried out with single stem treatment such as injection, hack and squirt, and/or basal bark spraying.

Scenario Feature Measure: Acres treated

Scenario Unit: Acres

Scenario Typical Size: 10

Scenario Cost: $5,289.25 **Scenario Cost/Unit:** $528.93

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	6	$223.86
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$57.01	45	$2,565.45
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	21	$2,308.74
Materials						
Herbicide, Picloram	337	Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$19.12	10	$191.20

Practice: 666 - Forest Stand Improvement

Scenario: #4 - Timber Stand Improvement, Chemical, Ground

Scenario Description:

Using ground applied chemicals to release young desirable trees from competing and/or overtopping vegetation. Typically half the acres are accessible for over-the-top type ground treatment and the other half will utilize spot treatments. Resource concerns addressed include: Undesirable plant productivity and health, and wildlife habitat degradation.

Before Situation:

An adequately stocked stand of desirable species and trees is not growing to its potential for the site due to severe competition from undesirable trees and brush.

After Situation:

The released stand of trees contains the composition and quality needed to meet the landowner's objectives and address the resource concerns. Releasing the desirable trees from the competition will be achieved through the application of appropriate herbicides according to label directions. Application will be by ground equipment as an over-the-top spray.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $4,997.48 **Scenario Cost/Unit:** $124.94

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$57.01	44	$2,508.44
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.83	20	$116.60
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	6	$659.64
Materials						
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.32	40	$52.80
Herbicide, Imazapyr	336	Pre and post-emergent, non-selective herbicide for control of undesirable vegetation in non-crop areas. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$41.50	40	$1,660.00

Practice: 666 - Forest Stand Improvement

Scenario: #5 - Timber Stand Improvement, Chemical, Aerial

Scenario Description:

Using aerially applied chemicals to release desirable trees from competing and/or overtopping vegetation. Resource concerns include: Undesirable plant productivity and health, and wildlife habitat degradation.

Before Situation:

An adequately stocked stand of desirable species and trees is not growing to its potential for the site due to severe competition from undesirable trees and brush.

After Situation:

The released stand of trees contains the composition and quality needed to meet the landowner's objectives and address the resource concerns. Releasing the desirable trees from the competition will be achieved through the application of appropriate herbicides according to label directions. Application will be by helicopter as an over-the-top spray. The work will be professionally planned and supervised.

Scenario Feature Measure: Area treated

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $3,358.30 **Scenario Cost/Unit:** $83.96

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, aerial application, helicopter	1991	Chemical application performed by helicopter on forest only. Includes equipment, mobilization, and labor.	Acre	$30.83	40	$1,233.20
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	10	$412.30
Materials						
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shi	Acre	$1.32	40	$52.80
Herbicide, Imazapyr	336	Pre and post-emergent, non-selective herbicide for control of undesirable vegetation in non-crop areas. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$41.50	40	$1,660.00

Practice: 666 - Forest Stand Improvement

Scenario: #6 - Competition Control, Mechanical, Light Equipment

Scenario Description:

Using mixed equipment such as a tractor with brush hog and light masticator work to control vegetation that is competing with desirable trees species or to reduce the stocking level of a stand of desirable trees. When additional treatment of slash is needed, refer to associated practice Woody Residue Treatment (384). If the equipment being used for the removal of the competing vegetation or undesirable cut trees also chips or mulches the woody debris created by that treatment, then 384-Woody Residue Treatment may not be needed as an associated practice. Resource concerns include Undesirable plant productivity and health; Wildlife habitat degradation; Wildfire hazard; and Inadequate structure and composition.

Before Situation:

A stand of young, desirable trees is adversely affected by competition either from undesirable species or because the stand is overstocked. The vegetation to be controlled is small enough that it can be mowed or shredded. The work can be done by shredding strips through the stand.

After Situation:

After adjusting the stocking to an acceptable level and/or controlling the competing vegetation, stand growth, condition, and overall quality is improved. In addition, wildlife habitat is improved with the resulting increase of sunlight reaching the forest floor.

Scenario Feature Measure: Area Treated

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $8,510.56 **Scenario Cost/Unit:** $851.06

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$128.90	48	$6,187.20
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$19.51	10	$195.10
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	14	$577.22
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	54	$1,205.82
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 666 - Forest Stand Improvement

Scenario: #7 - Competition Control, Mechanical, Heavy Equipment

Scenario Description:

Using equipment such as a masticator and mulcher to control vegetation that is competing with desirable trees species or to reduce the stocking level of a stand of desirable trees. The trees to be retained will be marked by a forester. In addition to mechanical treatment, on-ground labor will be utilized to meet prescription. When additional treatment of slash is needed, refer to associated practice Woody Residue Treatment (384). If the equipment being used for the removal of the competing vegetation or undesirable cut trees also chips or mulches the woody debris created by that treatment, then 384-Woody Residue Treatment may not be needed as an associated practice. Resource concerns include: Undesirable plant productivity and health; Wildlife habitat degradation; Wildfire hazard; and Inadequate structure and composition.

Before Situation:

A stand of desirable trees is adversely affected by competition either from undesirable species, cull trees, or because the stand is overstocked. The vegetation to be controlled is too large to be mowed or shredded. Therefore other mechanical methods such as using masticators or mulchers is necessary.

After Situation:

The released stand of trees contains the composition and quality needed to meet the landowner's objectives and address the resource concerns.

Scenario Feature Measure: Area treated

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $13,236.96 **Scenario Cost/Unit:** $1,323.70

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	40	$252.80
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$128.90	70	$9,023.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	45	$1,038.60
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	80	$1,786.40
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	8	$879.52
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	1	$256.64

Practice: 666 - Forest Stand Improvement

Scenario: #8 - Creating Patch Openings

Scenario Description:

Creating small open patches (typically less than 2 acres) in even aged and/or degraded stands using hand tools such as chainsaws. For treatment of resulting slash, use associated practice of Woody Residue Treatment (384). Resource concerns include: Inadequate structure and composition, Undesirable plant productivity and health, and wildlife habitat degradation.

Before Situation:

The existing stand is an even-aged stand and/or has been degraded in value by past harvesting practices. The present form, species composition and structure cannot meet the resource concerns of wildlife habitat, plant health and vigor.

After Situation:

A multi-aged/multi-storied stand of desirable species is established. In addition, early successional wildlife habitat as well as forest type diversity are created. The work will be done primarily with chainsaws to create small openings by cutting all trees and other woody vegetation.

Scenario Feature Measure: Area treated

Scenario Unit: Acre

Scenario Typical Size: 2

Scenario Cost: $1,151.72 **Scenario Cost/Unit:** $575.86

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.31	4	$149.24
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	16	$101.12
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	20	$461.60
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	4	$439.76

Practice: 666 - Forest Stand Improvement

Scenario: #9 - Wildlife Fire and Forest Health, Small Stem

Scenario Description:

A combination of hand and chemical treatments used to open the canopy of a stand to improve the wildlife habitat and tree health. Early enchroachment of stands that are 0-4" DBH (diameter-breast-height); 300-800 TPA (trees per acre). Under the supervision of a forester, the area will be marked for appropriate treatment that will include cutting with hand tools (chainsaws), very light equipment (skidsteers, etc.) and/or injection. When additional treatment of slash is needed, refer to associated practice Woody Residue Treatment (384).
Resource concerns include: Degraded plant condition - Inadequate structure and composition, Undesirable plant productivity and health, Wildfire hazard; and Wildlife habitat degradation.

Before Situation:

The stand of mature trees is overstocked resulting in a closed canopy. This condition is causing a lack of structure, herbaceous layer, and diversity that is needed to meet the landowner's objectives for improved wildlife habitat and forest health.

After Situation:

The stand is treated to favor diversity of important commercial and wildlife species. The canopy is opened to the extent necessary to promote herbaceous growth and the work is performed without excessive damage to the residual trees and site.
Costs involved in any commercial harvesting including marking, access, and transportation are not included in this scenario. However the costs involved in marking trees to be treated or left and supervising the work is included.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $10,513.63 **Scenario Cost/Unit:** $1,051.36

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	30	$1,299.60
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	60	$379.20
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$57.01	40	$2,280.40
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	30	$922.50
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	68	$1,569.44
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	34	$759.22
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	24	$2,638.56
Materials						
Tree Marking Paint	313	Trees to be cut through tree marking are physically identified through the application of paint on the tree. Typically one quart of paint is used to mark one acre of trees. Includes materials and shipping only.	Acre	$6.43	10	$64.30
Herbicide, Triazine	1321	Broad spectrum herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$42.78	10	$427.80
Mobilization						

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	1	$172.61

Practice: 666 - Forest Stand Improvement

Scenario: #10 - Wildlife Fire and Forest Health, Large Stem

Scenario Description:

A combination of hand, equipment, and chemical treatments used to open the canopy of a stand to improve the wildlife habitat and tree health. Enchroachment of stands that are 4-8" DBH; 300-600 TPA. Under the supervision of a forester, the area will be marked for appropriate treatments that will include cutting with hand tools (chainsaws), mechanical equipment (chopper, masticator), and/or injection. When treatment of slash is needed, refer to associated practice Woody Residue Treatment (384). If the equipment being used for the removal of the competing vegetation or undesirable cut trees also chips or mulches the woody debris created by that treatment, then 384-Woody Residue Treatment may not be needed as an associated practice. Resource concerns include: Degraded plant condition - Inadequate structure and composition, Undesirable plant productivity and health, Wildfire hazard; and Wildlife habitat degradation.

Before Situation:

The stand of mature trees is overstocked resulting in a closed canopy. This condition is causing a lack of structure, herbaceous layer, and diversity that is needed to meet the landowner's objectives for improved wildlife habitat and forest health.

After Situation:

The stand is treated to favor diversity of important commercial and wildlife species. The canopy is opened to the extent necessary to promote herbaceous growth and the work is performed without excessive damage to the residual trees and site. Costs involved in any commercial harvesting including marking, access, and transportation are not included in this scenario. However the costs involved in marking trees to be treated or left and supervising the work is included.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $15,436.84 **Scenario Cost/Unit:** $1,543.68

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$128.90	40	$5,156.00
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$57.01	40	$2,280.40
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	30	$189.60
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	16	$492.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	38	$877.04
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$37.52	44	$1,650.88
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	34	$3,737.96
Materials						
Herbicide, Triazine	1321	Broad spectrum herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$42.78	10	$427.80
Tree Marking Paint	313	Trees to be cut through tree marking are physically identified through the application of paint on the tree. Typically one quart of paint is used to mark one acre of trees. Includes materials and shipping only.	Acre	$6.43	10	$64.30
Mobilization						

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.87	1	$70.87

Practice: 666 - Forest Stand Improvement

Scenario: #11 - Wildlife and Forest Health, Dense Woodlands

Scenario Description:

Historic Oak Woodland and other threatened habitats that have become grossly overstocked with unwanted woody species approaching 400-800 trees per acre and ranging from 2-16+"dbh with closed or dense and entangled canopy will be thinned to stands of 40-120 trees per acre. Careful handling of cut material will ensure the remaining stand is damage-free. Refer to associated practice, Woody Residue Treatment (384), if treatment of resulting slash is needed. Treatments will address resource concerns to reduce wildfire hazard, improve wildlife habitat, improve structure and composition of the forest, and improve forest health.

Before Situation:

The stand of oaks is grossly overstocked resulting in a closed canopy dominated by small disfigured trees and/ or overshawdowing conifers. The historic forest condition was open canopy dominated by large white oak with a grass/brush understory. The current condition is a white oak forest (possibly with Douglas fir present) of 400-800 TPA ranging from 2" - 16+" dbh and a few, very large, trees. Lack of fire has allowed the stand to increase to excessive numbers. This condition is causing a lack of structure, herbaceous layer, and diversity that is needed to meet the landowner's objectives for reducing wildfire hazard, improved wildlife habitat and forest health.

After Situation:

Retained stand of larger oaks (or threatened hardwoods) spaced at 40-120 per acre with an understory of grass/shrubs.

Scenario Feature Measure: Acre

Scenario Unit: Acre

Scenario Typical Size: 5

Scenario Cost: $10,035.26 **Scenario Cost/Unit:** $2,007.05

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.75	16	$492.00
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$50.98	20	$1,019.60
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	40	$1,732.80
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.32	40	$252.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	42	$969.36
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	62	$1,384.46
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	22	$907.06
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$109.94	22	$2,418.68
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$172.61	2	$345.22

Practice: 670 - Lighting System Improvement

Scenario: #1 - Lighting - CFL

Scenario Description:

To install dimmable CFLs to replace incandescent lamps on a one-for-one basis. Light fixtures do not have to be replaced. A typical poultry house has 48 fixtures. CFL requirements: minimum 8 Watt, 4100 Kelvin, dimmable, grow-out bulb; industrial grade; suitably protected from dirt accumulation. In high humidity environments or areas subject to wash down, gasketted or weatherproof housings are required to prevent corrosion and premature failure.

Before Situation:

An inefficient lighting system such as one using incandescent lamps has been identified by an on-farm energy audit.

After Situation:

More efficient lighting is provided by Compact Fluorescent Lamps (CFLs) in order to reduce energy use as evidenced by the energy audit. Associated practices/activities: 122-AgEMP - HQ and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each lamp replaced

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $18.06 **Scenario Cost/Unit:** $18.06

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	0.167	$3.85
Materials						
Lighting, bulb, CFL, 8 watt	1166	8 watt compact fluorescent lamp (CFL), typically 4100 Kelvin, dimmable, grow-out bulb, industrial grade, suitably protected from dirt accumulation. Materials only.	Each	$14.21	1	$14.21

Practice: 670 - Lighting System Improvement

Scenario: #2 - Lighting - LED

Scenario Description:

To install dimmable LEDs to replace incandescent lamps on a one-for-one basis. Light fixtures do not have to be replaced. A typical poultry house has 48 fixtures. LED requirements: minimum 6 Watt, 3700 Kelvin, dimmable, grow-out bulb; industrial grade; suitably protected from dirt accumulation. In high humidity environments or areas subject to wash down, gasketted or weatherproof housings are required to prevent corrosion and premature failure.

Before Situation:

An inefficient lighting system such as one using incandescent lamps has been identified by an on-farm energy audit.

After Situation:

More efficient lighting is provided by Light-Emitting Diode (LED) lamps in order to reduce energy use as evidenced by the energy audit.Associated practices/activities: 122-AgEMP - HQ and 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each lamp replaced

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $22.97 **Scenario Cost/Unit:** $22.97

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	0.167	$3.85
Materials						
Lighting, bulb, LED, 6 watt	1167	6 watt light emitting diode (LED), typically 3700 Kelvin, dimmable, grow-out bulb; industrial grade; suitably protected from dirt accumulation. Materials only.	Each	$19.12	1	$19.12

Practice: 670 - Lighting System Improvement

Scenario: #3 - Lighting - LED Fixtures

Scenario Description:

The lighting system consists of a four-foot, four-lamp fixture with a single electronic ballast. The high-efficiency lighting system uses high-efficiency LED lamps, which are included as part of the fixture. Associated materials for installation of replacement fixtures are included. Appropriate disposal of existing lamps, ballasts and other materials is required.

Before Situation:

Inefficient lighting (such as incandescent or T12 fluorescent tubes driven by magnetic ballasts) as evidenced by an on-farm energy audit.

After Situation:

High-efficiency lighting system which reduces energy use. The new lighting equipment will provide suitable light levels and reduce overall power requirements (kW) compared to the existing lighting system as evidenced by the energy audit. Associated practices/activities: may include 122-AgEMP - HQ and 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each fixture replaced

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $338.81 **Scenario Cost/Unit:** $338.81

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	0.5	$19.07
Materials						
Lighting, Fixture, LED, 66 watt	2627	Fixture with 4 linear LED lamps (4 foot tall) rated at 1600 lummens and 16.5 watts each. Includes materials and shipping only.	Each	$319.74	1	$319.74

Practice: 670 - Lighting System Improvement

Scenario: #4 - Lighting - Linear Fluorescent

Scenario Description:

The lighting system consists of a four-foot, three-lamp fixture with a single electronic ballast. The high-efficiency lighting system uses high-efficiency T8 or T5 fluorescent lamps. Associated materials for installation of replacement fixtures are included. Appropriate disposal of existing lamps, ballasts and other materials is required.

Before Situation:

Inefficient lighting (such as incandescent or T12 fluorescent tubes driven by magnetic ballasts) as evidenced by an on-farm energy audit.

After Situation:

High-efficiency lighting system which reduces energy use. The new lighting equipment will provide suitable light levels and reduce overall power requirements (kW) compared to the existing lighting system as evidenced by the energy audit. Associated practices/activities: may include 122-AgEMP - HQ and 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each fixture replaced

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $339.77 **Scenario Cost/Unit:** $339.77

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	1	$38.14
Materials						
Lighting, fixture, Fluorescent, 75 watt	1168	75 watt fluorescent lamp fixture with T5 or T8 lamps and ballast. Materials only.	Each	$301.63	1	$301.63

Practice: 670 - Lighting System Improvement

Scenario: #5 - Lighting - Pulse-Start Metal Halide

Scenario Description:

The lighting system consists of a Pulse-Start Metal Halide (PSMH) lamp with a matched ballast or light-emitting diode (LED) equivalent fixtures (as detailed in ASABE S612-compliant energy audit). Associated materials for installation of replacement fixtures are included. Appropriate disposal of existing lamps, ballasts and other materials is required

Before Situation:

Inefficient high-bay or exterior lighting (such as mercury vapor, T12 fluorescent, or similar) as evidenced by an on-farm energy audit.

After Situation:

High-efficiency lighting system which reduces energy use. The new lighting equipment will provide suitable light levels and reduce overall power requirements (kW) compared to the existing lighting system as evidenced by the energy audit. Associated practices/activities: may include 122-AgEMP - HQ and activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each fixture replaced

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $39.06 **Scenario Cost/Unit:** $39.06

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	1	$38.14
Materials						
Lighting, Pulse Start Metal Halide	2425	Replacement of lighting with PSMH Light.	Watt	$0.92	1	$0.92

Practice: 670 - Lighting System Improvement

Scenario: #6 - Automatic Controller System

Scenario Description:

The typical scenario consists of an automatic control system installed on an existing manually controlled agricultural lighting system. Typical components may include any of the following: wiring, sensors, data logger, logic controller, communication link, software, switches, and relay.

Before Situation:

A manually controlled Lighting system is existing in an agricultural facility that causes the inefficient use of energy, as evidenced by an on-farm energy audit.

After Situation:

An on-farm energy audit has determined that energy use can be reduced through use of an automatic controller that helps regulates the energy consumption of the existing system. Associated practices/activities may include: 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm lighting operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each system

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $305.78 **Scenario Cost/Unit:** $305.78

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	4	$152.56
Materials						
Switches and Controls, programmable controller	1193	Programmable logic controller (with or without wireless telecommunications) commonly used to control pumps and irrigation systems	Each	$153.22	1	$153.22

Practice: 672 - Building Envelope Improvement

Scenario: #1 - Building Envelope - Attic Insulation

Scenario Description:

Install a minimum R-7 insulation in addition to existing attic or ceiling to reduce heat transfer. Increased insulation reduces seasonal heat loss and heat gain which reduces the respective need for heating and cooling equipment to operate.

Before Situation:

A poultry house with an inefficient building envelope with limited attic insulation.

After Situation:

A more effective and efficient building envelope can be created through addition of, or increased, attic insulation. Associated practices/activities: 122-AgEMP - HQ and 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Area of Attic Insulated

Scenario Unit: Square Foot

Scenario Typical Size: 20,000

Scenario Cost: $17,200.00 **Scenario Cost/Unit:** $0.86

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Insulation, Fiberglass or cellulose, R-15	1196	Fiberglass or cellulose insulation R-15, includes materials, equipment and labor to install.	Square Foot	$0.86	20000	$17,200.00

Practice: 672 - Building Envelope Improvement

Scenario: #2 - Building Envelope - Wall Insulation

Scenario Description:

Enclose both sidewalls and endwalls from ceiling to floor in one of two manners: 1) metal exterior, 3.5" fiberglass batts (R-11), vapor barrier, & interior plywood or OSB sheathing, or 2) closed-cell polyurethane foam application (minimum 1" thickness (R-7) of 2.5 lbs/cu.ft. or higher density, (3.0 or higher density preferred) with a form of physical protective barrier on lower 2' (may be 6 lbs/cu.ft. or higher density 1/8" thick foam, or treated lumber). Based on a 40' x 400' poultry house.

Before Situation:

A poultry house with an inefficient building envelope with limited wall insulation.

After Situation:

A more effective and efficient building envelope can be created through addition of, or increased, insulation. Associated practices/activities: may include 122-AgEMP - HQ and 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Area of Attic Insulated

Scenario Unit: Square Foot

Scenario Typical Size: 4,500

Scenario Cost: $8,325.00 **Scenario Cost/Unit:** $1.85

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Insulation, Panel, R-11 with sheathing	1197	Insulated wall panel typically 3.5" fiberglass batts (R-11), vapor barrier and OSB sheathing, or equal, includes materials, equipment and labor to install.	Square Foot	$1.85	4500	$8,325.00

Practice: 672 - Building Envelope Improvement

Scenario: #3 - Building Envelope - Sealant

Scenario Description:

A typical scenario is sealing the gaps between walls, gables, ceiling, etc. in a poultry house or greenhouse. Sealing is performed by a professional contractor, not merely use of spray foam from a can. The unit basis of payment in this scenario is each house based on 60' x 500' poultry house with an assumed need of sealant to seal 2400 linear feet of gap.

Before Situation:

An agricultural facility with an inefficient building envelope with gaps between walls, ceiling, etc. for a total of 2400 linear feet.

After Situation:

A more effective and efficient building envelope can be created through interior sealing of the exterior walls at the footer plate, eaves, ridge cap, and gable ends. The sealant reduces seasonal heat loss and heat gain due to infiltration which reduces the respective need for heating and cooling equipment to operate. Associated practices/activities: may include 122-AgEMP - HQ and 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Perimeter of heated structure

Scenario Unit: Foot

Scenario Typical Size: 2,400

Scenario Cost: $4,368.00 **Scenario Cost/Unit:** $1.82

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Sealant	1150	Greenhouse and building gap sealant. Performed by a professional contractor spraying the areas with an approved sealant for poultry production facilities. Includes materials, equipment and labor to install.	Foot	$1.82	2400	$4,368.00

Practice: 672 - Building Envelope Improvement

Scenario: #4 - Building Envelope - Greenhouse Screens

Scenario Description:

The mechanical energy screen system consists of a drive motor, support cables, controls, and shade material, which may be woven, knitted, or non-woven strips of aluminum fiber, polyethylene, nylon or other synthetic material. The screen provides a means to better control solar heat gain and heat transfer during night or cold weather conditions to reduce energy use. Screens and similar devices may also be used to divide internal areas and allow for differentiated heating, ventilation, or cooling system operation to reduce energy use.

Before Situation:

Heating and cooling of an existing greenhouse, or similar structure with conditioned spaces, is inefficient due to poorly regulated heat transfer. A need to regulate an entire space for uniform conditions when some portions have differing, intermittent requirements can also reduce efficiency.

After Situation:

The greenhouse is fitted with a mechanically controlled energy screen installed truss-to-truss or gutter-to-gutter, with side screens as necessary, reducing heat loss in the greenhouse. Associated practices/activities: may include 122-AgEMP - HQ and 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Area of Screen

Scenario Unit: Square Foot

Scenario Typical Size: 25,000

Scenario Cost: $47,610.24 **Scenario Cost/Unit:** $1.90

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	16	$610.24
Materials						
Thermal blanket 10,001 - 50,000 square foot	1148	Thermal blanket greenhouse screens: mechanical energy screen system consists of a drive motor, support cables, controls, and shade material, which may be woven, knitted, or non-woven. Size Range is 10,001 to 50,000 square feet. Materials only.	Square Foot	$1.88	25000	$47,000.00

Practice: 672 - Building Envelope Improvement

Scenario: #5 - Greenhouse - Insulate Unglazed Walls

Scenario Description:

A typical scenario is the installation insulation in green house to address energy loss. The insulation can be either of the cellouse or bubble type (or equivalent). The increased insulation reduces seasonal heat loss and heat gain which reduces the respective need for heating and cooling equipment to operate.

Before Situation:

Green house with standard glazing, plastic or polycarbonate walls and no insulation. Heating and cooling of an existing greenhouse is inefficient due to excessive heat loss.

After Situation:

The greenhouse is fitted with insulation installed truss-to-truss or gutter-to-gutter and/or non glazed endwalls and/or sidewalls, reducing heat loss and gain in the greenhouse. Associated practices/activities: may include 122-AgEMP - HQ and 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Square Feet of insulation

Scenario Unit: Square Foot

Scenario Typical Size: 25,000

Scenario Cost: $7,360.24 **Scenario Cost/Unit:** $0.29

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$38.14	16	$610.24
Materials						
Insulation, Greenhouse, Reflective Bubble	2410	Double bubble reflective insulation with aluminum foil on both sides. Includes materials and shipping only.	Square Foot	$0.27	25000	$6,750.00

Practice: 672 - Building Envelope Improvement

Scenario: #6 - Insulated Door

Scenario Description:

A typical scenario is installing an insulated roll-up or swinging door and any required hanging or installation hardware in a building or animal house to reduce energy loss. Roll-up doors, no less than 20 gauge, can be chain operated or mechanical. Installing an insulated door reduces seasonal heat loss and heat gain which reduces the need for heating and cooling.

Before Situation:

A Building or animal house with non-insulated doors and/or damaged doors. Heating and cooling of structure is inefficient due to excessive heat loss.

After Situation:

The building or animal house is fitted with a roll-up or swinging insulated door, reducing heat loss and gain in the building. Associated practices/activities: may include 122-AgEMP - HQ , 374-Farmstead Energy Improvement and the 670 Building Envelope sealant scenario . The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Size of Door

Scenario Unit: Square Foot

Scenario Typical Size: 168

Scenario Cost: $1,647.92 **Scenario Cost/Unit:** $9.81

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	8	$184.64
Materials						
Door, Insulated, Roll-up	2392	Rolling service insulated steel door, 20 gauge. Includes hardware required to install. Used to replace non insulated door in buildings. Materials only.	Square Foot	$8.71	168	$1,463.28

Practice: 735 - Waste Gasification Facility

Scenario: #1 - Waste Gasification, less than or equal to 700lbs./hour

Scenario Description:

This scenario consists of installing a manufactured continuous feed waste gasification system designed to handle up to 700 pounds/hour of animal or agricultural waste. A gasifier can be part of a waste management system and be used to generate energy and/or heat. This plant will typically process the waste generated annually from an operation with less than 150,000 birds. The purpose of the practice is to address resource concerns related to water quality degradation due to excessive nutrients, organics, and pathogens being transported into surface and ground water resources. Air quality impacts will also be addressed, however, in non-attainment areas, higher levels of processing may be required. The roofed portion will be addressed under Roofs and Covers (367) and waste storage under Waste Storage Facility (313).

Potential Associated Practices: Access Road (560), Animal Mortality Facility (316), Critical Area Planting (342), Fence (382), Heavy Use Area Protection (561), Nutrient Management (590), Roofs and Covers (367), Waste Storage Facility (313)

Before Situation:

Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accummulating at the source, or other location, or are being transported, but not properly utilized or disposed. This situation poses an environmental threat of excessive nutrients, organics, and pathogens being transported into surface and ground waters, in addition to excessive amounts of nutrients being applied as fertilizer.

After Situation:

Gasification of animal wastes is being done in a manner that prevents non-point source pollution of excessive nutrients, organics, and pathogens from being transported into surface and ground water resources. Proper operation of the gasification facility results in little to no odor, gasification of the waste product, reduction in waste volume (ash or bio-char), and protection from animals functioning as vectors to minimize pathogen survival or spreading effects.

The typical facility is installed to handle up to 300 pounds/hour of waste material on average for a small to medium sized poultry operation (operating an average of 18 hours/day). Included is a concrete slab for the gasifier and fuel tank, excavation and gravel sub-base. Ash materials are to be stored in suitable containers until land disposal as per the nutrient management plan or land-filled.

Scenario Feature Measure: Pounds/hr Manure/Waste Processed

Scenario Unit: Pounds per Day

Scenario Typical Size: 5,400

Scenario Cost: $155,978.01 **Scenario Cost/Unit:** $28.88

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	22	$3,539.80
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	44	$104.28
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	2	$228.96
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	2	$44.66
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	4	$92.32
Materials						
Fuel Tank, Anchored	1033	Fuel tank for operating incinerators and/or gasifiers. Materials only.	Gallon	$1.01	285	$287.85

Materials

Manure Gasifier, (300lb/hour)	1748	Gasifier unit which will process up to 300 lb/hour. Includes equipment and labor.	Each	##########	1	$150,309.52
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	22	$857.34

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 735 - Waste Gasification Facility

Scenario: #2 - Waste Gasification, more than 700lbs./hour

Scenario Description:

This scenario consists of installing a manufactured continuous feed waste gasification system designed to handle more than 700 pounds/hour of animal or agricultural waste. A gasifier can be part of a waste management system and be used to generate energy and/or heat. This plant will typically process the waste generated annually from an operation with more than 150,000 birds. The purpose of the practice is to address resource concerns related to water quality degradation due to excessive nutrients, organics, and pathogens being transported into surface and ground water resources. Air quality impacts will also be addressed, however, in non-attainment areas, higher levels of processing may be required. The roofed portion will be addressed under Roofs and Covers (367) and waste storage under Waste Storage Facility (313).

Potential Associated Practices: Access Road (560), Animal Mortality Facility (316), Critical Area Planting (342), Fence (382), Heavy Use Area Protection (561), Nutrient Management (590), Roofs and Covers (367), Waste Storage Facility (313)

Before Situation:

Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accummulating at the source, or other location, or are being transported, but not properly utilized or disposed. This situation poses an environmental threat of excessive nutrients, organics, and pathogens being transported into surface and ground waters, in addition to excessive amounts of nutrients being applied as fertilizer.

After Situation:

Gasification of animal wastes is being done in a manner that prevents non-point source pollution of excessive nutrients, organics, and pathogens from being transported into surface and ground water resources. Proper operation of the gasification facility results in little to no odor, gasification of the waste product, reduction in waste volume (ash or bio-char), and protection from animals functioning as vectors to minimize pathogen survival or spreading effects.

The typical facility is installed to handle up to 3000 pounds/hour of waste material on average for large livestock operations (operating an average of 18 hours/day). Included is a concrete slab for the gasifier and fuel tank, excavation and gravel sub-base. Ash materials are to be stored in suitable containers until land disposal as per the nutrient management plan or land-filled.

Scenario Feature Measure: Pounds/hr Manure/Waste Processed

Scenario Unit: Pounds per Day

Scenario Typical Size: 54,000

Scenario Cost: $1,253,681.06 **Scenario Cost/Unit:** $23.22

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$160.90	28	$4,505.20
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	56	$132.72
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$114.48	3	$343.44
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	6	$138.48
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	3	$66.99
Materials						
Fuel Tank, Anchored	1033	Fuel tank for operating incinerators and/or gasifiers. Materials only.	Gallon	$1.01	285	$287.85

Materials

Manure Gasifier, (3,000lb/hour)	1752	Gasifier unit which will process up to 3,000 lb/hour. Includes equipment and labor.	Each	##########	1	##########
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$38.97	28	$1,091.16

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: **740 - Pond Sealing or Lining, Soil Cement**

Scenario: **#1 - Soil Cement Treatment**

Scenario Description:

Construction of a compacted soil liner, treated with cement, typically 6" thick, to reduce seepage from ponds. Practice implementation includes incorporation of the cement with the soil under proper moisture conditions, compaction to the designed liner thickness. Associated practices include 378-Pond. Does not apply to waste storage structures.

Before Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits. Soils are suitable for treatment with cement.

After Situation:

Water conservation and environmental protection provided by limiting seepage losses from ponds.

Scenario Feature Measure: Surface Area of Lining

Scenario Unit: Square Foot

Scenario Typical Size: 10,890

Scenario Cost: $10,085.92 **Scenario Cost/Unit:** $0.93

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$54.81	4	$219.24
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.40	201	$884.40
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$41.23	2	$82.46
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	4	$89.32
Materials						
Herbicide, Picloram	337	Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$19.12	0.25	$4.78
Test, Soil-Cement, Wetting and Drying Test	1816	Wetting and Drying Test for Compacted Soil-Cement Mixtures (ASTM D559). Includes materials and shipping only.	Each	$249.88	1	$249.88
Test, Soil-Cement, Moisture-Density	1815	Moisture-Density Test for Soil-Cement Mixtures (ASTM D558). Includes materials and shipping only.	Each	$249.88	1	$249.88
Test, Soil-Cement, Freezing and Thawing	1814	Freezing and Thawing Test for Compacted Soil-Cement Mixtures (ASTM D560). Includes materials and shipping only.	Each	$249.88	1	$249.88
Cement, Type I or II	1336	Type I or II Portland Cement (94 lb. bag), Materials only.	Each	$13.84	545	$7,542.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	2	$513.28

Practice: 747 - Denitrifying Bioreactor

Scenario: #1 - Bioreactor. with Liner and Cover

Scenario Description:

This bioreactor has geotextile fabric (or polyethylene - PE) between the wood chips and the surrounding soil plus the following components: woodchip filled pit, a soil cover, two water control structures (to allow management of the flow rate and and free water elevation within the bioreactor), and piping to convey water to and from the bioreactor. Woodchips serve as the carbon source necessary to the denitrification process.
Associated practices: Subsurface Drain (606), Structure for Water Control (587), Drainage Water Management (554), Filter Strip (393), Vegetated Treatment Area (635).
Resource concern: Water Quality Degradation - Excess nutrients in surface and ground waters.
Management and maintenance of the bioreactor (including chip replenishment), as well as monitoring and reporting to demonstrate the performance of the practice are not included in this scenario.

Before Situation:

Before the installation, the subsurface drainage system is contributing nitrates to a surface water source (ditch or stream), high nitrates are a resource concern to the receiving water, and it is feasible to install a bioreactor to reduce the nitrate load from drainage outflows.

After Situation:

All components of the bioreactor are installed and functional. Nitrates are removed from bioreactor outflow. The approximate bioreactor excavated pit volume is 280 cubic yards (e.g. 5 feet deep, 15 feet wide and 100 feet long). Woodchips occupy the lower ~3.5 feet of the pit (200 cu. yd.) and a soil blanket over the woodchips is mounded 1.0 ft. above the surrounding ground surface to shed water and account for settling. A geotextile fabric (or PE material) surrounds the chips to prevent migration of soil into the pit. Two inline water control structures are in place and connected to the two 6" diameter HDPE dual-wall manifold pipes by 10" diameter dual wall pipe.Flow rates are dependent upon the availability of drainage water from the 10" drainage mainline. The soil excavated from the pit is spoiled onto the nearby field.

Scenario Feature Measure: Volume of Carbon Source

Scenario Unit: Cubic Yard

Scenario Typical Size: 200

Scenario Cost: $13,791.34 **Scenario Cost/Unit:** $68.96

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.45	780	$1,911.00
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	280	$663.60
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	280	$1,010.80
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	4	$173.28
Aggregate, Wood Chips	1098	Includes materials, equipment and labor	Cubic yard	$23.27	200	$4,654.00
Trenching, Earth, 24" x 60"	1460	Trenching, earth, 24" wide x 60" depth, includes equipment and labor for trenching and backfilling.	Foot	$3.65	50	$182.50
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	24	$553.92
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	6	$133.98
Materials						
Pipe, HDPE, CPT, Double Wall, Soil Tight, 6"	1992	Pipe, Corrugated HDPE Double Wall, 6" diameter with soil tight joints - AASHTO M252. Material cost only.	Foot	$2.83	30	$84.90
Water Level Control Structure, Inline, 2 Baffle, 10" diameter	2021	Inline Inlet WCS 6' High x 10" Dia.connections , 2 baffle (3 compartments)	Each	$1,915.78	1	$1,915.78

Materials

Water Control Structure, Stoplog, Inline, fixed costs portion	2145	Fixed cost portion of Water Level Control Structure, Inline stoplog type. Typically made of PVC or fiberglass materials. Fixed cost portion. Materials only.	Each	$309.67	1	$309.67
Water Control Structure, Stoplog, Inline, variable cost portion	2146	Variable cost portion of a Water Level Control Structure, Inline stoplog type. Typically made of PVC or fiberglass materials. Calculate total variable costs by multiplying by the structure height x pipe diameter. Materials only.	Height x Diameter	$11.96	60	$717.60
Pipe, HDPE, CPT, Double Wall, Soil Tight, 10"	1243	Pipe, Corrugated HDPE Double Wall, 10" diameter with soil tight joints - AASHTO M252. Material cost only.	Foot	$5.51	40	$220.40

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 747 - Denitrifying Bioreactor

Scenario: #2 - Bioreactor, No Liner or Cover

Scenario Description:

This bioreactor has no geotextile or PE liner on the walls or bottom and no soil cap over the wood chips. The components include woodchip filled pit, two water control structures (to allow management of the flow rate and and free water elevation within the bioreactor), and piping to convey water to and from the bioreactor. Woodchips serve as the carbon source necessary to the denitrification process.
Associated practices: Subsurface Drain (606), Structure for Water Control (587), Drainage Water Management (554), Filter Strip (393), Vegetated Treatment Area (635).
Resource concern: Water Quality Degradation - Excess nutrients in surface and ground waters.
Management and maintenance of the bioreactor (including chip replenishment), as well as monitoring and reporting to demonstrate the performance of the practice are not included in this scenario.

Before Situation:

Before the installation, a subsurface drainage system is contributing nitrates to a surface water source (ditch or stream), high nitrates are a resource concern to the receiving water, and it is feasible to install a bioreactor to reduce the nitrate load from drainage outflows.

After Situation:

All components of the bioreactor are installed and functional. Nitrates are removed from bioreactor outflow. The approximate bioreactor excavated pit volume is 200 cubic yards (e.g. 5 feet deep, 15 feet wide and 72 feet long). Woodchips occupy a 5 foot depth (200 cu. yd.) and the ground surface is graded away from the pit prevent inflow of surface water. Two inline water control structures are in place and connected to the two 6" diameter HDPE dual-wall manifold pipes by 10" diameter dual wall pipe.Flow rates are dependent upon the availability of drainage water from the 10" drainage mainline. The soil excavated from the pit is spoiled onto the nearby field.

Scenario Feature Measure: Volume of Carbon Source

Scenario Unit: Cubic Yard

Scenario Typical Size: 200

Scenario Cost: $11,217.30 **Scenario Cost/Unit:** $56.09

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.37	200	$474.00
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.61	200	$722.00
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.32	4	$173.28
Aggregate, Wood Chips	1098	Includes materials, equipment and labor	Cubic yard	$23.27	200	$4,654.00
Trenching, Earth, 24" x 60"	1460	Trenching, earth, 24" wide x 60" depth, includes equipment and labor for trenching and backfilling.	Foot	$3.65	50	$182.50
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	16	$369.28
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.33	6	$133.98
Materials						
Pipe, HDPE, CPT, Double Wall, Soil Tight, 6"	1992	Pipe, Corrugated HDPE Double Wall, 6" diameter with soil tight joints - AASHTO M252. Material cost only.	Foot	$2.83	30	$84.90
Water Level Control Structure, Inline, 2 Baffle, 10" diameter	2021	Inline Inlet WCS 6' High x 10" Dia.connections , 2 baffle (3 compartments)	Each	$1,915.78	1	$1,915.78
Water Control Structure, Stoplog, Inline, fixed costs portion	2145	Fixed cost portion of Water Level Control Structure, Inline stoplog type. Typically made of PVC or fiberglass materials. Fixed cost portion. Materials only.	Each	$309.67	1	$309.67

Materials

Water Control Structure, Stoplog, Inline, variable cost portion	2146	Variable cost portion of a Water Level Control Structure, Inline stoplog type. Typically made of PVC or fiberglass materials. Calculate total variable costs by multiplying by the structure height x pipe diameter. Materials only.	Height x Diameter	$11.96	60	$717.60
Pipe, HDPE, CPT, Double Wall, Soil Tight, 10"	1243	Pipe, Corrugated HDPE Double Wall, 10" diameter with soil tight joints - AASHTO M252. Material cost only.	Foot	$5.51	40	$220.40

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$489.99	1	$489.99
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$256.64	3	$769.92

Practice: 756 - Field Operations Emissions Reduction

Scenario: #1 - Tillage Pass Reduction

Scenario Description:

Utilize equipment that allows multiple operations in a single pass to reduce number of field passes per crop rotation. Utilize this practice only when residue and STIR values cannot be achieved when using the associated Residue and Tillage Management Practices: 329-NoTill/ Strip Till/ Direct Seed, 344-Seasonal Tillage or 345-Mulch Tillage. Resource Concern addressed is to improve air quality by reducing combustion and particulate matter emissions.

Before Situation:

Tillage operations are performed individually; each operation requiring a tractor or other power implement to pull the tillage implement resulting in multiple passes across the field.

After Situation:

One field pass provides 3 or more tillage operations or total field activity results in less tillage passes. This reduces the total number of passes across the field and thus reduces combustion and particulate matter emissions.

Scenario Feature Measure: Acres of treatment

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $1,216.00 **Scenario Cost/Unit:** $30.40

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.20	80	$1,216.00

Practice: **798 - Seasonal High Tunnel for Crops**

Scenario: **#1 - Hoop House Kit**

Scenario Description:

A manufactured seasonal high tunnel or "hoop house", typically framed of tubular steel (30 x 72 ft.) covered with 4-year 6mil plastic is installed. Costs are based on purchase of manufactured kit and landowner installing the structure. Structure must be installed to manufacturer's specifications. Plant health and vigor is improved and energy use is decreased by producing food locally.

Before Situation:

Cropland where extension of the growing season is needed. Additional resource concerns that may need to be addressed include; soil erosion, soil condition, water quality, water quantity, plant condition, and energy use.

After Situation:

A seasonal high tunnel has been installed and the growing season has been extended for 1-4 months on average. Plant health and vigor is improved and energy use is decreased by producing food locally.

Scenario Feature Measure: Area of Tunnel Installed

Scenario Unit: Square Foot

Scenario Typical Size: 2,160

Scenario Cost: $8,442.68 **Scenario Cost/Unit:** $3.91

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$23.08	71	$1,638.68
Materials						
Hoop House, quonset style, base package	1277	Includes the framework complete with all predrilled steel, hardware and instructions. Includes 6 mil 4-year polyethylene film to cover tunnel, and polylock for sides and ends for a quonset style (round top) hoop house. Materials and shipping only, does n	Square Foot	$3.15	2160	$6,804.00