Practice: 313 - Waste Storage Facility

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

Scenario Description:

An earthen 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 less than 50,000 ft3. This practice will address soil and water quality by reducing the pollution potential for surface water and groundwater quality degradation. Earthen storage liners are addressed with another standard. Vehicular and equipment access is addressed in Heavy Use Area Protection (561) to adequately protect liner at agitation and access points.

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 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. This situation poses an environmental 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 : design storage volume 25,000 ft3; 87'X87' (top); 3:1 inside and outside side slopes; cut/fill ratio = 1.25; total depth = 9.5' (design depth = 8'); (not inclued in volume - 1' freeboard and 0.5' sludge accumulation).

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 25,000

Scenario Cost: $9,001.95 **Scenario Cost/Unit:** $0.36

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	$4.01	582	$2,333.82
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	806	$3,522.22
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.95	224	$212.80
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.59	578	$2,075.02
Materials						
Structural steel tubing, 2" diameter	1120	Structural steel tubing, 2" diameter, 1/8" wall thickness, materials only	Foot	$3.69	8	$29.52
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77

Practice: 313 - Waste Storage Facility

Scenario: #2 - Earthen Storage Facility, greater than 50K ft3 Storage

Scenario Description:

An earthen 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 more than 50,000 ft3. This practice will address soil and water quality by reducing the pollution potential for surface water and groundwater quality degradation. Earthen storage liners are addressed with another standard. Vehicular and equipment access is addressed in Heavy Use Area Protection (561) to adequately protect liner at agitation and access points.

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 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. This situation poses an environmental 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: design storage volume 168,000 ft3; 157'X162' (top); 3:1 inside and outside side slopes; cut/fill ratio = 1.25; total depth = 13' 8" (design depth = 12'); (not inclued in volume - 1' freeboard and 8" sludge accumulation).

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 168,000

Scenario Cost: $47,042.69 **Scenario Cost/Unit:** $0.28

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	$4.37	4375	$19,118.75
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	$4.01	3634	$14,572.34
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.95	741	$703.95
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.59	3284	$11,789.56
Materials						
Structural steel tubing, 2" diameter	1120	Structural steel tubing, 2" diameter, 1/8" wall thickness, materials only	Foot	$3.69	8	$29.52
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	$543.77	1	$543.77
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 313 - Waste Storage Facility

Scenario: #3 - Earthen Storage Facility, High Water Table

Scenario Description:

An earthen waste impoundment constructed to store wastes such as manure, wastewater, and contaminated runoff as part of an agricultural waste management system. Due to high watertable conditions, the earthen embankment is constructed on the soil surface. Earthfill is obtained within five miles off-site. This practice will address soil and water quality by reducing the pollution potential for surface water and groundwater quality degradation. Earthen storage liners are addressed with another standard. Vehicular and equipment access is addressed in Heavy Use Area Protection (561) to adequately protect liner at agitation and access points.

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), Roof and Covers (367), Waste Separation Facility (632), Waste Treatment (629), Subsurface Drain (606), and Underground Outlet (620).

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. This situation poses an environmental 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: design storage volume 121,200 ft3; 150'X150' (top); 3:1 inside and outside side slopes; embankment topwidth = 10'; compaction ratio = 1.1; total depth = 10' (design depth = 8.5'); (not inclued in volume - 1' freeboard and 0.5' sludge accumulation); embankment volume = 4*160*((10+70)/2)*10*1.1

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 121,200

Scenario Cost: $165,160.11 **Scenario Cost/Unit:** $1.36

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	$212.37	97	$20,599.89
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.59	10430	$37,443.70
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	10430	$45,579.10
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	$4.01	9689	$38,852.89
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	$0.36	48445	$17,440.20
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.95	741	$703.95
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	$26.75	97	$2,594.75
Materials						

Materials

Structural steel tubing, 2" diameter	1120	Structural steel tubing, 2" diameter, 1/8" wall thickness, materials only	Foot	$3.69	8	$29.52

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	$543.77	3	$1,631.31
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 313 - Waste Storage Facility

Scenario: #4 - Above Ground Steel or Concrete, less than 25K ft3 storage

Scenario Description:

An above ground circular glass lined steel or concrete structure 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 less than 25,000 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), 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. This situation poses an environmental threat of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources.

After Situation:

An above ground storage structure 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 14,000 ft3, (not included - 1' freeboard); based on 31' X 19' glass lined steel tank.

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 14,000

Scenario Cost: $90,439.60 **Scenario Cost/Unit:** $6.46

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	$127.06	12	$1,524.72
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	$401.46	16.5	$6,624.09
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	$2.35	80	$188.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	80	$349.60
Materials						
Waste Storage, Glass lined steel structure (<25,000 ft3)	1616	Includes materials, equipment and labor to install 31' (diameter) X19' (height) steel lined structure. Includes materials, equipment and labor.	Cubic Foot	$5.77	14000	$80,780.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	21.5	$609.74
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	$78.65	1	$78.65
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 313 - Waste Storage Facility

Scenario: #5 - Above Ground Steel or Concrete, between 25 and100K ft3 storage

Scenario Description:

An above ground circular glass lined steel or concrete structure 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 between 25,000 and 100,000 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), 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. This situation poses an environmental threat of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources.

After Situation:

An above ground storage structure 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 75,000 ft3, (not included - 1' freeboard); based on 73' X 19' glass lined steel tank.

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 75,000

Scenario Cost: $181,779.57 **Scenario Cost/Unit:** $2.42

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	$4.37	250	$1,092.50
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	$127.06	65	$8,258.90
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	$401.46	39	$15,656.94
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	$2.35	250	$587.50
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	73	$2,070.28
Waste Storage, glass lined steel structure, 25,000 - 100,000 cubic foot	1620	Includes materials, equipment and labor to install a steel glass lined structure (based on typical 73' diameter X 19' height) . Includes materials, equipment and labor.	Cubic Foot	$2.05	75000	$153,750.00
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	$78.65	1	$78.65
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 313 - Waste Storage Facility

Scenario: #6 - Above Ground Steel or Concrete, between 100 and 200K ft3 storage

Scenario Description:

An above ground circular glass lined steel or concrete structure 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 between 100,000 and 200,000 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), 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. This situation poses an environmental threat of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources.

After Situation:

An above ground storage structure 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 177,000 ft3, (not included - 1' freeboard); based on 112' X 19' glass lined steel tank.

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 177,000

Scenario Cost: $338,654.74 **Scenario Cost/Unit:** $1.91

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	$127.06	152	$19,313.12
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	$401.46	59	$23,686.14
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	470	$2,053.90
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	$4.01	470	$1,884.70
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	143.5	$4,069.66
Waste Storage, glass lined steel structure, 100,000-200,000 cubic foot	1621	Includes materials, equipment and labor to install a steel glass lined structure (based on typical 112' diameter X 19' height) . Includes materials, equipment and labor.	Cubic Foot	$1.62	177000	$286,740.00
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	$543.77	1	$543.77

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	$78.65	1	$78.65
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 313 - Waste Storage Facility

Scenario: #7 - Above Ground Steel or Concrete, greater than 200K ft3 storage

Scenario Description:

An above ground circular glass lined steel or concrete structure 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 greater than 200,000 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), 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. This situation poses an environmental threat of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources.

After Situation:

An above ground storage structure 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 235,000 ft3, (not included - 1' freeboard); based on 129' X 19' glass lined steel tank.

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 235,000

Scenario Cost: $468,099.70 **Scenario Cost/Unit:** $1.99

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	$4.01	584	$2,341.84
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	584	$2,552.08
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	$127.06	202	$25,666.12
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	$401.46	68	$27,299.28
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	181	$5,133.16
Waste Storage, glass lined steel structure >200,000 cubic foot	1622	Includes materials, equipment and labor to install a steel glass lined structure (based on typical 129' diameter X 19' height) . Includes materials, equipment and labor.	Cubic Foot	$1.72	235000	$404,200.00
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	$78.65	1	$78.65
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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	$543.77	1	$543.77

Practice: 313 - Waste Storage Facility

Scenario: #8 - Drystack,earthen floor,no wall

Scenario Description:

This scenario consists of a dry stack facility with compacted earthen floor without side walls. This scenario is intended for dryer material such as poultry litter. 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 scenario is applicable when geological, soil, and climate conditions are appropriate for earth floors and are allowed by state and local regulations. 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. This situation poses an environmental 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:

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.
The typical is 4,000 SqFt (40' x 100'). The earthen floor will be prepared by stripping the top 1' of soil and roller compacting it back into floor.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 4,000

Scenario Cost: $2,327.78 **Scenario Cost/Unit:** $0.58

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	$4.37	148	$646.76
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	$4.01	148	$593.48
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	$543.77	2	$1,087.54

Practice: 313 - Waste Storage Facility

Scenario: #9 - Dry stack, earthen floor, wood or concrete wall

Scenario Description:

This scenario consists of a dry stack facility with compacted earthen floor with wooden walls, posts and a concrete curb. This scenario is intended for dryer material such as poultry litter. 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 scenario is applicable when geological, soil, and climate conditions are appropriate for earth floors and are allowed by state and local regulations.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. This situation poses an environmental 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:

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.
The typical is 4,000 SqFt (40' x 100'). The earthen floor will be prepared by stripping the top 1' of soil and roller compacting it back into floor. Walls are 5' pressure treated wood (2" x 8" boards), 6" x 6" x 8' posts set 4' c-c with 6" concrete curbing. Walls allow for greater storage volume. (Wood walls are 4.5' with 0.5' high concrete curbing.) Walls are along three sides of the facility (both short dimensions and one long dimension). Site preparation includes excavation and compaction of top 1' of material, setting posts, and installing curbing and wooden walls.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 4,000

Scenario Cost: $10,054.42 **Scenario Cost/Unit:** $2.51

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	$48.07	12	$576.84
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	148	$646.76
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$9.31	12	$111.72
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	$4.01	148	$593.48
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	$401.46	2	$802.92
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	$127.06	5.5	$698.83
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	90	$1,715.40

Labor

Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	12	$226.80

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	$1.59	1104	$1,755.36
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.85	1620	$1,377.00

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	$191.56	2	$383.12
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	2	$1,087.54
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	$78.65	1	$78.65

Practice: 313 - Waste Storage Facility

Scenario: #10 - Dry Stack, concrete floor, no wall

Scenario Description:

This scenario consists of a dry stack facility with reinforced concrete floor without side walls. This scenario is applicable when geological, soil, climate conditions or state and local regulations prohibit the use of an earthen surface, and requires a hard working surface such as concrete. 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. This situation poses an environmental 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:

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.
The typical is 4,000 SqFt (40' x 100'). The facility floor is 5" reinforced concrete without side walls. Site preparation includes topsoil removal (0.5'), placement of compacted gravel (4"), and installing 5" of reinforced concrete.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 4,000

Scenario Cost: $10,122.05 **Scenario Cost/Unit:** $2.53

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	$4.01	74	$296.74
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	$127.06	62	$7,877.72
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	49.5	$1,403.82
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	$543.77	1	$543.77

Practice: 313 - Waste Storage Facility

Scenario: #11 - Dry Stack, concrete floor, wood or concrete wall

Scenario Description:

This scenario consists of a dry stack facility with reinforced concrete Floor with pressure treated wood or concrete walls. This scenario is applicable when geological, soil, climate conditions or state and local regulations prohibit the use of an earthen surface, and requires a hard working surface such as concrete. The purpose of this practice is to temporarily, 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. This situation poses an environmental 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:

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.
The typical is 4,000 SqFt (40' x 100') with wood walls. The facility floor is 5" reinforced concrete with 5' pressure treated wood (2" x 8" boards) walls, 6" x 6" x 8' posts set 4' c-c with 6" concrete curbing. Walls allow for greater storage volume. (Wood walls are 4.5' with 0.5' high concrete curbing.) Walls are along three sides of the facility (both short dimensions and one long dimension). Site preparation includes topsoil removal (0.5'), placement of compacted gravel (4"), installing 5" of reinforced concrete floor, setting posts, and installing curbing and wooden walls.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 4,000

Scenario Cost: $17,848.69 **Scenario Cost/Unit:** $4.46

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	$127.06	5.5	$698.83
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	$127.06	62	$7,877.72
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	$401.46	2	$802.92
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	12	$576.84
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$9.31	12	$111.72
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	$4.01	74	$296.74

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	$18.90	12	$226.80
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	$19.06	90	$1,715.40

Materials

Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.85	1620	$1,377.00
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	$1.59	1104	$1,755.36
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	49.5	$1,403.82

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	$543.77	1	$543.77
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	$78.65	1	$78.65
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	$191.56	2	$383.12

Practice: 313 - Waste Storage Facility

Scenario: #12 - Concrete Tank, Buried, less than 5K

Scenario Description:

This scenario consists of installing a small concrete tank with a design storage volume of less than 5,000 CF that is totally or partially buried and has a solid lid with several openings for direct loading from a heavy use area, gutter cleaner or gravity pipe. Manure is held for 3 to 14 days on smaller operations or transfered to larger storage facility or direct land applied. Design volume does not include freeboard. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.

Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Access Road (560), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Waste Separation Facility (632), Diversion (362), Subsurface Drain (606), Pumping Plant (533),and Underground Outlet (620).

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. This situation poses an environmental 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:

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. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.
Tank typically 8' deep x 12' wide x 40' long, with a design storage volume of 3,600 cubic feet plus 6" freeboard and conrete top. Sizing based on manure, other wastes, rainfall, lot runoff, etc. Volume does not include 6" of freeboard. Tanks associated with open lots sized to handle design storm in tank or in combination with lot as per state regulations. Site preparation includes excavation of tank footprint, placement of compacted gravel (5"), pouring concrete floor, walls and top, and backfilling around the tank.

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 3,600

Scenario Cost: $21,973.13 **Scenario Cost/Unit:** $6.10

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	$401.46	36	$14,452.56
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	$127.06	8	$1,016.48
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	213	$1,224.75
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.59	163	$585.17
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	$127.04	19	$2,413.76
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	$26.75	19	$508.25
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	9	$255.24

Materials

Waterstop, PVC, ribbed, 3/16" x 6"	1614	Waterstop, PVC, ribbed, 3/16" thick by 6"wide. Includes materials, equipment and labor.	Foot	$4.35	104	$452.40

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	$543.77	1	$543.77
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
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	$78.65	3	$235.95

Practice: 313 - Waste Storage Facility

Scenario: #13 - Conc Tank, Buried, between 5K and 15K

Scenario Description:

This scenario consists of installing a concrete tank that has a design storage volume from 5,000 to 14,999 CF that is totally or partially buried and has an open top. The tank can also be under an animal facility with the top cover of either slats or solid concrete lid/floor. Design volume does not include freeboard.

Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Access Road (560), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Waste Separation Facility (632), Diversion (362), Subsurface Drain (606), and Underground Outlet (620).

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. This situation poses an environmental 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:

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. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.
Tank typically 8' deep, with a bottom area of 1256 SF, and a design storage volume of 9,420 cubic feet plus 6" freeboard (40' diameter). (6.5' excavation depth with 8" wall thickness.) Sizing based on manure, other wastes, rainfall, lot runoff, etc. as appropriate. Volume does not include 6" of freeboard. Site preparation includes excavation of tank footprint, placement of compacted gravel (5"), pouring concrete floor and wall, and backfilling around the tank.

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 9,420

Scenario Cost: $21,401.29 **Scenario Cost/Unit:** $2.27

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	$127.06	22	$2,795.32
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	$401.46	26	$10,437.96
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	162	$931.50
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.59	323	$1,159.57
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	$127.04	25	$3,176.00
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	$26.75	25	$668.75
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	22	$623.92

Materials

Waterstop, PVC, ribbed, 3/16" x 6"	1614	Waterstop, PVC, ribbed, 3/16" thick by 6"wide. Includes materials, equipment and labor.	Foot	$4.35	125	$543.75

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	$543.77	1	$543.77
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	$78.65	3	$235.95
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 313 - Waste Storage Facility

Scenario: #14 - Conc Tank, Buried, between 15K and 25K

Scenario Description:

This scenario consists of installing a concrete tank that has a design storage volume from 15,000 to 24,999 CF. The tank is totally or partially buried and has an open top. It can be under an animal facility with the top cover being slats or concrete lid/floor. The design volume does not include freeboard. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.

Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Access Road (560), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Waste Separation Facility (632), Diversion (362), Subsurface Drain (606), Pumping Plant (533) and Underground Outlet (620).

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. This situation poses an environmental 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:

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. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.
Tank is typically 8 ft deep, with a bottom area of 2,667 sq.ft., and a design storage volume of 20,000 cubic feet plus 6” freeboard (58.5' diameter). (6.5' excavation depth with 8" wall thickness.) Size based on design volume of manure, other wastes, rainfall, lot runoff, etc as appropriate and does not include the 6” of freeboard. Site preparation includes excavation of tank footprint, placement of compacted gravel (5"), pouring concrete floor and wall, and backfilling around the tank.

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 20,000

Scenario Cost: $34,522.86 **Scenario Cost/Unit:** $1.73

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	$127.06	45	$5,717.70
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	$127.04	46	$5,843.84
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.59	677	$2,430.43
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	227	$1,305.25
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	$401.46	37	$14,854.02
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	$26.75	46	$1,230.50
Materials						
Waterstop, PVC, ribbed, 3/16" x 6"	1614	Waterstop, PVC, ribbed, 3/16" thick by 6"wide. Includes materials, equipment and labor.	Foot	$4.35	184	$800.40

Materials

Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	45	$1,276.20

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	$543.77	1	$543.77
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	$78.65	3	$235.95
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 313 - Waste Storage Facility

Scenario: #15 - Conc Tank, Buried, between 25K and 50K

Scenario Description:

This scenario consists of installing a concrete tank that has a design storage volume from 25,000 to 49,999 CF. Tank is totally or partially buried and has an open top. Tank can be under a animal facility with the top cover being slats or concrete lid/floor. The design volume does not include freeboard. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.

Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Access Road (560), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Waste Separation Facility (632), Diversion (362), Subsurface Drain (606), and Underground Outlet (620).

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. This situation poses an environmental 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:

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. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.
Tank installed is 10' deep, with a bottom area of 2,947 SF, and a design storage volume of 28,000 cubic feet plus 6" freeboard (61.3' diameter). (8' excavation depth with 8" wall thickness.) Size based on manure, other wastes, rainfall, lot runoff, etc as appropriate. Calculated volume for scenario does not include the 6” of freeboard. Site preparation includes excavation of tank footprint, placement of compacted gravel (5"), pouring concrete floor and wall, and backfilling around the tank.

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 28,000

Scenario Cost: $39,343.81 **Scenario Cost/Unit:** $1.41

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	$127.06	49	$6,225.94
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	$401.46	48	$19,270.08
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	334	$1,920.50
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.59	922	$3,309.98
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	$4.01	1263	$5,064.63
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	49	$1,389.64
Waterstop, PVC, ribbed, 3/16" x 6"	1614	Waterstop, PVC, ribbed, 3/16" thick by 6"wide. Includes materials, equipment and labor.	Foot	$4.35	193	$839.55
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	$543.77	2	$1,087.54
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	$78.65	3	$235.95

Practice: 313 - Waste Storage Facility

Scenario: #16 - Conc Tank, Buried, between 50K and 75K

Scenario Description:

This scenario consists of installing a concrete tank that has a design storage volume from 50,000 to 74,999 CF. Tank is totally or partially buried and has an open top, however it can be under a animal facility with the top cover with slats or concrete lid/floor. The design volume does not include freeboard. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.

Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Access Road (560), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Waste Separation Facility (632), Diversion (362), Subsurface Drain (606), and Underground Outlet (620).

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. This situation poses an environmental 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:

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. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.
Tank typically 12' deep, with a bottom area of 5,391 SF, and a design storage volume of 62,000 cubic feet plus 6" freeboard (82.9' diameter). (10' excavation depth with 10" wall thickness.) Sizing based on manure, other wastes, rainfall, lot runoff, etc. as appropriate. Volume does not include 6" of freeboard. Site preparation includes excavation of tank footprint, placement of compacted gravel (5"), pouring concrete floor and wall, and backfilling around the tank.

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 62,000

Scenario Cost: $77,801.69 **Scenario Cost/Unit:** $1.25

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	$127.06	88	$11,181.28
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	$401.46	98	$39,343.08
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	661	$3,800.75
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.59	2078	$7,460.02
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	$4.01	2739	$10,983.39
Materials						
Waterstop, PVC, ribbed, 3/16" x 6"	1614	Waterstop, PVC, ribbed, 3/16" thick by 6"wide. Includes materials, equipment and labor.	Foot	$4.35	261	$1,135.35
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	88	$2,495.68
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	$78.65	4	$314.60
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	2	$1,087.54

Practice: 313 - Waste Storage Facility

Scenario: #17 - Conc Tank, Buried, between 75K and 110K

Scenario Description:

This scenario consists of installing a concrete tank that has a design storage volume from 75,000 to 109,999 CF. Tank is totally or partially buried and has an open top. Tank can also be under an animal facility with the top cover using slats or concrete lid/floor. The design volume does not include freeboard. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.

Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Access Road (560), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Waste Separation Facility (632), Diversion (362), Pipeline (516), Subsurface Drain (606), and Underground Outlet (620).

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. This situation poses an environmental 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:

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. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.
Tank typically 12' deep, with a bottom area of 8,044 SF, and a design storage capacity of 92,500 cubic feet plus 6" freeboard (101.2' diameter). (10' excavation depth with 10" wall thickness.) Sizing based on manure, other wastes, rainfall, lot runoff, etc. as appropriate. Volume does not include 6" of freeboard. Site preparation includes excavation of tank footprint, placement of compacted gravel (5"), pouring concrete floor and wall, and backfilling around the tank.

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 92,500

Scenario Cost: $101,813.01 **Scenario Cost/Unit:** $1.10

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	$127.06	129	$16,390.74
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.59	3081	$11,060.79
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	$4.01	3871	$15,522.71
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	$401.46	119	$47,773.74
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	790	$4,542.50
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	129	$3,658.44
Waterstop, PVC, ribbed, 3/16" x 6"	1614	Waterstop, PVC, ribbed, 3/16" thick by 6"wide. Includes materials, equipment and labor.	Foot	$4.35	318	$1,383.30
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	$543.77	2	$1,087.54
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	$78.65	5	$393.25

Practice: 313 - Waste Storage Facility

Scenario: #18 - Conc Tank, Buried, greater than 110K

Scenario Description:

This scenario consists of installing a concrete tank that has a design storage volume of 110, 000 or more CF. Tank is totally or partially buried and has an open top. Tank can also be under a animal facility with the top cover using slats or concrete lid/floor. The design volume does not include freeboard. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.

Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Access Road (560), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Waste Separation Facility (632), Diversion (362), Pipeline (516), Subsurface Drain (606), and Underground Outlet (620).

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. This situation poses an environmental 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:

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. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.
Tank typically 14' deep with a bottom area of 11,304 SF and a design storage volume of 152,600 CF plus 6" freeboard (120' diameter). (12' excavation depth with 10" wall thickness.) Sizing based on manure, other wastes, rainfall, lot runoff, etc. as appropriate. Volume does not include 6" of freeboard. Site preparation includes excavation of tank footprint, placement of compacted gravel (5"), pouring concrete floor and wall, and backfilling around the tank.

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 152,600

Scenario Cost: $153,763.05 **Scenario Cost/Unit:** $1.01

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	$3.59	5170	$18,560.30
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	1304	$7,498.00
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	$401.46	164	$65,839.44
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	$127.06	217	$27,572.02
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	$4.01	6474	$25,960.74
Materials						
Waterstop, PVC, ribbed, 3/16" x 6"	1614	Waterstop, PVC, ribbed, 3/16" thick by 6"wide. Includes materials, equipment and labor.	Foot	$4.35	377	$1,639.95
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	181	$5,133.16
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	$78.65	6	$471.90
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	2	$1,087.54

Practice: 313 - Waste Storage Facility

Scenario: #19 - Composted Bedded Pack, Earthen Floor, Concrete Wall

Scenario Description:

A composted bedded pack facility is constructed to store wastes 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: Fence (382), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), and Roofs and Covers (367).

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. This situation poses an environmental threat of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources.

After Situation:

Using a bedded pack 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. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.
Typical design: floor area 4,000 ft2 , (40' X 100'); 4' concrete wall height, 3' footing depth with an earthen floor; 20' openings on each end of structure. Site preparation includes excavation of bedded pack area and and concrete wall trench, recompaction of earthen floor, pouring concrete wall, and backfilling around the wall.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 4,000

Scenario Cost: $18,942.26 **Scenario Cost/Unit:** $4.74

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	$401.46	42	$16,861.32
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.95	102	$96.90
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	16	$92.00
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	$2.35	34	$79.90
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	$4.01	74	$296.74
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	74	$323.38
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	$543.77	1	$543.77
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	$78.65	1	$78.65
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 313 - Waste Storage Facility

Scenario: #20 - Composted Bedded Pack, Concrete Floor, Concrete Wall

Scenario Description:

A composted bedded pack facility is constructed to store wastes such as manure, wastewater, and contaminated runoff as part of an agricultural waste management system. This scenario is intended for situations where consistency of manure or geological conditions prohibit the use of earthen floors. 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), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561) and Roofs and Covers (367).

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. This situation poses an environmental threat of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources.

After Situation:

Using a bedded pack 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. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.
Typical design: floor area 4,000 ft2, (40' X 100'); 4' concrete wall height, 3' footing depth with a 6" concrete floor; 20' openings on each end of structure. Site preparation includes excavation of bedded pack area and and concrete wall trench, gravel placement for concrete floor (4"), pouring concrete floor and wall, and backfilling around the wall.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 4,000

Scenario Cost: $29,154.52 **Scenario Cost/Unit:** $7.29

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	$127.06	74	$9,402.44
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	$401.46	42	$16,861.32
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	$2.35	34	$79.90
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	16	$92.00
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.95	102	$96.90
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	$4.01	74	$296.74
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	50	$1,418.00
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	$543.77	1	$543.77
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	$78.65	1	$78.65
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 314 - Brush Management

Scenario: #2 - Mechanical, Hand tools

Scenario Description:

Using hand tools, such as axes, shovels, hoes, nippers, brush pullers, and including chainsaws to remove or cut off woody plants at of below the root collar. Typical area is moderate rolling to gentle sloping, moderately deep to deep soils that have stands of woody and non herbaceous species that are in the early phases of invasions. Typical unit is 80 acres.

Before Situation:

Area is in the very early phases of woody non herbaceous species 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:

Woody species 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: 80

Scenario Cost: $8,688.87 **Scenario Cost/Unit:** $108.61

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	20	$95.40
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	300	$2,103.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	2	$82.82
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	20	$229.80
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	$19.06	320	$6,099.20
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	$78.65	1	$78.65

Practice: 314 - Brush Management

Scenario: #3 - Mechanical, Small Shrubs, Light Infestation

Scenario Description:

Removal of small woody vegetation of light infestations on gentle sloping to moderately deep to deep soils. The practice entails the removal of brush 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 light infestation. Typical unit is 120 acres.

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: $10,997.96 **Scenario Cost/Unit:** $91.65

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	$143.05	60	$8,583.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	10	$414.10
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	30	$344.70
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	$33.06	10	$330.60
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	60	$1,134.00
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	$191.56	1	$191.56

Practice: 314 - Brush Management

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

Scenario Description:

Removal of small woody vegetation of medium infestations on gentle sloping to moderately deep to deep soils. The practice entails the removal of brush 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 the medium infestation. Typical unit is 120 acres.

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: $13,427.21 **Scenario Cost/Unit:** $111.89

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	$143.05	75	$10,728.75
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	10	$414.10
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	30	$344.70
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	$33.06	10	$330.60
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	75	$1,417.50
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	$191.56	1	$191.56

Practice: 314 - Brush Management

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

Scenario Description:

Removal of small woody vegetation of heavy infestations on gentle sloping to moderately deep to deep soils. The practice entails the removal of brush 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 the heavy infestation. Typical unit is 120 acres.

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: $15,856.46 **Scenario Cost/Unit:** $132.14

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	$41.41	10	$414.10
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$143.05	90	$12,874.50
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	30	$344.70
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	90	$1,701.00
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	$33.06	10	$330.60
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	$191.56	1	$191.56

Practice: 314 - Brush Management

Scenario: #6 - Mechanical, Large Shrubs, Light Infestation

Scenario Description:

Removal of large woody vegetation of light infestations on gentle sloping to moderately deep to deep soils. The practice entails the removal of brush 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 the light infestation. Typical unit is 120 acres.

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: $29,763.57 **Scenario Cost/Unit:** $248.03

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	$41.41	10	$414.10
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$207.67	120	$24,920.40
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	30	$344.70
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	$33.06	10	$330.60
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	$26.75	120	$3,210.00
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	$543.77	1	$543.77

Practice: 314 - Brush Management

Scenario: #7 - Mechanical, Large Shrubs, Medium Infestation

Scenario Description:

Removal of large woody vegetation of medium infestations on gentle sloping to moderately deep to deep soils. The practice entails the removal of brush 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 the medium infestation. Typical unit is 120 acres.

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: $48,517.17 **Scenario Cost/Unit:** $404.31

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	$207.67	200	$41,534.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	10	$414.10
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	30	$344.70
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	$26.75	200	$5,350.00
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	$33.06	10	$330.60
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	$543.77	1	$543.77

Practice: 314 - Brush Management

Scenario: #8 - Mechanical, Large Shrubs, Heavy Infestation

Scenario Description:

Removal of large woody vegetation of heavy infestations on gentle sloping to moderately deep to deep soils. The practice entails the removal of brush 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 the heavy infestation. Typical unit is 120 acres.

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: $60,610.52 **Scenario Cost/Unit:** $505.09

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	$41.41	15	$621.15
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$207.67	250	$51,917.50
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	30	$344.70
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	$26.75	250	$6,687.50
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$33.06	15	$495.90
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	$543.77	1	$543.77

Practice: 314 - Brush Management

Scenario: #9 - Mechanical & Chemical, Small Shrubs, Light Infestation

Scenario Description:

Removal of small woody vegetation of light infestations on gentle sloping to moderately deep to deep soils. The practice entails the removal of brush by the use of mechanical cutter, chopper or other light equipment followed by an application of low cost chemicals in low volumes of material 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 the light infestation rate. Typical unit is 120 acres.

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: $14,227.16 **Scenario Cost/Unit:** $118.56

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	$143.05	60	$8,583.00
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	120	$776.40
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	10	$414.10
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	30	$344.70
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	$33.06	10	$330.60
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	60	$1,134.00
Materials						
Herbicide, Picloram	337	Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$19.12	120	$2,294.40
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 shipping only.	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	$191.56	1	$191.56

Practice: 314 - Brush Management

Scenario: #10 - Mechanical & Chemical, Small Shrubs, Medium Infestation

Scenario Description:

Removal of small woody vegetation of medium infestations on gentle sloping to moderately deep to deep soils. The practice entails the removal of brush by the use of mechanical cutter, chopper or other light equipment followed by an application of low cost chemicals in low volumes of material 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 the medium infestation rate. Typical unit is 120 acres.

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: $16,656.41 **Scenario Cost/Unit:** $138.80

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	$41.41	10	$414.10
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$143.05	75	$10,728.75
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	120	$776.40
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	30	$344.70
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	$33.06	10	$330.60
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	75	$1,417.50
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 shipping only.	Acre	$1.32	120	$158.40
Herbicide, Picloram	337	Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$19.12	120	$2,294.40
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	$191.56	1	$191.56

Practice: 314 - Brush Management

Scenario: #11 - Mechanical & Chemical, Small Shrubs, Heavy Infestation

Scenario Description:

Removal of small woody vegetation of heavy infestations on gentle sloping to moderately deep to deep soils. The practice entails the removal of brush by the use of mechanical cutter, chopper or other light equipment t followed by an application of low cost chemicals in low volumes of material 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 the heavy infestation. Typical unit is 120 acres.

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: $19,458.01 **Scenario Cost/Unit:** $162.15

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	$6.47	120	$776.40
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$143.05	90	$12,874.50
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	15	$621.15
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	30	$344.70
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	$33.06	15	$495.90
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	90	$1,701.00
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 shipping only.	Acre	$1.32	120	$158.40
Herbicide, Picloram	337	Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$19.12	120	$2,294.40
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	$191.56	1	$191.56

Practice: 314 - Brush Management

Scenario: #12 - Chemical, Individual Plant Treatment

Scenario Description:

This Practice is for the implementation of brush management on range, pasture or native pasture using Individual Plant Treatment (IPT). The typical method of control is application of herbicides (basal or foliar location) on selected individual plants.

Before Situation:

Brush species exceed desired levels resulting in degraded plant condition, loss of forage production, or degraded wildlife habitat. Densities of brush exceed levels indicated in the ecological site descriptions.

After Situation:

Brush has been treated to a level which results in improved plant condition, forage production, or wildlife habitat. The typical method of control is application of herbicides (basal or foliar location) on selected individual plants.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $5,994.57 **Scenario Cost/Unit:** $149.86

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	$41.41	2	$82.82
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	$63.26	40	$2,530.40
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$34.13	20	$682.60
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	10	$114.90
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 shipping only.	Acre	$1.32	40	$52.80
Herbicide, Tebuthiuron	343	A nonselective broad spectrum herbicide used to control weeds, woody and herbaceous plants, and sugar cane. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$61.31	40	$2,452.40
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	$78.65	1	$78.65

Practice: 314 - Brush Management

Scenario: #13 - Chemical - Ground Applied

Scenario Description:

Apply brush management on 160 acres of rangeland, grazed forest, or pasture thru the use of broadcast application of material using low cost chemical(s) to reduce or remove undesirable woody 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 160 acre unit of pasture, grazed range, or grazed forest where reduction or removal of undesirable woody 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: 160

Scenario Cost: $8,773.34 **Scenario Cost/Unit:** $54.83

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	$6.47	160	$1,035.20
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	2	$82.82
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	40	$459.60
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	$33.06	2	$66.12
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	160	$6,844.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 314 - Brush Management

Scenario: #14 - Chemical, Aerial Applied

Scenario Description:

Apply brush management on 500 acres of rangeland, grazed forest, or pasture thru the use of broadcast aerial application of material with low cost chemical(s) to reduce or remove undesirable woody 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 woody 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: $27,969.99 **Scenario Cost/Unit:** $55.94

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, aerial application, fixed wing	947	Chemical application performed by fixed wing aircraft. Includes equipment, power unit and labor costs.	Acre	$9.90	500	$4,950.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	2	$82.82
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	125	$1,436.25
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	$33.06	2	$66.12
Materials						
Herbicide, Triclopyor	338	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$42.30	500	$21,150.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 314 - Brush Management

Scenario: #15 - Low Cost Chemical, Aerial Applied

Scenario Description:

Apply brush management on 500 acres of rangeland, grazed forest, or pasture thru the use of broadcast aerial application of material with low cost chemical(s) to reduce or remove undesirable woody species (such as mesquite and or shinnery oak 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 woody species (brush) 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: $22,294.99 **Scenario Cost/Unit:** $44.59

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	$41.41	2	$82.82
Chemical, aerial application, fixed wing	947	Chemical application performed by fixed wing aircraft. Includes equipment, power unit and labor costs.	Acre	$9.90	500	$4,950.00
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	125	$1,436.25
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	$33.06	2	$66.12
Materials						
Herbicide, Picloram	337	Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$19.12	250	$4,780.00
Herbicide, Triazine	1321	Broad spectrum herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$42.78	250	$10,695.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 314 - Brush Management

Scenario: #16 - Chemical, Aerial Applied Salt Cedar

Scenario Description:

Apply brush management on 30 acres of rangeland, grazed forest, or pasture thru the use of broadcast aerial application of chemical(s) to reduce or remove undesirable woody species (salt cedar) in uplands and other areas.

Before Situation:

Plant, animal, or wildlife resource concerns associated with uplands and other areas on grazed range, grazed forest, or pasture which are adversely affected by brush or trees.

After Situation:

A 30 acre unit of pasture, grazed range, or grazed forest where reduction or removal of undesirable woody species have been accomplished by aerial chemical application to address plant, animal, and wildlife resource concerns.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $2,671.40 **Scenario Cost/Unit:** $89.05

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, aerial application, fixed wing	947	Chemical application performed by fixed wing aircraft. Includes equipment, power unit and labor costs.	Acre	$9.90	30	$297.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	5	$207.05
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	13	$149.37
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	$33.06	8	$264.48
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 shipping only.	Acre	$1.32	30	$39.60
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	30	$1,245.00
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	30	$468.90

Practice: 314 - Brush Management

Scenario: #17 - Split-method event series

Scenario Description:

The practice entails the control of woody vegetation by treating it up to three times during the multi-year treatment period in order to improve ecological site condition. The brush can be treated with the same method or by a combination of methods. Woody vegetation needs to be treated at least twice in order to fully control it. Generally,herbicide volumes are reduced as the last 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.

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: $19,001.67 **Scenario Cost/Unit:** $158.35

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	$26.12	90	$2,350.80
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	120	$776.40
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$56.58	120	$6,789.60
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	5	$207.05
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	30	$344.70
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	$33.06	8	$264.48
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	120	$2,268.00
Materials						
Herbicide, Triclopyor	338	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$42.30	120	$5,076.00
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 shipping only.	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	$191.56	4	$766.24

Practice: 314 - Brush Management

Scenario: #18 - PJ Mechanical Removal - Low Density

Scenario Description:

Removal of pinyon/juniper trees in areas with low density encroachment of less than 100 trees per acre. The practice entails the removal of trees by mechanical means, either chainsaw or heavy equipment or a combination as appropriate in order to reduce fuel loading and improve ecological site condition. Tree density has exceeded desired levels based on ecological site potential and data collected as per state specifications to determine actual density. Typical unit is 500 acres in fairly remote areas.

Before Situation:

Area consists of excessive stands of pinyon juniper degrading health and vigor of native herbaceous species promoting noxious and invasive species and degrading wildlife habitat, especially for sage grouse areas.

After Situation:

Pinyon/Juniper trees 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: 500

Scenario Cost: $96,551.55 **Scenario Cost/Unit:** $193.10

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	$143.05	550	$78,677.50
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	125	$1,436.25
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	300	$5,670.00
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	$19.06	550	$10,483.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 314 - Brush Management

Scenario: #19 - PJ Mehcanical Removal - Moderate Density

Scenario Description:

Removal of pinyon/juniper trees in areas with moderate density encroachment between 101 - 250 trees per acre. The practice entails the removal of trees by mechanical means, either chainsaw or heavy equipment or a combination as appropriate in order to reduce fuel loading and improve ecological site condition. Tree density has exceeded desired levels based on ecological site potential and data collected as per state specifications to determine actual densityl. Typical unit is 500 acres in fairly remote areas.

Before Situation:

Area consists of excessive stands of pinyon juniper degrading health and vigor of native herbaceous species promoting noxious and invasive species and degrading wildlife habitat, especially for sage grouse areas.

After Situation:

Pinyon/Juniper trees 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: 500

Scenario Cost: $138,969.05 **Scenario Cost/Unit:** $277.94

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	$143.05	800	$114,440.00
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	125	$1,436.25
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	$19.06	800	$15,248.00
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	400	$7,560.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 314 - Brush Management

Scenario: #20 - PJ Mechancial Removal - High Density

Scenario Description:

Removal of pinyon/juniper trees in areas with high density encroachment of over 251 trees per acre. The practice entails the removal of trees by mechanical means, either chainsaw or heavy equipment or a combination as appropriate in order to reduce fuel loading and improve ecological site condition. Tree density has exceeded desired levels based on ecological site potential and data collected as per state specifications to determine actual densityl. Typical unit is 500 acres in fairly remote areas.

Before Situation:

Area consists of excessive stands of pinyon juniper degrading health and vigor of native herbaceous species promoting noxious and invasive species and degrading wildlife habitat, especially for sage grouse areas.

After Situation:

Pinyon/Juniper trees 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: 500

Scenario Cost: $222,859.05 **Scenario Cost/Unit:** $445.72

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	$143.05	1300	$185,965.00
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	125	$1,436.25
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	$19.06	1300	$24,778.00
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	550	$10,395.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 314 - Brush Management

Scenario: #21 - Juniper Chaining, one pass

Scenario Description:

Site preparation of a field with 2 dozers and an anchor chain to uproot pinyon and juniper trees to acheive a conservation objective. Typical scenario is approximately 500 acres of trees to be cleared. The resource concern is determined by the conservation objective met with the final practice applied to the field, typically sage grouse habitat and/or forage improvement.

Before Situation:

Wooded juniper area of approximately 500 acres, with variable density tree canopy.

After Situation:

Crew uses 2 dozers and an anchor chain to clear trees and prepare field for conservation objective. Associated practices, like plantings, woody debris removal, other structures, or irrigation/drainage water management practices, would be contracted separately as needed.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 500

Scenario Cost: $50,770.02 **Scenario Cost/Unit:** $101.54

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	$207.67	200	$41,534.00
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	125	$1,436.25
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	$19.06	100	$1,906.00
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	$26.75	200	$5,350.00
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	$543.77	1	$543.77

Practice: 314 - Brush Management

Scenario: #22 - Juniper Chaining, two pass

Scenario Description:

Site preparation of a field with 2 dozers and an anchor chain to uproot pinyon and juniper trees to acheive a conservation objective. Typical scenario is approximately 500 acres of trees to be cleared. The resource concern is determined by the conservation objective met with the final practice applied to the field, typically sage grouse habitat and/or forage improvement.

Before Situation:

Wooded juniper area of approximately 500 acres, with variable density tree canopy.

After Situation:

Crew uses 2 dozers and an anchor chain to clear trees and prepare field for conservation objective. Associated practices, like plantings, woody debris removal, other structures, or irrigation/drainage water management practices, would be contracted separately as needed.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 500

Scenario Cost: $89,964.59 **Scenario Cost/Unit:** $179.93

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	$207.67	360	$74,761.20
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	125	$1,436.25
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	$19.06	160	$3,049.60
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	$26.75	360	$9,630.00
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	$543.77	2	$1,087.54

Practice: 315 - Herbaceous Weed Control

Scenario: #1 - Mechanical, Hand

Scenario Description:

Using hand tools, such as axes, shovels, hoes, nippers, to remove or cut off herbaceous plants at of below the root collar. Typical area is moderate rolling to gentle sloping, moderately deep to deep soils that have herbaceous weed species that are in the early phases of invasions. Typical unit is 20 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: $626.40 **Scenario Cost/Unit:** $62.64

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	$34.13	5	$170.65
Pruning tools, hand tools	1318	Pruning tools, hand tools, shears, loppers, pole saw, handsaw. Material costs only. Labor not included.	Hour	$4.77	16	$76.32
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	1	$41.41
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	16	$304.96
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	$33.06	1	$33.06

Practice: 315 - Herbaceous Weed Control

Scenario: #2 - Mechanical

Scenario Description:

Removal of herbaceous weeds of light infestations on gentle sloping to moderately deep to deep soils. The practice entails the removal of herbaceous weeds by the use of mower, brush hog, disc or other light equipment in order to reduce fuel loading and improve ecological site condition. Weed has 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: $422.30 **Scenario Cost/Unit:** $10.56

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	$41.41	2	$82.82
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$56.58	6	$339.48

Practice: 315 - Herbaceous Weed Control

Scenario: #3 - Chemical, Spot

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, either initial or retreatment using hand-carried equipment (such as a backpack and hand-sprayer) 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: 20

Scenario Cost: $863.68 **Scenario Cost/Unit:** $43.18

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	$34.13	10	$341.30
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	4	$165.64
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	$33.06	4	$132.24
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	$19.06	10	$190.60
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 shipping only.	Acre	$1.32	2	$2.64
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: 315 - Herbaceous Weed Control

Scenario: #4 - Chemical, Ground

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 ground equipment 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: 20

Scenario Cost: $857.08 **Scenario Cost/Unit:** $42.85

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	$41.41	4	$165.64
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	20	$129.40
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	$33.06	4	$132.24
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	$19.06	4	$76.24
Materials						
Herbicide, 2,4-D	330	Broadleaf herbicide labeled for cropland and pasture. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$6.78	20	$135.60
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 shipping only.	Acre	$1.32	20	$26.40
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	$191.56	1	$191.56

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: 20

Scenario Cost: $162.00 **Scenario Cost/Unit:** $8.10

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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 shipping only.	Acre	$1.32	20	$26.40
Herbicide, 2,4-D	330	Broadleaf herbicide labeled for cropland and pasture. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$6.78	20	$135.60

Practice: 315 - Herbaceous Weed Control

Scenario: #6 - hand and chemical

Scenario Description:

Using hand tools, such as axes, shovels, hoes, nippers, to remove or cut off herbaceous plants at or below the root collar. Herbicide is applied to control re-growth of target weeds. Typical area is moderate rolling to gentle sloping, moderately deep to deep soils that have herbaceous weed species that are in the early phases of invasions. Typical unit is 10 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 planned

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $853.05 **Scenario Cost/Unit:** $85.31

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	10	$47.70
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$34.13	5	$170.65
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	$63.26	1	$63.26
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	1	$41.41
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	10	$190.60
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	$33.06	4	$132.24
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
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	$191.56	1	$191.56

Practice: 315 - Herbaceous Weed Control

Scenario: #7 - mechanical and chemical

Scenario Description:

Removal of herbaceous weeds of light infestations on gentle sloping to moderately deep to deep soils. The practice entails the removal of herbaceous weeds by the use of mower, brush hog, disc or other light equipment in order to reduce fuel loading and improve ecological site condition, then applying herbicide to control re-growth of target weeds. Weed has 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 planned

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $1,077.33 **Scenario Cost/Unit:** $107.73

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	$41.41	1	$41.41
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$56.58	2	$113.16
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	10	$64.70
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$34.13	2	$68.26
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	2	$37.80
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	$33.06	4	$132.24
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	10	$415.00
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 shipping only.	Acre	$1.32	10	$13.20
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	$191.56	1	$191.56

Practice: 315 - Herbaceous Weed Control

Scenario: #8 - split-method and event series

Scenario Description:

The practice entails the control of herbaceous vegetation by treating it up to three times during the multi-year treatment period in order to improve ecological site condition. The herbs can be treated with the same method or by a combination of methods. Vegetation needs to be treated at least twice in order to fully control it. Generally,herbicide volumes are reduced as the last treatment will kill resprouting stems or those which survived the first treatment or newly sprouted seedlings. Density has exceeded desired levels based on ecological site potential.

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 planned

Scenario Unit: Acre

Scenario Typical Size: 25

Scenario Cost: $2,387.65 **Scenario Cost/Unit:** $95.51

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	$6.47	25	$161.75
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$56.58	4	$226.32
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	4	$165.64
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	$33.06	4	$132.24
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	4	$75.60
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	$19.06	8	$152.48
Materials						
Herbicide, Triclopyor	338	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$42.30	25	$1,057.50
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 shipping only.	Acre	$1.32	25	$33.00
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	$191.56	2	$383.12

Practice: 316 - Animal Mortality Facility

Scenario: #1 - Incineration, < 50 CF Chamber

Scenario Description:

This scenario consists of installing a manufactured Type IV incinerator designed to handle 350 lbs of average daily mortality for the species and size of the operation. System shall use high temperature (>1,300 degrees F) incineration with a secondary combustion or afterburner chamber prior to flue discharge. After determining average daily mortality in lbs, select smallest incinerator that meets capacity. Payment made per unit of actual chamber size obtained from manufacturers' product literature. This option is not typically least-cost. In most states a roofed static compost pile with concrete floor and bins would be considered least cost. Therefore consider reducing payment rate as per State Conservationist discretion. 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 groundwater resources. Air quality impacts due to odors will also be addressed, however, in non-attainment areas, certain states may require a higher level of processing such as gasification or other approved methods.

Potential Associated Practices: Heavy Use Area Protection (561), Fence (382), Critical Area Planting (342), Access Road (560), Waste Storage Facility (313), Nutrient Management (590), Roofs and Covers (367), Critical Area Planting (342).

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 incineration, 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.
Typical incinerator installed to handle 150 lbs per day average mortality for a small poultry operation and has an incinerator chamber volume of 44 cubic feet. Included is a concrete slab to set the incinerator on and a fuel tank. Ash materials to be stored in suitable containers until land disposal as per the nutrient management plan or landfilled.

Scenario Feature Measure: Incinerator Chamber Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 44

Scenario Cost: $10,946.99 **Scenario Cost/Unit:** $248.80

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	$127.04	1	$127.04
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	$127.06	4	$508.24
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	$2.35	8	$18.80
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	1	$18.90
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	$19.06	1	$19.06
Materials						
Fuel Tank, Anchored	1033	Fuel tank for operating incinerators and/or gasifiers. Materials only.	Gallon	$1.01	285	$287.85

Materials

Incinerator, 200 lbs/day	1624	Poultry and livestock incinerator with an approximate chamber capacity of 200 pounds per day. Includes equipment and after burner only.	Each	$9,568.86	1	$9,568.86
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	4	$113.44

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 316 - Animal Mortality Facility

Scenario: #2 - Incineration 50-100CF chamber

Scenario Description:

This scenario consists of installing a manufactured Type IV incinerator designed to handle 350 to 850 lbs of average daily mortality for the species and size of the operation. Typically very large poultry or medium sized swine operations. System shall use high temperature (>1,300 degrees F) incineration with a secondary combustion or afterburner chamber prior to flue discharge. After determining average daily mortality in lbs, select smallest incinerator that meets capacity. Payment made per unit of actual chamber size obtained from manufacturers' product literature. This option is not typically least-cost. In most states a roofed static pile with concrete floor and bins would be considered least cost. Therefore consider reducing payment rate as per State Conservationist discretion. 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 groundwater resources. Air quality impacts due to odors are reduced, however, in non-attainment areas, certain states may require a higher level of processing such as gasification or other approved methods.

Potential Associated Practices: Heavy Use Area Protection (561), Fence (382), Critical Area Planting (342), Access Road (560), Waste Storage Facility (313), Nutrient Management (590), Roofs and Covers (367), Critical Area Planting (342).

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 incineration, and protection from predators to minimize pathogen survival or spreading. In non-attainment areas, certain states may require a higher level of processing such as gasification or different methods. 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.
Typical incinerator installed to handle 700 lbs per day average mortality for a medium poultry or swine operation and has an incinerator chamber volume of 55.8 cubic feet. Included is a concrete slab to set the incinerator on and a diesel fuel tank. Ash materials to be stored in suitable containers until land disposal as per the nutrient managment plan or landfilled.

Scenario Feature Measure: Incinerator Chamber Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 56

Scenario Cost: $12,722.07 **Scenario Cost/Unit:** $227.18

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	$2.35	8	$18.80
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	$127.04	1	$127.04
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	$127.06	4	$508.24
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	$19.06	1	$19.06
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	1	$18.90
Materials						
Fuel Tank, Anchored	1033	Fuel tank for operating incinerators and/or gasifiers. Materials only.	Gallon	$1.01	285	$287.85

Materials

Incinerator, 400 lbs/day	1625	Poultry and livestock incinerator with an approximate chamber capacity of 400 pounds per day. Includes equipment and after burner only.	Each	$11,343.94	1	$11,343.94
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	4	$113.44

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 316 - Animal Mortality Facility

Scenario: #3 - Incineration >100 CF Chamber

Scenario Description:

This scenario consists of installing a manufactured Type IV incinerator designed to handle a single 1,200 to 1,500 mortality. Typically a single dairy cow or multiple heifers or swine. System shall use high temperature (>1,300 degrees F) incineration with a secondary combustion or afterburner chamber prior to flue discharge. Select smallest incinerator that has a bin capacity to handle largest individual mortality. Payment made per unit of actual chamber size obtained from manufacturers' product literature. This option uses a very small footprint, however, it costs 15-20 gallons of diesel fuel per fill. The usage needs to be significant. At 500 cows with replacements, this option would offset a 4,000 SF concrete pad with another 8,000 to 12,000 SF of grassed area. This option for small dairy operations would not typically be least-cost. In most states either a roofed or unroofed static pile with concrete floor and walls would be considered least cost. Unless regulations require this or severe site limitations exist, consider reducing payment rate as per State Conservationist discretion. 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 groundwater resources. Air quality impacts due to odors will also be addressed, however, in non-attainment areas, certain states may require a higher level of processing such as gasification or other approved methods.

Potential Associated Practices: Heavy Use Area Protection (561), Fence (382), Critical Area Planting (342), Access Road (560), Waste Storage Facility (313), Nutrient Management (590), Roofs and Covers (367), Critical Area Planting (342).

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 incineration, and protection from predators to minimize pathogen survival or spreading. An overall plan covers normal and catastrophic mortality events. In non-attainment areas, certain states may require a higher level of processing such as gasification or other approved method. Selected method for carcass treatment and disposal meet or are permitted by federal, state, and local laws, rules, regulations.
Typical incinerator installed to handle a whole 1350 lb dairy cow on a 1,000 cow operation and has an incinerator chamber volume of 119.6 cubic feet. Included is a concrete slab to set the incinerator on and a fuel tank. Ash materials to be stored in suitable containers, a waste storage pit until land disposal as per the nutrient management plan or landfilled. Proper incineration will require between 15 and 25 gallons of diesel fuel per usage.

Scenario Feature Measure: Incineration Chamber Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 120

Scenario Cost: $14,567.73 **Scenario Cost/Unit:** $121.40

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	$127.06	4	$508.24
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	$2.35	8	$18.80
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	$127.04	1	$127.04
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	1	$18.90
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	$19.06	1	$19.06

Materials

Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	4	$113.44
Fuel Tank, Anchored	1033	Fuel tank for operating incinerators and/or gasifiers. Materials only.	Gallon	$1.01	285	$287.85
Incinerator, 600 lbs/day	1626	Poultry and livestock incinerator with an approximate chamber capacity of 600 pounds per day. Includes equipment and after burner only.	Each	$13,189.60	1	$13,189.60

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 316 - Animal Mortality Facility

Scenario: #4 - Small Animal Type

Scenario Description:

This scenario will address animal mortalities for small animal types (less than 10 pound average weight -i.e. broilers and birth to weaning swine). It was developed for various types of animal mortality facilities as listed below (which is not an exhaustive list):
− Static Bin: Consisting of a group of small bins (concrete or wood walls) on a concrete pad to compost 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.
− Invessel Rotary Drum. A commercially manufactured horizontal rotary drum to compost animal mortalities mixed with a carbon material (i.e. sawdust or wood chips). A secondary composting storage area is required to finish materials.
− Invessel Grinding Batch. A commercially manufactured grinding batch composter with a minimum capacity of 1,000 lbs per batch. A secondary composting storage area is required to finish materials.
- Forced Air Composting Bins: Consisting of a group of small bins with an aeration and leachate collection system.

(This scenario does not address incinerators.)

The least cost scenario is based on a static bin system with wood walls. The roofed portion of the facility is addressed with Roofs and Covers (367). Approach apron is addressed with Heavy Use Area Protection (561). Size of facility is based on daily mortality and sizing procedures accepted in particular state. 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 groundwater resources. Air quality impacts due to odors will also be addressed. Organic sites will require more frequent replacement of lumber (if used).

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), and Underground Outlet (620).

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 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.

The typical mortality facility is based on a wood wall static bin composting facility with the primary bins on one side and secondary bins along the backside. A typical livestock operation consists of a 88,000 broiler operation with 6 flocks per year. Average bird weight is 4 pounds with an average mortality rate of 5%. The average daily mortality is 289 lb/day which requires a minimum primary bin volume of 646 ft3. The secondary bin volume is the same as the primary bin. The facility will be installed on a 12' X 24' concrete pad with 6 bins (3 primary and 3 secondary bins) with a total bin capacity of 1,440 cubic feet. Bin dimensions are 5' Height x 8' Width x 6' Length. Bin wall consists of a 1' concrete curb and 4' of treated lumber. Site preparation includes topsoil removal, installing 4" of gravel, setting posts , installing concrete slab (5"), installing wooden walls and retaining planks. Piles turned to go through a second heat cycle prior to final land application.

Scenario Feature Measure: Total Bin Capacity

Scenario Unit: Cubic Foot

Scenario Typical Size: 1,440

Scenario Cost: $6,586.54 **Scenario Cost/Unit:** $4.57

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	$2.35	5.5	$12.93
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	$401.46	1.5	$602.19

Equipment/Installation

Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	4	$192.28
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	$127.06	2	$254.12
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	$127.06	4.5	$571.77
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$9.31	4	$37.24

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	$27.30	80	$2,184.00
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	4	$75.60

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	$1.59	360	$572.40
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.85	1440	$1,224.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	4	$113.44

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	$191.56	2	$383.12
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	$78.65	1	$78.65
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 316 - Animal Mortality Facility

Scenario: #5 - Medium Animal Type

Scenario Description:

This scenario will address animal mortalities for small animal types (which generally range in size from 10 to 50 pounds average weight -i.e. turkeys and nursery pigs). It was developed for various types of animal mortality facilities as listed below (which is not an exhaustive list):
− Static Bin:Consisting of a group of small bins (concrete or wood walls) on a concrete pad to compost 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.
− Invessel Rotary Drum. A commercially manufactured horizontal rotary drum to compost animal mortalities mixed with a carbon material (i.e. sawdust or wood chips). A secondary composting storage area is required to finish materials.
− Invessel Grinding Batch. A commercially manufactured grinding batch composter with a minimum capacity of 1,000 lbs per batch. A secondary composting storage area is required to finish materials.
- Forced Air Composting Bins: Consisting of a group of small bins with an aeration and leachate collection system.

(This scenario does not address incinerators.)

The least cost scenario is based on a static bin system with wood walls. The roofed portion of the facility is addressed with Roofs and Covers (367). Approach apron is addressed with Heavy Use Area Protection (561). Size of facility is based on daily mortality and sizing procedures accepted in particular state. 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 groundwater resources. Air quality impacts due to odors will also be addressed. Organic sites will require more frequent replacement of lumber (if used).

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), and Underground Outlet (620).

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.

The typical mortality facility is based on a wood wall static bin composting facility with the primary bins on one side and secondary bins along the backside. A typical livestock operation consists of a 28,000 hen turkey operation with 3 flocks per year. Average bird weight is 20 pounds with an average mortality rate of 7%. The average daily mortality is 322 lb/day which requires a minimum primary bin volume of 1,611 ft3. The secondary bin volume is the same as the primary bin. The facility will be installed on a 20' X 36' concrete pad with 6 bins (3 primary and 3 secondary bins) for a total bin capacity of 3,600 cubic feet. Bin dimensions are 5' Height x 12' Width x 10' Length. Bin wall consists of a 1' concrete curb and 4' of treated lumber. Site preparation includes topsoil removal, installing 4" of gravel, setting posts , installing concrete slab (5"), installing wooden walls and retaining planks. Piles turned to go through a second heat cycle prior to final land application.

Scenario Feature Measure: Total Bin Capacity

Scenario Unit: Cubic Foot

Scenario Typical Size: 3,600

Scenario Cost: $10,599.28 **Scenario Cost/Unit:** $2.94

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	$2.35	13.5	$31.73
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	$127.06	3	$381.18

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	$127.06	11.5	$1,461.19
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	7	$336.49
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	$401.46	2.5	$1,003.65
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$9.31	7	$65.17

Labor

Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	7	$132.30
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	$27.30	120	$3,276.00

Materials

Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	9	$255.24
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	$1.59	624	$992.16
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.85	2256	$1,917.60

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
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	$191.56	2	$383.12
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	$78.65	1	$78.65

Practice: 316 - Animal Mortality Facility

Scenario: #6 - Large Animal Type

Scenario Description:

This scenario will address animal mortalities for large animal types (which generally range in size from 50 to 300 average weight -i.e. grower/finishing pigs sheep and goats). It was developed for various types of animal mortality facilities as listed below (which is not an exhaustive list):
− Static Bin:Consisting of a group of small bins (concrete or wood walls) on a concrete pad to compost 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.
− Invessel Rotary Drum. A commercially manufactured horizontal rotary drum to compost animal mortalities mixed with a carbon material (i.e. sawdust or wood chips). A secondary composting storage area is required to finish materials.
− Invessel Grinding Batch. A commercially manufactured grinding batch composter with a minimum capacity of 1,000 lbs per batch. A secondary composting storage area is required to finish materials.
- Forced Air Composting Bins: Consisting of a group of small bins with an aeration and leachate collection system.

(This scenario does not address incinerators.)

The least cost scenario is based on a static bin system with wood walls. The roofed portion of the facility is addressed with Roofs and Covers (367). Approach apron is addressed with Heavy Use Area Protection (561). Size of facility is based on daily mortality and sizing procedures accepted in particular state. 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 groundwater resources. Air quality impacts due to odors will also be addressed. Organic sites will require more frequent replacement of lumber (if used).

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), and Underground Outlet (620).

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.

The typical mortality facility is based on a wood wall static bin composting facility with the primary bins on one side and secondary bins along the backside. A typical livestock operation consists of a 6,400 finishing pigs with 2.5 litters per year (all in all out system). Average pig weight is 160 pounds with an average mortality rate of 3%. The average daily mortality is 210 lb/day which requires a minimum primary bin volume of 3,320 ft3. The secondary bin volume is the same as the primary bin. The facility will be installed on a 20' X 72' concrete pad with 12 bins (6 primary and 6 secondary bins) for a total bin capacity of 7,200 cubic feet. Bin dimensions are 5' Height x 12' Width x 10' Length. Bin wall consists of a 1' concrete curb and 4' of treated lumber. Site preparation includes topsoil removal, installing 4" of gravel, setting posts , installing concrete slab (5"), installing wooden walls and retaining planks. Piles turned to go through a second heat cycle prior to final land application.

Scenario Feature Measure: Total Bin Capacity

Scenario Unit: Cubic Foot

Scenario Typical Size: 7,200

Scenario Cost: $17,396.10 **Scenario Cost/Unit:** $2.42

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	$127.06	5.5	$698.83
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$9.31	12	$111.72

Equipment/Installation

Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	12	$576.84
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	$2.35	27	$63.45
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	$401.46	4	$1,605.84
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	$127.06	22.5	$2,858.85

Labor

Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	12	$226.80
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	$27.30	160	$4,368.00

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	$1.59	1128	$1,793.52
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.85	4512	$3,835.20
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	18	$510.48

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
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	$78.65	1	$78.65
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	$191.56	2	$383.12

Practice: 316 - Animal Mortality Facility

Scenario: #7 - Extra Large Animal, Static Pile

Scenario Description:

This scenario consists of installing an impervious earthen pad to compost large animal mortalities, typically dairy cow, beef, sow or boar, in a static windrow or single pile. Additional carbon based bulking material is added to facilitate aeration and provide a proper C:N ratio. Piles turned at least once to go into another heat cycle prior to land application. Access is infrequent. This option requires at least 2 more times the area in vegetation for runoff treatment. This may not be an option for sites will limited areas, karst topography, and not isolated from of public view. 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 groundwater resources. Air quality impacts due to odors will also be addressed. Any roofed portion of the facility will be addressed with Roofs and Covers (367). Any approach areas will be addressed with Heavy Use Area Protection (561).

Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Access Road (560), Diversion (362), Subsurface Drain (606), and Underground Outlet (620)). Vegetative Treatment Area (635), Composting (317), Roofs and Covers (367), Heavy Use Area Protection (561)

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 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.
Typical system consists of a 50' x 50' compacted earth surface. Site can handle mortality for a 100 cow dairy with associated heifers and calves. On site soils can be recompacted to meet required imperviousness. Include sufficient area for processing equipment access. Use single piles or windrows to minimize runoff. 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. Site preparation includes removal of top 1.5' and recompacting.

Scenario Feature Measure: Pad Area

Scenario Unit: Square Foot

Scenario Typical Size: 2,500

Scenario Cost: $2,001.77 **Scenario Cost/Unit:** $0.80

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	$4.01	140	$561.40
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	140	$611.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77

Practice: 316 - Animal Mortality Facility

Scenario: #8 - Extra Large Animal, Static Pile, Geologic Limitations

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), beef, boar or sow animal mortality. 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. Any roofed portion of the facility will be addressed with Roofs and Covers (367). Any approach areas will be addressed with Heavy Use Area Protection (561).

Potential Associated Practices: Fence (382), Critical Area Planting (342), Heavy Use Area Protection (561), Nutrient Management (590), Access Road (560), Diversion (362), Subsurface Drain (606), and Underground Outlet (620).

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.
Typical system consists of a 60'x95' concrete surface to process an average mortality of 175 lb/day. Concrete 5" thick with light reinforcement. 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: $15,308.39 **Scenario Cost/Unit:** $2.69

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	$4.37	106	$463.22
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	$127.06	88	$11,181.28
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	$4.01	212	$850.12
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	70	$1,985.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77

Practice: 317 - Composting Facility

Scenario: #1 - Composter, with concrete under bins (wood or concrete) only

Scenario Description:

The composting facility, with concrete under bins only, is installed to address water quality concerns and disease vectors resulting from improper waste disposal by providing a dedicated facility for storage and treatment, and by creating a compost product that can be used in multiple ways including land application for enrichment of crop ground. All animal mortality composting shall be done using Practice Standard 316 - Animal Mortality
Facility.

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), Access Road (560), Structure for water control (587), Diversion (362), Pipeline (516), Subsurface Drain (606), Heavy Use Area Protection (561), Roofs and Covers (367), Roof Runoff Structure (558), Waste Storage Facility (313), Waste Recycling (633), Waste Transfer (634), Underground Outlet (620) and Vegetative Treatment Area (635).

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:

Manure and other agricultural by-products are being controlled, by the collection at the source, and stored properly, 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.
The typical composter is designed to handle organic material from a 4 house poultry operation containing 20,000 4 lbs birds in each house. The typical bin is 40' x 32' with 5' high bins, 4-primary bins and 1 secondary bin. Strip top 1' of soil and roll compact same back into sub-floor. The entire structure is constructed on a 5" concrete slab used to store and stabilize organic material from a four house complex on any farm.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 1,280

Scenario Cost: $9,675.90 **Scenario Cost/Unit:** $7.56

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	$127.06	2	$254.12
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	50	$218.50
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	$127.06	9	$1,143.54
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	$401.46	2	$802.92
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	$4.01	50	$200.50

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	$19.06	90	$1,715.40

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	$1.59	936	$1,488.24
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	10	$283.60
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.85	1640	$1,394.00

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	$543.77	4	$2,175.08

Practice: 317 - Composting Facility

Scenario: #2 - Composter, whole concrete floor, wood or concrete bins

Scenario Description:

The composting facility, with complete concrete floor, equipment lane and under bins, is installed to address water quality concerns and disease vectors resulting from improper waste disposal by providing a dedicated facility for storage and treatment, and by creating a compost product that can be used in multiple ways including land application for enrichment of crop ground. This scenario is applicable when geological, soil or climate conditions prohibit the use of only partial concrete surfaces (bins only). All animal mortality composting shall be done using Practice Standard 316 - Animal Mortality
Facility.

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), Access Road (560), Structure for water control (587), Diversion (362), Pipeline (516), Subsurface Drain (606), Heavy Use Area Protection (561), Roofs and Covers (367), Roof Runoff Structure (558), Waste Storage Facility (313), Waste Recycling (633), Waste Transfer (634), Underground Outlet (620) and Vegetative Treatment Area (635).

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:

Manure and other agricultural by-products are being controlled, by the collection at the source, and stored properly, 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.
The typical composter is designed to handle organic material from a 4 house poultry operation containing 20,000 4 lbs birds in each house. The typical bin is 40' x 32' with 5' high bins, 4-primary bins and 1 secondary bin. Strip top 1' of soil and roll compact same back into sub-floor. The entire structure is constructed on a 5" concrete slab used to store and stabilize organic material from a four house complex on any farm.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 1,280

Scenario Cost: $11,210.08 **Scenario Cost/Unit:** $8.76

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	$127.06	2	$254.12
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	50	$218.50
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	$127.06	22	$2,795.32
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	$401.46	2	$802.92
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	$4.01	50	$200.50

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	$19.06	90	$1,715.40

Materials

Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	22	$623.92
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.85	1640	$1,394.00
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	$1.59	648	$1,030.32

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	$543.77	4	$2,175.08

Practice: 317 - Composting Facility

Scenario: #3 - Composter, windrow, all weather surface

Scenario Description:

The composting facility is installed to address water quality concerns and disease vectors resulting from improper waste disposal by providing a dedicated facility for storage and treatment, and by creating a compost product that can be used in multiple ways including land application for enrichment of crop ground. This scenario is applicable when geological, soil, climate conditions or state and local regulations prohibit the use of an earthen surface. All animal mortality composting shall be done using Practice Standard 316 - Animal Mortality
Facility.

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), Access Road (560), Structure for water control (587), Diversion (362), Pipeline (516), Subsurface Drain (606), Heavy Use Area Protection (561), Roofs and Covers (367), Roof Runoff Structure (558), Waste Storage Facility (313), Waste Recycling (633), Waste Transfer (634), Underground Outlet (620) and Vegetative Treatment Area (635).

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:

Manure and other agricultural by-products are being controlled, by the collection at the source, and stored properly, 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. This is incorporated as part of the overall waste management system meeting the National Engineering Handbook (NEH), Part 651, Agricultural Waste Management Field Handbook (AWMFH) that has been developed to also account for end use of the product from the composting facility.
This scenario consists of installing a gravel pad over impervious soil to act as a working area to compost organic material in a static pile, windrow, that has sufficient carbon based bulking material to allow natural aeration. Piles typically turned at least once to go into another heat cycle prior to final deposal, typically land application. Typical pad 90' x 363' (3/4 acre) on an improved gravel surface. Sub base material sufficiently compacted or improved. Include sufficient area for processing equipment access. Single piles or windrows to minimize runoff. 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. Site preparation includes topsoil removal, compaction of subsoil, and installing 6" of compacted gravel.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 32,670

Scenario Cost: $38,003.18 **Scenario Cost/Unit:** $1.16

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	$4.01	1210	$4,852.10
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	3630	$8,530.50
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	1210	$5,287.70
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	605	$17,157.80
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	$543.77	4	$2,175.08

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: $3,830.57 **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	$2.35	1467	$3,447.45
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	$191.56	2	$383.12

Practice: 324 - Deep Tillage

Scenario: #1 - Deep Tillage < 36 inches

Scenario Description:

Deep tillage of <36 inches in depth is required to correct adverse conditions from soil compaction which results in slow water infiltration rates, limited root growth, and reduced crop production. Compaction is typically caused by tillage or harvest operations, or by heavy equipment traffic. This practice does not apply to normal tillage practices to prepare a seedbed, but is meant to fracture compacted soil zones.
Resource Concern: Soil Condition - Compaction

Before Situation:

Soil structure has been damaged through compaction caused by tillage equipment, harvest traffic, or construction equipment. Hardpan layers in the soil are restricting water infiltration, plant root growth, proper soil biological function, and overall crop production. Soil structure has been reduced, aggregate strength is week 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:

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 less than 36 inches. Soil compaction is measured with a penetrometer and/or visual observations. Soil moisture is less than 30 percent when deep tillage is used. Deep tillage is generally performed in the fall after crop harvest when soil conditions are dry, or soon after construction of conservation practices such as terraces, diversions, etc. Reduce tillage operations, avoid tillage or harvest operations when soil moisture levels are high, and limit harvest traffic to end rows or haul roads when possible

Scenario Feature Measure:

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $1,722.21 **Scenario Cost/Unit:** $21.53

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
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	$21.01	80	$1,680.80
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	1	$41.41

Practice: 324 - Deep Tillage

Scenario: #2 - Deep Tillage >= 36 inches

Scenario Description:

Deep tillage of >=36 inches in depth is required to correct adverse conditions from soil compaction which results in slow water infiltration rates, limited root growth, and reduced crop production. Compaction is typically caused by tillage or harvest operations, or by heavy equipment traffic. This practice does not apply to normal tillage practices to prepare a seedbed, but is meant to fracture compacted soil zones.
Resource Concern: Soil Condition - Compaction

Before Situation:

Soil structure has been damaged through compaction caused by tillage equipment, harvest traffic, or construction equipment. Hardpan layers in the soil are restricting water infiltration, plant root growth, proper soil biological function, and overall crop production. Soil structure has been reduced, aggregate strength is week 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:

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. Soil compaction is measured with a penetrometer and/or visual observations. Soil moisture is less than 30 percent when deep tillage is used. Deep tillage is generally performed in the fall after crop harvest when soil conditions are dry, or soon after construction of conservation practices such as terraces, diversions, etc. When possible, reduce tillage operations, and avoid tillage or harvest operations when soil moisture levels are high. Limit harvest traffic to end rows or haul roads when possible

Scenario Feature Measure:

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $2,570.61 **Scenario Cost/Unit:** $64.27

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	$41.41	1	$41.41
Ripper or subsoiler, > 36 inch depth	1236	Deep ripper or subsoiler, (>36 inches depth) includes tillage implement, power unit and labor.	Acre	$63.23	40	$2,529.20

Practice: 326 - Clearing and Snagging

Scenario: #1 - Clearing and Snagging - Light

Scenario Description:

Removal of vegetation, logs, or other material that impedes the proper functioning on up to 200 linear feet 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-third 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.

Scenario Feature Measure: Length of water course or channel

Scenario Unit: Linear Feet

Scenario Typical Size: 200

Scenario Cost: $3,407.28 **Scenario Cost/Unit:** $17.04

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	$127.04	6	$762.24
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	6	$449.16
Truck, dump, 8 CY	1401	Dump truck for moving bulk material. Typically capacity is 12 ton or 8 cubic yards. Includes equipment only.	Hour	$64.89	8	$519.12
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	12	$84.12
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	$19.06	16	$304.96
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	24	$453.60
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	$33.06	8	$264.48
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 326 - Clearing and Snagging

Scenario: #2 - Clearing and Snagging - Medium

Scenario Description:

Removal of vegetation, logs, or other material that impedes the proper functioning on 200 to 400 linear feet 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.

Scenario Feature Measure: Length of water course or channel

Scenario Unit: Linear Feet

Scenario Typical Size: 300

Scenario Cost: $5,254.26 **Scenario Cost/Unit:** $17.51

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	$7.01	20	$140.20
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$138.48	10	$1,384.80
Truck, dump, 8 CY	1401	Dump truck for moving bulk material. Typically capacity is 12 ton or 8 cubic yards. Includes equipment only.	Hour	$64.89	10	$648.90
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	$127.04	10	$1,270.40
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	32	$604.80
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	$33.06	10	$330.60
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	$19.06	16	$304.96
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 326 - Clearing and Snagging

Scenario: #3 - Clearing and Snagging - Heavy

Scenario Description:

Removal of vegetation, logs, or other material that impedes the proper functioning on over 400 linear feet 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 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:

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.

Scenario Feature Measure: Length of water course or channel

Scenario Unit: Linear Feet

Scenario Typical Size: 400

Scenario Cost: $7,923.22 **Scenario Cost/Unit:** $19.81

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	$64.89	16	$1,038.24
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	$127.04	16	$2,032.64
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$138.48	16	$2,215.68
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	30	$210.30
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	$19.06	30	$571.80
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	40	$756.00
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	$33.06	16	$528.96
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 327 - Conservation Cover

Scenario: #1 - Grass

Scenario Description:

This practice applies on land to be retired from agricultural production and on other lands needing permanent protective cover. This practice typically involves conversion from a clean-tilled (conventional tilled) intensive cropping system to permanent non-native vegetation (scenario includes non-native grass). 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, develop wildlife habitit, and reduce air quality impacts.

Before Situation:

Crops such as corn, soybeans, or cotton are conventionally grown and harvested. Full width tillage is utilized, weeds controlled by cultivation and/or chemical application. Soil surface residue amounts average 10% or less. 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 tillage practices, 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 non-native grass 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: 50

Scenario Cost: $5,000.50 **Scenario Cost/Unit:** $100.01

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	$22.51	50	$1,125.50
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$7.18	50	$359.00
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	50	$323.50
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$11.74	100	$1,174.00
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	50	$781.50
Introduced, cool season perennial grass. Includes material and shipping only.	2318	Introduced, cool season perennial grass. Includes material and shipping only.	Acre	$24.74	50	$1,237.00

Practice: 327 - Conservation Cover

Scenario: #2 - Native Grass

Scenario Description:

This practice applies on land to be retired from agricultural production and on other lands needing permanent protective cover. This practice typically involves conversion from a clean-tilled (conventional tilled) intensive cropping system to permanent native vegetation (scenario includes native grass). 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, develop wildlife habitit, and reduce air quality impacts.

Before Situation:

Crops such as corn, soybeans, or cotton are conventionally grown and harvested. Full width tillage is utilized, weeds controlled by cultivation and/or chemical application. Soil surface residue amounts average 10% or less. 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 tillage practices, 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 grass 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: 50

Scenario Cost: $5,510.00 **Scenario Cost/Unit:** $110.20

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Two Species Mix, Warm Season, Native Perennial Grass	2325	Native, warm season perennial grass. Includes material and shipping only.	Acre	$94.57	50	$4,728.50
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	50	$781.50

Practice: 327 - Conservation Cover

Scenario: #3 - Orchard or Vineyard Alleyways

Scenario Description:

This practice applies on orchards and vineyards needing permanent protective cover in the alleyways between tree and vine rows. The typical size of this practice is 20 acres. This practice typically involves conversion from a clean-tilled (conventional tilled) intensive cropping system to permanent vegetation (scenario includes non-native grass and legume mix). This practice scenario is typically used to reduce soil erosion, reduce soil quality degradation, improve water quality, enhance wildlife and/or pollinator habitit, manage plant pests, and reduce air quality impacts. 60% conservation cover per acre is typical.

Before Situation:

Orchard or vineyard with bare soil between vine/tree rows. Bare soil is exposed to wind erosion and/or intense rainfall during the fall, winter, and early spring. Over the winter sediment/nutrient runoff from orchards/vineyards increases. Sheet and rill erosion occurs with visible rills by spring. 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 long periods of bare soil. Little to no wildlife/pollinator habitat present.

After Situation:

Orchard or Vineyard area between vine/tree rows are planted with permanent introduced grass/legume mix. Area covered 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, pollinators, and wildlife.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $1,547.04 **Scenario Cost/Unit:** $77.35

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	$22.51	12	$270.12
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$21.65	12	$259.80
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$7.18	12	$86.16
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$11.74	24	$281.76
Materials						
Two Species Mix, Cool Season Annual (1 grass and 1 legume)	2314	Cool season annual grass and legume mix. Includes material and shipping only.	Acre	$54.10	12	$649.20

Practice: 327 - Conservation Cover

Scenario: #4 - Pollinator Habitat

Scenario Description:

Permanent vegetation, including mix of native grasses, legume, forbs (mix may also include non-native species), established on any land needing permanent vegetative cover that provides habitat for pollinators. Typical practice size is variable depending on site, this scenario uses 1 ac as the typical size. In addition to providing pollinator habitat, this practice scenario may also reduce sheet and rill erosion, improve soil quality, improve water quality, and improve air quality. The practice may also provide wildlife habitat. Practice applicable on cropland, odd areas, corners, etc.

Before Situation:

Crops such as corn, soybeans, or cotton are conventionally grown and harvested. Full width tillage is utilized, weeds controlled by cultivation and/or chemical application. Soil surface residue amounts average 10% or less. 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 tillage practices, 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 or pollinator habitat.

After Situation:

Land covered with permanent pollinator habitat including a mix of native grasses, legume, forbs (mix may also include non-native species). This practice may also have reduced soil erosion, reduced water/sediment runoff, and significant dust emissions are eliminated therefore, air quality is improved. Plants sown for pollinator habitat may also provide cover for beneficial insects and wildlife. This scenario does not apply to critical area plantings.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $405.14 **Scenario Cost/Unit:** $405.14

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	$11.74	1	$11.74
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	3	$19.41
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$21.65	2	$43.30
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	1	$22.51
Materials						
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	1	$261.29
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	3	$46.89

Practice: 327 - Conservation Cover

Scenario: #5 - Organic Introduced Mix

Scenario Description:

This practice applies on organically managed land needing permanent protective cover. This practice typically involves conversion from an intensive organic cropping system to permanent non-native vegetation (scenario includes non-native grass/legume mix). The typical size of the practice is 20 acres. This practice scenario is typically used to reduce soil erosion, reduce soil quality degradation, improve water quality, develop wildlife habitit, and reduce air quality impacts.

Before Situation:

Crops such as vegetables and small fruit crops are organically grown and harvested. Full width tillage is utilized, weeds controlled mainly by cultivation. Soil surface residue amounts average 10% or less. 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 tillage practices, 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:

Organically managed land covered with permanent non-native grass/legume mix 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: 20

Scenario Cost: $3,828.40 **Scenario Cost/Unit:** $191.42

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	$11.74	60	$704.40
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	20	$450.20
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$21.65	40	$866.00
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$7.18	20	$143.60
Materials						
Certified Organic, Three plus Species Mix, Cool Season, Annual Grasses and Legumes	2343	Certified organic cool season annual grass and legume mix. Includes material and shipping only.	Acre	$83.21	20	$1,664.20

Practice: 327 - Conservation Cover

Scenario: #6 - Organic Native Mix

Scenario Description:

This practice applies on organically managed land needing permanent protective cover. This practice typically involves conversion from an intensive organic cropping system to permanent native vegetation (scenario includes native grass/legume mix). The typical size of the practice is 20 acres. This practice scenario is typically used to reduce soil erosion, reduce soil quality degradation, improve water quality, develop wildlife habitit, and reduce air quality impacts. *Certified Organic Native Seed is typically NOT available, therefore non-organic seed components were used.

Before Situation:

Crops such as vegetables and small fruit crops are organically grown and harvested. Full width tillage is utilized, weeds controlled mainly by cultivation. Soil surface residue amounts average 10% or less. 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 tillage practices, 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:

Organically manage land covered with permanent native grass/legume mix 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: 20

Scenario Cost: $3,846.00 **Scenario Cost/Unit:** $192.30

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	$11.74	60	$704.40
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$21.65	60	$1,299.00
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	20	$450.20
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	20	$1,392.40

Practice: 327 - Conservation Cover

Scenario: #7 - Organic Pollinator Habitat

Scenario Description:

Permanent vegetation, including mix of native grasses, legume, forbs (mix may also include non-native species), established on organically managed land needing permanent vegetative cover that provides habitat for pollinators. Typical practice size is variable depending on site, this scenario uses 1 ac as the typical size. In addition to providing pollinator habitat, this practice scenario may also reduce sheet and rill erosion, improve soil quality, improve water quality, and improve air quality. The practice may also provide wildlife habitat. Practice applicable on cropland, odd areas, corners, etc. *Certified Organic Native Seed is typically NOT available, therefore non-organic seed components were used.

Before Situation:

Crops such as vegetables and small fruit crops are organically grown and harvested. Full width tillage is utilized, weeds controlled mainly by cultivation. Soil surface residue amounts average 10% or less. 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 tillage practices, 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 or pollinator habitat.

After Situation:

Organically managed land covered with permanent pollinator habitat including a mix of native grasses, legume, forbs (mix may also include non-native species). This practice may also have reduced soil erosion, reduced water/sediment runoff, and significant dust emissions are eliminated therefore, air quality is improved. Plants sown for pollinator habitat may also provide cover for beneficial insects and wildlife. This scenario does not apply to critical area plantings.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $428.15 **Scenario Cost/Unit:** $428.15

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						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$11.74	3	$35.22
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$21.65	3	$64.95
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	1	$22.51
Materials						
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	1	$261.29

Practice: 328 - Conservation Crop Rotation

Scenario: #1 - Standard Rotation

Scenario Description:

In this region this practice may be part of a conservation management system to: 1) Reduce sheet and rill or wind erosion 2) Improve soil quality 3) Supply nitrogen through biological nitrogen fixation to reduce energy use 4) Manage the balance of plant nutrients 5) Conserve water 6) Manage saline seeps 7) Manage plant pests (weeds, insects, and diseases). 8) Provide food for domestic livestock 9) Provide annual crops for bioenergy feed stocks 10) Provide food and cover for wildlife, including pollinator forage, cover, and nesting. This practice payment is provided to acquire the technical knowledge and skills necessary to effectively implement a conservation crop rotation on a typical 200 cropland farm. No foregone income. Cost represents typical situations for conventional (non-organic) producers.

Before Situation:

The rotation consists primarily of low residue producing row crops. Fields range from nearly flat to C and D slopes. Erosion, soil quality, and pest management are the primary concerns.

After Situation:

A rotation is establish that provides additional 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: 200

Scenario Cost: $330.60 **Scenario Cost/Unit:** $1.65

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	$33.06	10	$330.60

Practice: 328 - Conservation Crop Rotation

Scenario: #2 - Conversion-Irrigated to Dryland

Scenario Description:

In this region this practice may be part of a conservation management system to primarily convert from an irrigated cropping system to dryland farming. In addition to improving water use efficiency the rotation may 1) Reduce sheet and rill erosion 2) Reduce soil erosion from wind 3) Maintain or improve soil organic matter 4) Manage the balance of plant nutrients 5) Manage plant pests (weeds, insects, and diseases). 6) Provide food for domestic livestock and 7) Provide food and cover for wildlife. This practice payment is provided to acquire the technical knowledge and skills necessary to effectively implement a conservation crop rotation on a typical 120 ac pivot irrigated cropland farm. There is foregone income involved with this conversion from irrigated to dryland farming due to lower yields and net return. Cost represents typical situations for conventional (non-organic) producers converting from irrigated cropping to dryland farming.

Before Situation:

This rotation consisted of growing row crop grains that received a significant (more than half) of the required water via irrigation. The water demands are impacting the area's water availability. Erosion, soil condition, and future water availability are the major concerns.

After Situation:

The dryland rotation, using the same crops or a rotation that grows crops over different periods, will be part of a management system capable of utilizing available rainfall and soil moisture more efficiently and controling wind and water erosion. Corn yields will be expected to be reduced from 170 to 70 bu/acre.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 120

Scenario Cost: $48,025.80 **Scenario Cost/Unit:** $400.22

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Foregone Income						
FI, Corn Dryland	1959	Dryland Corn is Primary Crop	Acre	$144.36	-120	($17,323.20)
FI, Corn Irrigated	1960	Irrigated Corn is Primary Crop	Acre	$536.31	120	$64,357.20
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	$33.06	30	$991.80

Practice: 328 - Conservation Crop Rotation

Scenario: #4 - Specialty Crops

Scenario Description:

Describe the key features of the scenario so that it can be readily separated from other scenarios in the same practice. Describe the resource concerns that need to be addressed by installing the practice.In this region a rotation of specialty crops (fruits and vegetable) are produced as part of a conservation management system to: 1) Reduce sheet and rill erosion 2) Reduce soil erosion from wind 3) Maintain or improve soil organic matter 4) Manage the balance of plant nutrients 5) Improve water use efficiency, and 6) Manage plant pests (weeds, insects, and diseases). This practice payment is provided to acquire the technical knowledge and skills necessary to effectively implement a conservation crop rotation on a typical 50 acre specialty crop farm. No foregone income. Cost represents typical situations for conventional (non-organic) producers.

Before Situation:

This rotation consisted of growing specialty crops. Fields range from nearly flat to B and C slopes. Erosion, soil quality, and pest management are the primary concerns.

After Situation:

The rotation established adds higher residue crop(s) to the rotation that reduce erosion, improve soil quality, and break pest cycles.

Scenario Feature Measure: Area Planted

Scenario Unit: Acre

Scenario Typical Size: 50

Scenario Cost: $1,653.00 **Scenario Cost/Unit:** $33.06

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	$33.06	50	$1,653.00

Practice: 328 - Conservation Crop Rotation

Scenario: #6 - Small Farm <25 acres

Scenario Description:

In this region a rotation of specialty crops (fruits and vegetable) are produced as part of a conservation management system to: 1) Reduce sheet and rill erosion 2) Reduce soil erosion from wind 3) Maintain or improve soil organic matter 4) Manage the balance of plant nutrient 5) Improve water use efficiency, and 6) Manage plant pests (weeds, insects, and diseases). This practice payment is provided to acquire the technical knowledge and skills necessary to effectively implement a conservation crop rotation on a typical 5 acre or less specialty crop farm. No foregone income. Cost represents typical situations for conventional (non-organic) and organic producers on small farms less than 25 acres.

Before Situation:

This rotation consisted of growing specialty crops. Fields range from nearly flat to B and C slopes. Erosion, soil quality, and pest management are the primary concerns.

After Situation:

The rotation established adds higher residue crop(s) to the rotation that reduce erosion, improve soil quality, and break pest cycles.

Scenario Feature Measure: Area Planted

Scenario Unit: Acre

Scenario Typical Size: 5

Scenario Cost: $1,653.00 **Scenario Cost/Unit:** $330.60

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	$33.06	50	$1,653.00

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

Scenario: #1 - No-Till/Strip-Till

Scenario Description:

This practice typically involves conversion from a clean-tilled (conventional tilled) system to no-till or strip-till (conservation tilled) 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. The no-till/strip-till system includes chemical weed control (rather than cultivation) and may also include a period of chemical fallow. System 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 100 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 to be 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.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $2,119.50 **Scenario Cost/Unit:** $21.20

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	$22.51	50	$1,125.50
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	$19.88	50	$994.00

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

Scenario: #2 - No-Till/Strip-Till 5 acres or less

Scenario Description:

This practice typically involves conversion from a clean or mulch tilled (conventional tilled) system to no-till or strip-till (conservation tilled) system on 5 acres or less of cropland (scenario typical size is 4 acres). 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. The no-till/strip-till system relies on mulching/residue management, organic-approved chemical weed control, or alterative methods of weed control such as hand weeding, flaming, etc. (rather than traditional cultivation). System is applicable in both irrigated and non-irrigated fields.

Before Situation:

Crops such as various vegetable and fruit crops along with row crops are grown and harvested throughout the year. Full width tillage is performed prior to planting and weed control during crop production is typically cultivation and mulching. 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. Wind and/or water 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:

329 is applied per the practice plan and all the appropriate criteria are followed for the planned purpose(s). Crop residue is managed on the surface of a small field (typical 4 acres) year around while limiting soil disturbing activities to those which condition residue, place nutrients, and plant crops. All crops are seeded/planted with a no-till drill, no-till/strip-till transplanter, or no-till/strip-till planter, which minimize soil disturbance while establishing good seed-soil contact. All residues are to be 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 provide wildlife food and cover. 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.

Scenario Feature Measure: Farm 5 acres or less

Scenario Unit: Acre

Scenario Typical Size: 4

Scenario Cost: $84.78 **Scenario Cost/Unit:** $21.20

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	$22.51	2	$45.02
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	$19.88	2	$39.76

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

Scenario: #3 - No Till Adaptive Management

Scenario Description:

The practice scenario is for the implementation of no till in small replicated plots 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 done following the interim guidance for no till adaptive management to be issued to all field offices for FY15.

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). 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.

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: Area planted

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $3,476.46 **Scenario Cost/Unit:** $173.82

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	$22.51	10	$225.10
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	$19.88	10	$198.80
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	$19.06	24	$457.44
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	$108.13	24	$2,595.12

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: $3,451.26 **Scenario Cost/Unit:** $10.79

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	$34.13	16	$546.08
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	8	$331.28
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	$2.87	8	$22.96
Trailer, water tank	1598	Mobile 5,000 gal water tank mounted on a trailer. Equipment only. Does not include towing equipment.	Hour	$22.31	8	$178.48
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	$108.13	8	$865.04
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	$27.30	32	$873.60
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	$33.06	12	$396.72
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	$78.65	2	$157.30

Practice: 338 - Prescribed Burning

Scenario: #2 - Level Terrain, Herbaceous Fuel Non-Volatile

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 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/or low volatile woody fuel with no high volatile fuels. 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: $2,984.64 **Scenario Cost/Unit:** $9.33

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						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$34.13	16	$546.08
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	16	$662.56
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	$2.87	16	$45.92
Trailer, water tank	1598	Mobile 5,000 gal water tank mounted on a trailer. Equipment only. Does not include towing equipment.	Hour	$22.31	8	$178.48
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	$27.30	32	$873.60
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	$33.06	12	$396.72
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	$78.65	2	$157.30

Practice: 338 - Prescribed Burning

Scenario: #3 - Level Terrain, Volatile or woody fuels

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 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 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: $3,878.19 **Scenario Cost/Unit:** $12.12

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						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$34.13	16	$546.08
Trailer, water tank	1598	Mobile 5,000 gal water tank mounted on a trailer. Equipment only. Does not include towing equipment.	Hour	$22.31	8	$178.48
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	$2.87	16	$45.92
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	16	$662.56
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	$27.30	64	$1,747.20
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	$33.06	12	$396.72
Materials						
Fuel, ignition fuel mixture	1596	Mixture of gasoline and diesel for ignition of prescribed burns. Materials only.	Gallon	$3.99	25	$99.75
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	$78.65	2	$157.30

Practice: 338 - Prescribed Burning

Scenario: #4 - Steep Terrain, Herbaceous Fuel

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 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/or low volatile woody fuel with no high volatile fuels. 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: $5,117.55 **Scenario Cost/Unit:** $15.99

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						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$34.13	24	$819.12
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	16	$662.56
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	$2.87	16	$45.92
Trailer, water tank	1598	Mobile 5,000 gal water tank mounted on a trailer. Equipment only. Does not include towing equipment.	Hour	$22.31	8	$178.48
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	$27.30	64	$1,747.20
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	$33.06	24	$793.44
Materials						
Fuel, ignition fuel mixture	1596	Mixture of gasoline and diesel for ignition of prescribed burns. Materials only.	Gallon	$3.99	25	$99.75
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
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	$78.65	2	$157.30

Practice: 338 - Prescribed Burning

Scenario: #5 - Steep Terrain, Volatile or Woody fuels

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. 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: $6,393.42 **Scenario Cost/Unit:** $19.98

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						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$34.13	48	$1,638.24
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	16	$662.56
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	$2.87	16	$45.92
Trailer, water tank	1598	Mobile 5,000 gal water tank mounted on a trailer. Equipment only. Does not include towing equipment.	Hour	$22.31	8	$178.48
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	$27.30	80	$2,184.00
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	$33.06	24	$793.44
Materials						
Fuel, ignition fuel mixture	1596	Mixture of gasoline and diesel for ignition of prescribed burns. Materials only.	Gallon	$3.99	30	$119.70
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
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	$78.65	2	$157.30

Practice: 340 - Cover Crop

Scenario: #1 - Cover Crop-herbicide or mechanical termination

Scenario Description:

This scenario is an irrigated, drill seeded, mixed cover, planted to address one or more of the following purposes: reduce erosion from wind and water, improve soil organic matter content, capture and recycle or redistribut nutrients in the soil profile, promote biological nitrogen fixation and reduce energy use, increase biodiversity, suppress weeds, manage soil moisture, or minimize and reduce soil compaction. The cover is terminated by a herbicide application or mechanical operation.

Before Situation:

Little or no crop residue remains on the soil surface until establishment of the next crop.

After Situation:

The soil surface is covered until establishment of the next crop. The cover crop and herbicide application or mechanical operation is compatible with other components of the cropping system. Noxious or invasive weeds are not established with the cover crop, and cover crop residue is not burned.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $9,871.00 **Scenario Cost/Unit:** $98.71

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	$6.47	100	$647.00
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	100	$2,251.00
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
Two Species Mix, Cool Season Annual (1 grass and 1 legume)	2314	Cool season annual grass and legume mix. Includes material and shipping only.	Acre	$54.10	100	$5,410.00

Practice: 340 - Cover Crop

Scenario: #2 - Cover Crop-winter kill termination

Scenario Description:

This is a dryland seeding to establish a cover that address one or more of the following purposes: reduce erosion from wind and water, improve soil organic matter content, capture and recycle or redistribut nutrients in the soil profile, suppress weeds, or manage soil moisture. The cover is terminated by winter kill or mechanical operation and provides a suitable cover for establishment of planned crop or perennial grasses.

Before Situation:

Little or no crop residue remains on the soil surface until establishment of the next crop.

After Situation:

The soil surface is covered until establishment of the next crop. The cover crop is compatible with other components of the cropping system. Noxious or invasive weeds are not established with the cover crop, and cover crop residue is not burned.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $6,180.00 **Scenario Cost/Unit:** $61.80

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	$22.51	100	$2,251.00
Materials						
One Species, Cool Season, Annual Grass or Legume	2311	Cool season annual grass or legume. Includes material and shipping only.	Acre	$39.29	100	$3,929.00

Practice: 340 - Cover Crop

Scenario: #3 - Organic Cover Crop

Scenario Description:

This scenario is an irrigated, drill seeded, mixed cover, planted to address one or more of the following purposes: reduce erosion from wind and water, improve soil organic matter content, capture and recycle or redistribut nutrients in the soil profile, promote biological nitrogen fixation and reduce energy use, increase biodiversity, suppress weeds, manage soil moisture, or minimize and reduce soil compaction. The seed is certified organic and the cover is terminated by a mechanical operation.

Before Situation:

Little or no crop residue remains on the soil surface until establishment of the next crop.

After Situation:

The soil surface is covered until establishment of the next crop. The cover crop and mechanical operation is compatible with other components of the cropping system. Noxious or invasive weeds are not established with the cover crop, and cover crop residue is not burned.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $12,737.00 **Scenario Cost/Unit:** $127.37

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	$21.65	100	$2,165.00
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	100	$2,251.00
Materials						
Certified Organic, Three plus Species Mix, Cool Season, Annual Grasses and Legumes	2343	Certified organic cool season annual grass and legume mix. Includes material and shipping only.	Acre	$83.21	100	$8,321.00

Practice: 340 - Cover Crop

Scenario: #4 - Cover Crop Adaptive Mgt

Scenario Description:

The practice scenario is for the implementation of cover crops in small replicated plots to allow the producer to learn how to manage cover crops on their operation. Scenario includes implementing replicated strip trials on a field plot to evaluate, identify and implement a particular cover crop management strategy (e.g., cover crop vs no cover crop, multiple species vs, single specie, evaluate different termination methods or timings, using a legume vs no legume for nitrogen credits). This will be done following the interim guidance for cover crop adaptive management to be issued to all field offices.

Before Situation:

Row crops such as corn, soybeans, or cotton are grown and harvested in mid-late fall. 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 occurs with visible rills by spring. 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 crops, and long periods of bare soil. The producer is considering the use of cover crops but is unsure how to manage on their unique operation or is seeking a way to better manage cover crops in the operation.

After Situation:

Installation of this scenario will result in establishment of a cover crop replicated plots to compare to different management strategies for cover crop management following the guidance in the Agronomy Technical Note 11 - Adaptive Management and the Interim Guidance for Cover Crop Adaptive Management to be issued to all field offices for FY15. Implementation involves establishing the replicated plots to evaluate one or more cover crop 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 cover crop management. Results are used to make cover crop management decisions to address erosion 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: Area planted

Scenario Unit: Acre

Scenario Typical Size: 50

Scenario Cost: $4,813.60 **Scenario Cost/Unit:** $96.27

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	$22.51	10	$225.10
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	10	$64.70
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	$108.13	30	$3,243.90
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	$19.06	30	$571.80
Materials						
Five species Mix, Warm Season, Annual Grass/Legume/Forb	2328	Native, warm season annual grass, legume, and forb mix. Includes material and shipping only.	Acre	$50.28	5	$251.40
Five Species Mix, Cool Season, Annual Grasses and Legumes	2320	Cool season, introduced grass and legume mix. Includes material and shipping only.	Acre	$60.08	5	$300.40
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

Practice: 342 - Critical Area Planting

Scenario: #1 - Grass/legume mix-normal tillage

Scenario Description:

Establishment of permanent vegetation on a site that is void or nearly void of vegetation due to a natural occurrence or a newly constructed conservation practice. Costs include seedbed preparation with typical tillage implements, grass/legume seed, companion crop, and fertilizer with application.

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.) or due to newly constructed conservation practices such as waterways, terraces, water and sediment basins or dams. The exposed areas will be subject to wind erosion, sheet and rill erosion, or visible rills may have already occurred. Runoff from the area flows into streams, water courses or other water bodies causing degradation to the receiving waters. The soil typically has a pH imbalance and low fertility.

After Situation:

This typical 1.0 acre critical area is stabilized by applying fertilizer, lime and seed. Soil amendments will be incorporated at an depth of six inches to improve fertility and ensure establishment of permanent vegetative cover. Apply 30 lbs of nitrogen, 60 lbs of phosphate, and 60 lbs of potash. Prepare a firm, weed free seedbed so that proper germination and stand establishment are ensured. Once the seedbed has been prepared, drill the following mixture for a vegetative cover: Smooth Bromegrass (15 lbs/ac), and Red Clover (8 lbs/ac) with a nurse crop of oats at a seeding rate of 48 lbs per acre.

Scenario Feature Measure: area seeded

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $201.20 **Scenario Cost/Unit:** $201.20

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Two Species Mix, Cool Season Annual (1 grass and 1 legume)	2314	Cool season annual grass and legume mix. Includes material and shipping only.	Acre	$54.10	2	$108.20
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.56	60	$33.60
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	$0.68	30	$20.40
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	$0.65	60	$39.00

Practice: 342 - Critical Area Planting

Scenario: #2 - Organic Grass/legume mix-normal tillage

Scenario Description:

Establishment of permanent vegetation on a site that is void or nearly void of vegetation due to a natural occurrence or a newly constructed conservation practice. Costs include seedbed preparation with typical tillage implements, grass/legume seed, companion crop. Certified organic seed and fertilizer based upon NOP approved fertilizer inputs will be used where available.

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, etc) or due to newly constructed conservation practices such as waterways, terraces, water and sediment basins or dams. The exposed areas will be subject to wind erosion, sheet and rill erosion, or visible rills may have already occurred. Runoff from the area flows into streams, water courses or other water bodies causing degradation to the receiving waters. The soil typically has a pH imbalance and low fertility.

After Situation:

This typical 1.0 acre critical area is stabilized by applying fertilizer, lime and seed. Soil amendments will be incorporated at an depth of six inches to improve fertility and ensure establishment of permanent vegetative cover. The plant nutrients will supplied by a blend of organic soil amendments. Apply 30 lbs of nitrogen, 60 lbs of phosphate, and 60 lbs of potash. Prepare a firm, weed free seedbed so that proper germination and stand establishment are ensured. Once the seedbed has been prepared, drill the following mixture for a vegetative cover: Smooth Bromegrass (15 lbs/ac) and Red Clover (8 lbs/ac) with a nurse crop of oats at a seeding rate of 48 lbs per acre. Organic seed will be used where available. Manure may be used in lieu of a commercially blended product as long as the manure is tested and the correct quantity of manure is calculated such that the specified 30-60-60 N-P2O5-K2O requirement is met.

Scenario Feature Measure: area seeded

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $45.00 **Scenario Cost/Unit:** $45.00

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Potassium, Organic	268	ORGANIC Potassium	Pound	$0.30	60	$18.00
Phosphorus, Organic	267	ORGANIC Phosphorus	Pound	$0.30	60	$18.00
Nitrogen, Organic	266	ORGANIC Nitrogen	Pound	$0.30	30	$9.00

Practice: 342 - Critical Area Planting

Scenario: #3 - Native seeding - normal tillage

Scenario Description:

Establishment of permanent vegetation on a site that is void or nearly void of vegetation due to a natural occurrence or a newly constructed conservation practice. Costs include seedbed preparation with typical tillage implements, native grass seed, and fertilizer.

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, etc) or due to newly constructed conservation practices such as waterways, terraces, water and sediment basins or dams. The exposed areas will be subject to wind erosion, sheet and rill erosion, or visible rills may have already occurred. Runoff from the area flows into streams, water courses or other water bodies causing degradation to the receiving waters. The soil typically has a pH imbalance and low fertility.

After Situation:

This typical 1.0 acre critical area is stabilized by applying fertilizer and seed. Soil amendments will be incorporated at an depth of six inches to improve fertility and ensure establishment of permanent vegetative cover. Apply 60 lbs of phosphate and 60 lbs of potash. Prepare a firm, weed free seedbed so that proper germination and stand establishment are ensured. Once the seedbed has been prepared, drill the following mixture for a vegetative cover: Big Bluestem (14 lbs/ac) and Switchgrass (2 lbs/ac) with a nurse crop of oats at a seeding rate of 32 lbs per acre.

Scenario Feature Measure: area seeded

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $261.74 **Scenario Cost/Unit:** $261.74

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Two Species Mix, Warm Season, Native Perennial Grass	2325	Native, warm season perennial grass. Includes material and shipping only.	Acre	$94.57	2	$189.14
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.56	60	$33.60
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	$0.65	60	$39.00

Practice: 342 - Critical Area Planting

Scenario: #4 - Grass/legume mix-moderate grading

Scenario Description:

Establishment of permanent vegetation on a site that is void or nearly void of vegetation due to a natural or human disturbance. Costs include a dozer for grading and shaping of small gullies, seedbed preparation with typical tillage implements, grass/legume seed, companion crop, and fertilizer with application.

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 natural occurrences (fire, flood, etc) or human disturbance. The exposed areas have visible rills and small gullies averaging 1 foot in depth and 1 foot in width. Runoff from the area flows into streams, water courses or other water bodies causing degradation to the receiving waters. The soil typically has a pH imbalance and low fertility.

After Situation:

This typical 1.0 acre critical area is stabilized by grading and shaping the small gullies with a dozer (4 hours) and then applying fertilizer, lime and seed. Soil amendments will be incorporated at an depth of six inches to improve fertility and ensure establishment of permanent vegetative cover. Apply 30 lbs of nitrogen, 60 lbs of phosphate, and 60 lbs of potash. Prepare a firm, weed free seedbed so that proper germination and stand establishment are ensured. Once the seedbed has been prepared, drill the following mixture for a vegetative cover: Smooth Bromegrass (15 lbs/ac) and Red Clover (8 lbs/ac) with a nurse crop of oats at a seeding rate of 48 lbs per acre.

Scenario Feature Measure: area seeded

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $201.20 **Scenario Cost/Unit:** $201.20

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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	$0.68	30	$20.40
Two Species Mix, Cool Season Annual (1 grass and 1 legume)	2314	Cool season annual grass and legume mix. Includes material and shipping only.	Acre	$54.10	2	$108.20
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	$0.65	60	$39.00
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.56	60	$33.60

Practice: 342 - Critical Area Planting

Scenario: #5 - Native seeding-moderate grading

Scenario Description:

Establishment of permanent vegetation on a site that is void or nearly void of vegetation due to a natural or human disturbance. Costs include a dozer for grading and shaping of small gullies, seedbed preparation with typical tillage implements, native grass seed, companion crop, and fertilizer with application.

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 natural occurrences (fire, flood, etc) or human disturbance. The exposed areas have visible rills and small gullies averaging 1 foot in depth and 1 foot in width. Runoff from the area flows into streams, water courses or other water bodies causing degradation to the receiving waters. The soil typically has a pH imbalance and low fertility.

After Situation:

This typical 1.0 acre critical area is stabilized by grading and shaping the small gullies with a dozer (4 hours) and then applying fertilizer, lime and seed. Soil amendments will be incorporated at an depth of six inches to improve fertility and ensure establishment of permanent vegetative cover. Apply 60 lbs of phosphate and 60 lbs of potash. Prepare a firm, weed free seedbed so that proper germination and stand establishment are ensured. Once the seedbed has been prepared, drill the following mixture for a vegetative cover: Big Bluestem (14 lbs/ac) and Switchgrass (2 lbs/ac) with a nurse crop of oats at a seeding rate of 32 lbs per acre.

Scenario Feature Measure: area seeded

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $72.60 **Scenario Cost/Unit:** $72.60

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.56	60	$33.60
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	$0.65	60	$39.00

Practice: 342 - Critical Area Planting

Scenario: #6 - Grass/legume mix-heavy grading

Scenario Description:

Establishment of permanent vegetation on a site that is void or nearly void of vegetation due to a natural or human disturbance. Costs include a dozer for grading and shaping of moderate to severe gullies, seedbed preparation with typical tillage implements, grass/legume seed, companion crop, and fertilizer with application.

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 natural occurrences (fire, flood, etc) or human disturbance. The exposed areas have visible rills and moderate to severe gullies averaging 3 feet in depth and 3 feet in width. Runoff from the area flows into streams, water courses or other water bodies causing degradation to the receiving waters. The soil typically has a pH imbalance and low fertility.

After Situation:

This typical 1.0 acre critical area is stabilized by grading and shaping the moderate to severe gullies with a dozer (8 hours) and then applying fertilizer, lime and seed. Soil amendments will be incorporated at an depth of six inches to improve fertility and ensure establishment of permanent vegetative cover. Apply 30 lbs of nitrogen, 60 lbs of phosphate, and 60 lbs of potash. Prepare a firm, weed free seedbed so that proper germination and stand establishment are ensured. Once the seedbed has been prepared, drill the following mixture for a vegetative cover: Smooth Bromegrass (15 lbs/ac) and Red Clover (8 lbs/ac) with a nurse crop of oats at a seeding rate of 48 lbs per acre.

Scenario Feature Measure: area seeded

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $201.20 **Scenario Cost/Unit:** $201.20

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Two Species Mix, Cool Season Annual (1 grass and 1 legume)	2314	Cool season annual grass and legume mix. Includes material and shipping only.	Acre	$54.10	2	$108.20
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.56	60	$33.60
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	$0.65	60	$39.00
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	$0.68	30	$20.40

Practice: 342 - Critical Area Planting

Scenario: #7 - Native seeding-heavy grading

Scenario Description:

Establishment of permanent vegetation on a site that is void or nearly void of vegetation due to a natural or human disturbance. Costs include a dozer for grading and shaping of moderate to severe gullies, seedbed preparation with typical tillage implements, grass/legume seed, companion crop, and fertilizer with application.

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 natural occurrences (fire, flood, etc) or human disturbance. The exposed areas have visible rills and moderate to severe gullies averaging 3 feet in depth and 3 feet in width. Runoff from the area flows into streams, water courses or other water bodies causing degradation to the receiving waters. The soil typically has a pH imbalance and low fertility.

After Situation:

This typical 1.0 acre critical area is stabilized by grading and shaping the moderate to severe gullies with a dozer (8 hours) and then applying fertilizer, lime and seed. Soil amendments will be incorporated at an depth of six inches to improve fertility and ensure establishment of permanent vegetative cover. Apply 60 lbs of phosphate and 60 lbs of potash. Prepare a firm, weed free seedbed so that proper germination and stand establishment are ensured. Once the seedbed has been prepared, drill the following mixture for a vegetative cover: Big Bluestem (14 lbs/ac) and Switchgrass (2 lbs/ac) with a nurse crop of oats at a seeding rate of 32 lbs per acre.

Scenario Feature Measure: area seeded

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $261.74 **Scenario Cost/Unit:** $261.74

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.56	60	$33.60
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	$0.65	60	$39.00
Two Species Mix, Warm Season, Native Perennial Grass	2325	Native, warm season perennial grass. Includes material and shipping only.	Acre	$94.57	2	$189.14

Practice: 342 - Critical Area Planting

Scenario: #8 - Drill Seed, compost, mulch

Scenario Description:

Establishment of permanent vegetation on disturbed sites that have high erosion rates and or physical, chemical or biological conditions that prevent the establishment of vegetation with normal practices. Costs include organic amendment and application, seedbed preparation, grass/legume seed and drill application.

Before Situation:

Slopes that are too steep for safe equipment operation that are void or nearly void of vegetation resulting in bare soil being exposed to excessive erosion. The exposed areas may be caused by mining, construction or reclamation activities. Surface soils are typically mixtures of various subsoil materials that are low in organic matter and available nitrogen and phosphorus.

After Situation:

This typical 10.0 acre critical area is stabilized by application of organic amendments and the establishment of sodfoorming perennial vegetation. Seed is applied at a 40 seed per square foot rate. Plan and apply mulch applications for critical areas where where rapid establishment of seeded species is essential or where one or more of the following factors are likely to cause failure of the planting, as determined by the planner.

• Low or erratic precipitation • Droughty or slowly permeable soils • High soil temperatures • Erosive soils • Drying winds

Scenario Feature Measure: area seeded

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $4,744.95 **Scenario Cost/Unit:** $474.50

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	$11.74	10	$117.40
Manure, compost, application	955	Loading, hauling and spreading manure/compost by ground equipment. Includes equipment, power unit and labor costs.	Hour	$114.22	5	$571.10
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	10	$225.10
Mulcher, straw blower	1305	Straw bale mulcher/blower to mechanically spread small or large straw bales. Labor not included.	Hour	$50.68	5	$253.40
Mulch crimper, straight blade	2310	Equipment and power unit costs. Labor not included.	Hour	$11.47	5	$57.35
Materials						
Straw	1237	Small grain straw (non organic and certified organic). Includes materials only.	Ton	$118.54	5	$592.70
Compost	265	A mixture of decaying organic matter, as from leaves and manure, used to improve soil structure and provide nutrients.	Ton	$64.61	20	$1,292.20
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
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	4	$1,139.20

Practice: 342 - Critical Area Planting

Scenario: #9 - Hydro Seed

Scenario Description:

Establishment of permanent vegetation on steep slopes that have high erosion rates and or physical, chemical or biological conditions that prevent the establishment of vegetation with normal practices. Costs include organic amendment, grass/legume seed and hydroseed application.

Before Situation:

Slopes that are too steep for safe equipment operation that are void or nearly void of vegetation resulting in bare soil being exposed to excessive erosion. The exposed areas may be caused by mining, construction or reclamation activities. Surface soils are typically mixtures of various subsoil materials that are low in organic matter and available nitrogen and phosphorus.

After Situation:

This typical 2.0 acre critical area is stabilized by application of organic amendments, mulch and seed with a hydroseeder. Seed is applied at an 80 seed per square foot rate.

Scenario Feature Measure: area seeded

Scenario Unit: Acre

Scenario Typical Size: 2

Scenario Cost: $2,503.76 **Scenario Cost/Unit:** $1,251.88

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	$945.57	2	$1,891.14
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	4	$198.60
Compost	265	A mixture of decaying organic matter, as from leaves and manure, used to improve soil structure and provide nutrients.	Ton	$64.61	2	$129.22
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 342 - Critical Area Planting

Scenario: #10 - Hand seed and Incorporate

Scenario Description:

Establishment of permanent vegetation on steep slopes or small areas that have high erosion rates and or physical, chemical or biological conditions that prevent the establishment of vegetation with normal practices. Costs include compost, grass/legume seed and hand application and incorporation.

Before Situation:

Areas that are too steep or small for safe equipment operation that are void or nearly void of vegetation resulting in bare soil being exposed to excessive erosion. The exposed areas may be caused by mining, construction or reclamation activities. Surface soils are typically mixtures of various subsoil materials that are low in organic matter and available nitrogen and phosphorus.

After Situation:

This typical 1.0 acre critical area is stabilized by application of organic amendments, mulch and seed by hand application. Seed is applied at an 80 seed per square foot rate.

Scenario Feature Measure: area seeded

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $569.68 **Scenario Cost/Unit:** $569.68

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	$34.13	4	$136.52
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	$19.06	10	$190.60
Materials						
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
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	2	$99.30
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	$78.65	1	$78.65

Practice: 345 - Residue and Tillage Management, Reduced Till

Scenario: #1 - Reduced Till

Scenario Description:

Reduced Till is managing the amount, orientation and distribution of crop and other plant residue on the soil surface year round while limiting the soil-disturbing activities used to grow crops in systems where the entire field surface is tilled prior to planting. This practice includes tillage methods commonly referred to as mulch tillage or chiseling and disking. It applies to stubble mulching on summer-fallowed land, to tillage for annually planted crops and to tillage for planted crops and to tillage for planting perennial crops. All residue shall be uniformly distributed over the entire field, be present on the soil surface throughout the critical wind erosion period(s), and not burned or removed. RUSLE2 or WEPS models 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. Residue and tillage management, Reduced Till is planned and applied to address one or more of the following purposes: reduce sheet and rill erosion, reduce wind erosion, improve soil quality, reduce energy use, or increase plant-available moisture. This practice is applicable to both irrigated and non-irrigated fields and conventional or organic farming operations.

Before Situation:

Full width tillage is performed to incorporate post harvest crop residues, prepare the seed bed, and manage weeds. Crop residue cover is not maintained on the soil surface. Residue amounts after harvest average 30% or less, resulting in bare soil being exposed to erosion (wind & water) during fallow periods. Runoff from the fields may flow 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.

After Situation:

Following harvest, at least 30% of the crop residues will be maintained on the soil surface, during critical erosion periods or until the next crop is planted. Soil erosion losses will be kept below T as documented in RUSLE2 and or WEPS models. Over time, soil health is improved due to the additional biomass, ground cover, soil infiltration, and plant diversity in the cropping system.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $4,467.50 **Scenario Cost/Unit:** $44.68

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	$11.74	200	$2,348.00
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	50	$1,125.50
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	$19.88	50	$994.00

Practice: 345 - Residue and Tillage Management, Reduced Till

Scenario: #2 - Reduced Till 5 ac. or less

Scenario Description:

This practice typically involves conversion from a clean or mulch tilled (conventional tilled) system to a reduced till (conservation tilled) system on 5 acres or less of cropland (scenario typical size is 4 acres).Reduced Till is managing the amount, orientation and distribution of crop and other plant residue on the soil surface year round while limiting the soil-disturbing activities used to grow crops in systems where the entire field surface is tilled prior to planting. This practice includes tillage methods commonly referred to as mulch tillage or chiseling and disking. It applies to stubble mulching on summer-fallowed land, to tillage for annually planted crops and to tillage for planted crops and to tillage for planting perennial crops. All residue shall be uniformly distributed over the entire field, be present on the soil surface throughout the critical wind erosion period(s), and not burned or removed. RUSLE2 or WEPS models 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 STIR value rating shall be no greater than 80, and no primary inversion tillage implements (e.g. moldboard plow) shall be used. Residue and tillage management, Reduced Till is planned and applied to address one or more of the following purposes: reduce sheet and rill erosion, reduce wind erosion, improve soil quality, reduce energy use, or increase plant-available moisture. This practice is applicable to both irrigated and non-irrigated fields and conventional or organic farming operations.

Before Situation:

Crops such as various vegetable and fruit crops along with row crops are grown and harvested throughout the year. Full width tillage is performed prior to planting and weed control during crop production is typically cultivation and mulching. 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. Wind and/or water 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:

Following harvest, at least 30% of the crop residues will be maintained on the soil surface, during critical erosion periods or until the next crop is planted. Soil erosion losses will be kept below T as documented in RUSLE2 and or WEPS models. Over time, soil health is improved due to the additional biomass, ground cover, soil infiltration, and plant diversity in the cropping system. The STIR value rating shall be no greater than 80, and no primary inversion tillage implements (e.g. moldboard plow) shall be used.

Scenario Feature Measure: Farm 5 acres or less

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $178.70 **Scenario Cost/Unit:** $178.70

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
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	$19.88	2	$39.76
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$11.74	8	$93.92
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	2	$45.02

Practice: 345 - Residue and Tillage Management, Reduced Till

Scenario: #3 - Reduced Till Adaptive Mgt

Scenario Description:

The practice scenario is for the implementation of Reduced Till in small replicated plots to allow the producer to learn how to manage reduced till on their operation. Scenario includes implementing replicated strip trials on a field plot to evaluate, identify and implement a particular reduced till management strategy (e.g., reduced till vs conventional till, two different reduced till systems, etc.) This will be done following the interim guidance for reduced till adaptive management to be issued to all field offices for FY15.

Before Situation:

Row crops such as corn, soybeans, or cotton are grown and harvested in mid-late fall. 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 occurs 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. The producer is considering using mulch till technology, but is unsure how to manage on their operation or needs to improve the management of mulch till to be successful.

After Situation:

Installation of this scenario will result in establishment of reduced till replicated plots to compare to different management strategies for reduced till and other residue management strategies following the guidance in the Agronomy Technical Note 11 - Adaptive Management and the Interim Guidance for Reduced Till Adaptive Management to be issued to all field offices for FY15. Implementation involves establishing the replicated plots to evaluate one or more reduced 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 reduced till management. Results are used to make reduced 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: Area planted

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $3,946.06 **Scenario Cost/Unit:** $197.30

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	$22.51	10	$225.10
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	$19.88	10	$198.80
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$11.74	40	$469.60
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	$108.13	24	$2,595.12
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	$19.06	24	$457.44

Practice: 348 - Dam Diversion

Scenario: #1 - Rock/Gravel Fill

Scenario Description:

A rock structure with a gravel bedding on geotextile is 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 rock structure of approximately 1050 cubic yards with a gravel bedding of approximately 450 cubic yards on approximately 200 square yards of geotextile, 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 rock 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: Fill in Cubic Yards

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,500

Scenario Cost: $69,232.30 **Scenario Cost/Unit:** $46.15

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	450	$12,762.00
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	1050	$56,185.50
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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 earth fill 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: $13,285.60 **Scenario Cost/Unit:** $8.86

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	$406.61	30	$12,198.30
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	$26.75	30	$802.50
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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 earth fill and grouted rock 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: $59,609.86 **Scenario Cost/Unit:** $39.74

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	$406.61	21	$8,538.81
Rock Riprap, grouted	1757	Grouted Rock Riprap, placed, includes materials, equipment and labor to transport and place.	Cubic Yard	$111.61	450	$50,224.50
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	$26.75	21	$561.75
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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: $115,023.89 **Scenario Cost/Unit:** $38.34

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Portable Welder	1407	Portable field welder. Equipment only. Labor not included.	Hour	$22.43	24	$538.32
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	$25.99	3000	$77,970.00
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	$27.30	24	$655.20
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	660	$35,316.60
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	$543.77	1	$543.77

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 reinforced concrete 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: $604,819.00 **Scenario Cost/Unit:** $403.21

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	$207.67	10	$2,076.70
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	$401.46	1500	$602,190.00
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	$26.75	10	$267.50
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 351 - Water Well Decommissioning

Scenario: #1 - Shallow Well less than 20 ft deep

Scenario Description:

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. 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.

Before Situation:

Shallow well or hand dug well that is less than 20 feet deep. Assume 30" diameter casing. 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.

After Situation:

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

Scenario Feature Measure: Length of well casing

Scenario Unit: Linear Feet

Scenario Typical Size: 15

Scenario Cost: $2,481.83 **Scenario Cost/Unit:** $165.46

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Grout pump	1334	Grout pump with tremie pipe. Equipment and power unit costs. Labor not included.	Hour	$14.78	1	$14.78
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	1	$62.38
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	2.7	$15.53
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	$27.30	2	$54.60
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	$758.13	2.7	$2,046.95
Chlorine	1335	Liquid chlorine bleach. Includes materials only.	Gallon	$2.79	1	$2.79
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 351 - Water Well Decommissioning

Scenario: #2 - Shallow Well greater than 20 ft deep

Scenario Description:

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 or hand dug well that is greater than 30 feet deep. Assume 30" diameter casing.

After Situation:

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

Scenario Feature Measure: Length of well casing

Scenario Unit: Linear Feet

Scenario Typical Size: 30

Scenario Cost: $4,736.57 **Scenario Cost/Unit:** $157.89

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	$5.75	5.5	$31.63
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	2	$124.76
Grout pump	1334	Grout pump with tremie pipe. Equipment and power unit costs. Labor not included.	Hour	$14.78	1	$14.78
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	$26.75	2	$53.50
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	$27.30	2	$54.60
Materials						
Chlorine	1335	Liquid chlorine bleach. Includes materials only.	Gallon	$2.79	1	$2.79
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	$758.13	5.5	$4,169.72
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 351 - Water Well Decommissioning

Scenario: #3 - Drilled well less than 300 ft deep

Scenario Description:

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. Assume 6" diameter casing.

After Situation:

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

Scenario Feature Measure: Length of well casing

Scenario Unit: Linear Feet

Scenario Typical Size: 200

Scenario Cost: $1,583.30 **Scenario Cost/Unit:** $7.92

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	$62.38	1	$62.38
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	$27.30	2	$54.60
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	$26.75	1	$26.75
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	$758.13	1.5	$1,137.20
Chlorine	1335	Liquid chlorine bleach. Includes materials only.	Gallon	$2.79	1	$2.79
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 351 - Water Well Decommissioning

Scenario: #4 - Drilled well greater than 300 ft deep

Scenario Description:

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 greater than 300 feet deep. Assume 6" diameter casing.

After Situation:

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

Scenario Feature Measure: Length of well casing

Scenario Unit: Linear Feet

Scenario Typical Size: 500

Scenario Cost: $3,278.48 **Scenario Cost/Unit:** $6.56

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	$62.38	1	$62.38
Grout pump	1334	Grout pump with tremie pipe. Equipment and power unit costs. Labor not included.	Hour	$14.78	1	$14.78
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	$26.75	1	$26.75
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	$27.30	3	$81.90
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	$758.13	3.7	$2,805.08
Chlorine	1335	Liquid chlorine bleach. Includes materials only.	Gallon	$2.79	1	$2.79
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 353 - Monitoring Well

Scenario: #1 - Borehole, 200 Ft. Depth or Less

Scenario Description:

A vertical borehole designed and installed 200 feet or less in depth to obtain representative groundwater quality samples and hydrogeologic information. The well provides controlled access for sampling groundwater near an agricultural waste storage or treatment facility to detect seepage and monitor groundwater quality. Installation methods must be in conformance with ASTM D5092. The resource concerns addressed include groundwater contamination and groundwater quality.

Before Situation:

This practice applies to the design, installation, and development of monitoring wells where contamination of groundwater from an agricultural waste storage or treatment facility is a concern, detection of seepage and monitoring of groundwater quality is needed, and the facility is a component of an agricultural waste management system.

After Situation:

Typical installation of a vertical borehole for a monitoring well 100 feet deep that provides controlled access to obtain water samples for detecting seepage and monitoring of groundwater quality from an agricultural waste storage or treatment facility as a component of an agricultural waste management system. The monitoring well is installed by drilling an 8 inch borehole, installing a protective casing, a 2 inch riser pipe, a well screen, and filter pack. The installation method was in conformance with ASTM D5092. Vegetation of disturbed areas will be completed under critical area planting (342). Erosion control during construction activities will use Stormwater Runoff Control (570). Other associated practices include Access Control (472), Water Well Decommissioning (351), Waste Storage Facility (313), Waste Treatment Lagoon (359), and Pumping Plant (533).

Scenario Feature Measure: Depth of Well

Scenario Unit: Foot

Scenario Typical Size: 100

Scenario Cost: $7,969.96 **Scenario Cost/Unit:** $79.70

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	$174.36	24	$4,184.64
Materials						
Bentonite	41	Bentonite, includes materials (50# bag)	Each	$10.02	6	$60.12
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	$31.27	3	$93.81
Well Casing, Metal, 6"	1810	Steel well casing, 6". Materials only.	Foot	$14.01	20	$280.20
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	$758.13	3	$2,274.39
Well Cap, 6"	1786	Well cap, 6". Materials only.	Each	$33.29	1	$33.29
Pipe, PVC, Flush Thread, 2" SCH 40	2295	Flush thread PVC riser pipe, 2" diameter, schedule 40. Materials only.	Foot	$2.38	110	$261.80
Well Screen, plastic, 2"	1997	2" PVC well screen. Materials only.	Foot	$3.95	25	$98.75
Centralizer, stainless steel, 2"	2298	Stainless steel centralizer to stabilize and center pipe in groundwater monitoring and other well installations. Materials only.	Each	$22.54	10	$225.40
End Cap, PVC, 2"	2301	PVC End cap used in groundwater monitoring and other well installations. Materials only.	Each	$2.60	1	$2.60
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	6	$170.16
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 353 - Monitoring Well

Scenario: #2 - Borehole, Greater Than 200 Ft. Depth

Scenario Description:

A vertical borehole designed and installed greater than 200 feet deep to obtain representative groundwater quality samples and hydrogeologic information. The well provides controlled access for sampling groundwater near an agricultural waste storage or treatment facility to detect seepage and monitor groundwater quality. Installation methods must be in conformance with ASTM D5092. The resource concerns addressed include groundwater contamination and groundwater quality.

Before Situation:

This practice applies to the design, installation, and development of monitoring wells where contamination of groundwater from an agricultural waste storage or treatment facility is a concern, detection of seepage and monitoring of groundwater quality is needed, and the facility is a component of an agricultural waste management system.

After Situation:

Typical installation of a vertical borehole for a monitoring well 300 feet deep that provides controlled access to obtain water samples for detecting seepage and monitoring of groundwater quality from an agricultural waste storage or treatment facility as a component of an agricultural waste management system. The monitoring well is installed by drilling an 8 inch borehole, installing a protective casing, a 2 inch monitoring-riser pipe, a well screen, and filter pack. The installation method was in conformance with ASTM D5092. Vegetation of disturbed areas will be completed under critical area planting (342). Erosion control during construction activities will use Stormwater Runoff Control (570). Other associated practices include Access Control (472), Water Well Decommissioning (351), Waste Storage Facility (313), Waste Treatment Lagoon (359), and Pumping Plant (533).

Scenario Feature Measure: Depth of Well

Scenario Unit: Foot

Scenario Typical Size: 300

Scenario Cost: $22,876.35 **Scenario Cost/Unit:** $76.25

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	$174.36	90	$15,692.40
Materials						
Well Screen, plastic, 2"	1997	2" PVC well screen. Materials only.	Foot	$3.95	50	$197.50
Well Casing, Metal, 6"	1810	Steel well casing, 6". Materials only.	Foot	$14.01	20	$280.20
Bentonite	41	Bentonite, includes materials (50# bag)	Each	$10.02	12	$120.24
End Cap, PVC, 2"	2301	PVC End cap used in groundwater monitoring and other well installations. Materials only.	Each	$2.60	1	$2.60
Centralizer, stainless steel, 2"	2298	Stainless steel centralizer to stabilize and center pipe in groundwater monitoring and other well installations. Materials only.	Each	$22.54	20	$450.80
Pipe, PVC, Flush Thread, 2" SCH 40	2295	Flush thread PVC riser pipe, 2" diameter, schedule 40. Materials only.	Foot	$2.38	310	$737.80
Well Cap, 6"	1786	Well cap, 6". Materials only.	Each	$33.29	1	$33.29
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	$758.13	6	$4,548.78
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	$31.27	6	$187.62
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	12	$340.32
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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: $49.58 **Scenario Cost/Unit:** $49.58

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	$19.06	0.5	$9.53
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

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: $206.23 **Scenario Cost/Unit:** $206.23

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	$19.06	0.5	$9.53
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
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	$156.65	1	$156.65

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: $251.90 **Scenario Cost/Unit:** $251.90

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	$19.06	0.5	$9.53
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	$202.32	1	$202.32
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: 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: $49.58 **Scenario Cost/Unit:** $49.58

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	$19.06	0.5	$9.53
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

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: $206.23 **Scenario Cost/Unit:** $206.23

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	$19.06	0.5	$9.53
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	$156.65	1	$156.65
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: 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: $251.90 **Scenario Cost/Unit:** $251.90

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	$19.06	0.5	$9.53
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	$202.32	1	$202.32
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: 356 - Dike

Scenario: #1 - Dike

Scenario Description:

Construction of a earthen embankment barrier to control water flow and level. Associated practices include: PS342 Critical Area Planting, PS382 Fence, PS464 Irrigation Land Levelling, PS587 Structure for Water Control

Before Situation:

Site is subject to flooding or overland flow which poses a potential for 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. Resource concerns include Soil Erosion, Excessive runoff, flooding or ponding

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

Scenario Unit: Cubic Yard

Scenario Typical Size: 500

Scenario Cost: $1,459.80 **Scenario Cost/Unit:** $2.92

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	$2.35	500	$1,175.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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 biological treatment of manure and other byproducts of animal agricultural operations by 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, 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), and 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 (~5500CY); 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: $107,627.22 **Scenario Cost/Unit:** $0.24

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	$0.95	1389	$1,319.55
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	$4.01	9125	$36,591.25
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	9102	$39,775.74
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.59	8101	$29,082.59
Materials						
Structural steel tubing, 2" diameter	1120	Structural steel tubing, 2" diameter, 1/8" wall thickness, materials only	Foot	$3.69	8	$29.52
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77

Practice: 360 - Waste Facility Closure

Scenario: #1 - Poultry House Soil Remediation

Scenario Description:

This practice scenario includes the remediation of the soil in an abandoned poultry structures previously used to store poultry waste (litter) on an earthen floor.

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:

The abandoned poultry house has a damaged roof exposing the earthen floor of the structure to rainfall. Rainfall and nutrients on the floor of the house pose a risk to surface water from contaminated runoff or to ground water from seepage into the underlying soils.

After Situation:

This scenario is based on a 40' wide x 400' long poultry house with 1 foot depth of nutrient laden soil to remediate (16,000 CF). Payment under this scenario includes only activities associated with the soil remediation. Soil remediation activities in this scenario include removing the nutrient enriched soil found in the first 7 inches of soil beneath the litter floor and mixing wood chips with the remaining 5 inches of soil. Nutrient level testing and field application of the removed soil shall be performed according to nutrient planning in conformance with Nutrient Management, Code 590. The remaining 5 inches of soil will be remediated in-situ by mixing in wood chips, at a rate of 33% of the volume of remaining soil, for the purpose of nitrogen sequestration. Additional soil will be hauled in (estimated at 110% of the soil volume that was removed for field application) to backfill the depression. Shaping and crowning of the soil material on the disturbed area and critical area seeding will be done to provide drainage, complete the site remediation and establish vegetation. Operation and maintenance of the site will include nutrient testing the following year to determine if the nutrients in the mixed soil have been remediated and surface and ground water resource concerns have been addressed. In this scenario, samples at four (4) locations will be taken at 6, 12, 18 and 24 inches at the end of Year 1.

Scenario Feature Measure: Cubic feet of soil remediated

Scenario Unit: Cubic Foot

Scenario Typical Size: 16,000

Scenario Cost: $12,946.99 **Scenario Cost/Unit:** $0.81

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Front End Loader, 185 HP	1619	Wheeled front end loader with horsepower range of 160 to 210. Equipment and power unit costs. Labor not included.	Hour	$105.74	6	$634.44
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	$127.04	31	$3,938.24
Manure, compost, application	955	Loading, hauling and spreading manure/compost by ground equipment. Includes equipment, power unit and labor costs.	Hour	$114.22	19	$2,170.18
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.59	380	$1,364.20
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$60.82	1	$60.82
Aggregate, Wood Chips	1098	Includes materials, equipment and labor	Cubic yard	$22.35	82	$1,832.70
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	$26.75	31	$829.25
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	1	$18.90
Materials						
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	16	$156.32
Mobilization						

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	3	$854.40
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	2	$1,087.54

Practice: 360 - Waste Facility Closure

Scenario: #2 - Feedlot Closure

Scenario Description:

This practice scenario includes the remediation of the soil on an abandoned feedlot previously used to feed animals on a bare earthen lot. 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:

The feedlot is abandoned. Vegetation has not been reestablished. The high level of nutrients in the soil is preventing volunteer establishment of native vegetation. Rainfall and nutrients on the bare earth feedlot pose a risk to surface water from contaminated runoff or to ground water from seepage into the underlying soils.

After Situation:

This scenario is based on a 3 acre feedlot. Surveys and testing have determined the manure pack averages 8 inches in depth and the level of nutirients in the 4 inches of soil below the manure pack is too high to treat insitu with vegetation. Payment under this scenario includes only activities associated with the soil remediation. Soil remediation activities in this scenario include removing the nutrient enriched manure pack and soil, an average of 12 inches below the existing surface (130,680 CF). The excavated surface will be vegetated with a mix of salt tolerant plants in conformance with Critical Area Planting, Code 342. Nutrient level testing and field application of the removed soil shall be performed according to nutrient planning in conformance with Nutrient Management, Code 590. Shaping and crowning of the soil material on the disturbed area and critical area seeding will be done to provide drainage, complete the site remediation and establish vegetation. Operation and maintenance of the site will include nutrient testing the following year to determine if the soil has been remediated and surface and ground water resource concerns have been addressed. In this scenario, samples at four (4) locations will be taken at 6, 12, 18 and 24 inches at the end of Year 1. Fence and feedbunk removal is to be performed under Obstruction Removal, Code 500.

Scenario Feature Measure: Cubic feet of soil remediated

Scenario Unit: Cubic Foot

Scenario Typical Size: 130,680

Scenario Cost: $37,602.70 **Scenario Cost/Unit:** $0.29

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	$127.04	40	$5,081.60
Manure, compost, application	955	Loading, hauling and spreading manure/compost by ground equipment. Includes equipment, power unit and labor costs.	Hour	$114.22	269	$30,725.18
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	$26.75	40	$1,070.00
Materials						
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	16	$156.32
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

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 environmental 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 10ft 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: $10,573.39 **Scenario Cost/Unit:** $2.95

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	$4.37	667	$2,914.79
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	$0.36	1330	$478.80
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
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	$127.04	10	$1,270.40
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.21	133	$2,421.93
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	$19.06	10	$190.60
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	$26.75	10	$267.50
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	$543.77	1	$543.77
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	4	$1,139.20

Practice: 360 - Waste Facility Closure

Scenario: #4 - Liquid Waste Impoundment Closure with 75% Liquids and 25% Solids

Scenario Description:

This practice scenario includes the decommissioning of an earthen liquid waste impoundment (embankment or excavated type) where the estimated volume of waste to be removed is approximately 75% liquid/slurry waste and 25% sludge/solid waste of the structural storage capacity of the 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 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 75% if the structural volume (75% X 63,851 CF = 47,888 CF). The volume of solid waste to be removed approximately equals 25% of the structural volume (25% X 63,851 = 15,963 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: $15,701.64 **Scenario Cost/Unit:** $0.25

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
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	15963	$4,629.27
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	$127.04	12	$1,524.48
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	$2.35	709	$1,666.15
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	473	$2,067.01
Manure, compost, injection	956	Loading, hauling and injecting manure/compost by ground equipment. Includes equipment, power unit and labor costs.	Gallon	$0.01	358204	$3,582.04
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	$26.75	12	$321.00
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	$19.06	12	$228.72

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	4	$1,139.20
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77

Practice: 360 - Waste Facility Closure

Scenario: #5 - Liquid Waste Impoundment Closure with 50% Liquids and 50% Solids

Scenario Description:

This practice scenario includes the decommissioning of an earthen liquid waste impoundment (embankment or excavated type) where the estimated volume of waste to be removed is approximately 50% liquid/slurry waste and 50% sludge/solid waste of the structural storage capacity of the 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 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 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: $19,136.61 **Scenario Cost/Unit:** $0.30

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
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
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	$127.04	12	$1,524.48
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	473	$2,067.01
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	$2.35	709	$1,666.15
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
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	$26.75	12	$321.00
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	$19.06	12	$228.72

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	4	$1,139.20
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77

Practice: 360 - Waste Facility Closure

Scenario: #6 - Liquid Waste Impoundment Closure with 25% Liquids and 75% Solids

Scenario Description:

This practice scenario includes the decommissioning of an earthen liquid waste impoundment (embankment or excavated type) where the estimated volume of waste to be removed is approximately 25% liquid/slurry waste and 75% sludge/solid waste of the structural storage capacity of the 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 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 25% if the structural volume (25% X 63,851 CF = 15,9635 CF). The volume of solid waste to be removed approximately equals 75% of the structural volume (75% X 63,851 = 47,888 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: $22,571.86 **Scenario Cost/Unit:** $0.35

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	$4.37	473	$2,067.01
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	$127.04	12	$1,524.48
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	$2.35	709	$1,666.15
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	47888	$13,887.52
Manure, compost, injection	956	Loading, hauling and injecting manure/compost by ground equipment. Includes equipment, power unit and labor costs.	Gallon	$0.01	119401	$1,194.01
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	12	$228.72
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	$26.75	12	$321.00

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	4	$1,139.20
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77

Practice: 360 - Waste Facility Closure

Scenario: #7 - Liquid Waste Impoundment Closure with 0% Liquids and 100% Solids

Scenario Description:

This practice scenario includes the decommissioning of an earthen liquid waste impoundment (embankment or excavated type) where the estimated volume of waste to be removed is approximately 0% liquid/slurry waste and 100% sludge/solid waste of the structural storage capacity of the 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 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 0% of the structural volume. The volume of solid waste to be removed approximately equals 100% of the structural volume (63,851 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: $25,722.32 **Scenario Cost/Unit:** $0.40

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
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	63851	$18,516.79
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	$2.35	709	$1,666.15
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	473	$2,067.01
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	$127.04	12	$1,524.48
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	$19.06	12	$228.72
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	$26.75	12	$321.00
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	$543.77	1	$543.77
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	3	$854.40

Practice: 360 - Waste Facility Closure

Scenario: #8 - Liquid Waste Impoundment Conversion to Fresh Water Storage with 75% Liquids and 25% Solids

Scenario Description:

This practice scenario includes the conversion of an earthen liquid waste impoundment (embankment or excavated type) to fresh water storage where the estimated volume of waste to be removed is approximately 75% liquid/slurry waste and 25% sludge/solid waste of the structural storage capacity of the 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 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 75% if the structural volume (75% X 63,851 CF = 47,888 CF). The volume of solid waste to be removed approximately equals 25% of the structural volume (25% X 63,851 = 15,963 CF). The volume of earthwork (earthfill and/or excavation) required to meet current NRCS standards and perform final grading and shaping of the site is approximately 5% of the structural volume. 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. Conversion of a liquid waste storage impoundment for fresh water storage 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). All inflow devices and associated appurtenances will be removed and properly disposed of. The embankment will be brought up to current NRCS standards for its intended purpose. The disturbed areas shall be vegetated in accordance with Critical Area Planting (342). Conversion to fresh water storage will address water quality degradation, air quality impacts and safety hazards by removing and properly utilizing the waste from the impoundment.

Scenario Feature Measure: Cubic feet of structural storage

Scenario Unit: Cubic Foot

Scenario Typical Size: 63,851

Scenario Cost: $11,792.74 **Scenario Cost/Unit:** $0.18

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Manure, compost, injection	956	Loading, hauling and injecting manure/compost by ground equipment. Includes equipment, power unit and labor costs.	Gallon	$0.01	358204	$3,582.04
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	15963	$4,629.27
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	118	$515.66
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	$127.04	8	$1,016.32
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	$19.06	8	$152.48
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	$26.75	8	$214.00
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	$543.77	1	$543.77

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	4	$1,139.20

Practice: 360 - Waste Facility Closure

Scenario: #9 - Liquid Waste Impoundment Conversion to Fresh Water Storage with 50% Liquids and 50% Solids

Scenario Description:

This practice scenario includes the conversion of an earthen liquid waste impoundment (embankment or excavated type) to fresh water storage where the estimated volume of waste to be removed is approximately 50% liquid/slurry waste and 50% sludge/solid waste of the structural storage capacity of the 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 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% of 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/or excavation) required to meet current NRCS standards and perform final grading and shaping of the site is approximately 5% of the structural volume. 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. Conversion of a liquid waste storage impoundment for fresh water storage 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). All inflow devices and associated appurtenances will be removed and properly disposed of. The embankment will be brought up to current NRCS standards for its intended purpose. The disturbed areas shall be vegetated in accordance with Critical Area Planting (342). Conversion to fresh water storage will address water quality degradation, air quality impacts and safety hazards by removing and properly utilizing the waste from the impoundment.

Scenario Feature Measure: Cubic feet of structural storage

Scenario Unit: Cubic Foot

Scenario Typical Size: 63,851

Scenario Cost: $15,227.71 **Scenario Cost/Unit:** $0.24

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
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
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	$127.04	8	$1,016.32
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	118	$515.66
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
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	8	$152.48
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	$26.75	8	$214.00
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	$543.77	1	$543.77

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	4	$1,139.20

Practice: 360 - Waste Facility Closure

Scenario: #10 - Liquid Waste Impoundment Conversion to Fresh Water Storage with 25% Liquids and 75% Solids

Scenario Description:

This practice scenario includes the conversion of an earthen liquid waste impoundment (embankment or excavated type) to fresh water storage where the estimated volume of waste to be removed is approximately 25% liquid/slurry waste and 75% sludge/solid waste of the structural storage capacity of the 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 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 25% of the structural volume (25% X 63,851 CF = 15,963 CF). The volume of solid waste to be removed approximately equals 75% of the structural volume (75% X 63,851 = 47,888 CF). The volume of earthwork (earthfill and/or excavation) required to meet current NRCS standards and perform final grading and shaping of the site is approximately 5% of the structural volume. 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. Conversion of a liquid waste storage impoundment for fresh water storage 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). All inflow devices and associated appurtenances will be removed and properly disposed of. The embankment will be brought up to current NRCS standards for its intended purpose. The disturbed areas shall be vegetated in accordance with Critical Area Planting (342). Conversion to fresh water storage will address water quality degradation, air quality impacts and safety hazards by removing and properly utilizing the waste from the impoundment.

Scenario Feature Measure: Cubic feet of structural storage

Scenario Unit: Cubic Foot

Scenario Typical Size: 63,851

Scenario Cost: $18,662.96 **Scenario Cost/Unit:** $0.29

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	$127.04	8	$1,016.32
Manure, compost, injection	956	Loading, hauling and injecting manure/compost by ground equipment. Includes equipment, power unit and labor costs.	Gallon	$0.01	119401	$1,194.01
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	47888	$13,887.52
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	118	$515.66
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	$26.75	8	$214.00
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	$19.06	8	$152.48
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	4	$1,139.20

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	$543.77	1	$543.77

Practice: 360 - Waste Facility Closure

Scenario: #11 - Liquid Waste Impoundment Conversion to Fresh Water Storage with 0% Liquids and 100% Solids

Scenario Description:

This practice scenario includes the conversion of an earthen liquid waste impoundment (embankment or excavated type) to fresh water storage where the estimated volume of waste to be removed is approximately 0% liquid/slurry waste and 100% sludge/solid waste of the structural storage capacity of the 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 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 0% of the structural volume. The volume of solid waste to be removed approximately equals 100% of the structural volume (47,888 CF). The volume of earthwork (earthfill and/or excavation) required to meet current NRCS standards and perform final grading and shaping of the site is approximately 5% of the structural volume. 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. Conversion of a liquid waste storage impoundment for fresh water storage 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). All inflow devices and associated appurtenances will be removed and properly disposed of. The embankment will be brought up to current NRCS standards for its intended purpose. The disturbed areas shall be vegetated in accordance with Critical Area Planting (342). Conversion to fresh water storage will address water quality degradation, air quality impacts and safety hazards by removing and properly utilizing the waste from the impoundment.

Scenario Feature Measure: Cubic feet of structural storage

Scenario Unit: Cubic Foot

Scenario Typical Size: 63,851

Scenario Cost: $21,813.42 **Scenario Cost/Unit:** $0.34

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
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	63851	$18,516.79
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	118	$515.66
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	$127.04	8	$1,016.32
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	$19.06	8	$152.48
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	$26.75	8	$214.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	3	$854.40
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77

Practice: 362 - Diversion

Scenario: #1 - Diversion

Scenario Description:

An earthen channel and ridge constructed across long slopes, 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 1-3 percent, requiring 1 CY excavation per LF. Channel may be level or gradient, and the 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 fields and other locations. Also may be associated with animal feeding operations, with surface or roof runoff to be diverted from potential contamination sources, or contaminated water needing diverted to storage or treatment structures.

After Situation:

Diversion is installed using a dozer, scraper, or other earth-moving equipment. Field system meets "T", contaminated water or "clean" storm water runoff is diverted away from a contamination source to minimize the volume of runoff that is contaminated by agricultural waste. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Underground Outlet (620), Mulching (484), and Subsurface Drain (606).

Scenario Feature Measure: Diversion Fill Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,000

Scenario Cost: $2,233.77 **Scenario Cost/Unit:** $2.23

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	$1.69	1000	$1,690.00
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	$543.77	1	$543.77

Practice: 362 - Diversion

Scenario: #2 - Diversion Minor Structure

Scenario Description:

An earthen channel and ridge on the lower side constructed across the slope, commonly referred to as road bars, kickers, and gully plugs. Typical minor structures are less than 200 feet long, have a maximum height of 5 feet in the gully section and 2.5 feet in the spillway section, and an embankment volume less than 200 cubic yards. The drainage area above an individual structure shall be 15 acres or less. The total area above several structures in series shall be limited to 40 acres or less.

Before Situation:

Soil erosion as a result of gully, rill, or sheet erosion which exceeds "T" from farm fields, range land, earthen roadways, and other locations. Also may be associated with animal feeding operations, with surface or roof runoff to be diverted from potential contamination sources, or contaminated water needing diverted to storage or treatment structures.

After Situation:

Diversion is installed using a backhoe, dozer, or other earth-moving equipment. Field system meets "T", contaminated water or "clean" storm water runoff is diverted away from a contamination source to minimize the volume of runoff that is contaminated by agricultural waste. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Underground Outlet (620), Mulching (484), and Subsurface Drain (606).

Scenario Feature Measure: Diversion Fill Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 100

Scenario Cost: $859.80 **Scenario Cost/Unit:** $8.60

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	$5.75	100	$575.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 362 - Diversion

Scenario: #3 - Net Wire Diversion

Scenario Description:

A low barrier constructed of posts and mesh wire across shallow depressions or other areas where surface water concentrates. Practice is typically installed in drainage areas located primarily on range land to reduce sheet and rill erosion. Wire height will not be less than 12 inches or more than 18 inches. The diversion shall be constructed on the contour or on grade not to exceed 0.5 foot per 100 feet. Posts may be juniper with a minimum top diameter of 3 inches, treated wood posts with a minimum top diameter of 4 inches, T, U, or I sectin steel posts, or iron pipe of not less than 1 1/4 inches inside diameter. Posts shall be set a minimum of 1 1/2 feet in the ground for a 1' tall structure and 2' in the ground for a 1-1/2' tall structure and spaced at 10 feet or less. Wire mesh diversions trap sediment, spread or disperse overland water flows to reduce erosion from concentrated flow and aid in the infiltration of surface flows by slowing water movement. Typical scenario size is 20 feet long, with 3 metal tee posts, with wire mesh 12 to 18 inches

Before Situation:

Soil erosion is accelerated as a result of gully, rill, or sheet erosion which exceeds "T" on range land, pasture land, and other locations due to excessive sheet flow. Excessive sheet flow results in head cuts, small channels or gullies and increased sheet erosion. Due to excessive erosion more precipitation is running off the site versus infiltrating the soil.

After Situation:

Net Wire Diversion is installed using post driving equipment and/or manual labor. Sheet flows are slowed and or spread across the land form to decrease concentrated flow and resulting soil erosion (sheet, rill, and small gullies) and aid the soil in the infiltration of sheet flows.

Scenario Feature Measure: Diversion Length

Scenario Unit: Foot

Scenario Typical Size: 20

Scenario Cost: $253.78 **Scenario Cost/Unit:** $12.69

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Wire Mesh Screen, galvanized, 2"x 4", V-mesh	2371	Galvanized V-mesh wire screen, 2" x 4". Materials only.	Foot	$2.43	20	$48.60
Post, Steel T, 1.25 lbs, 5'	2372	Steel Post, Studded 5' - 1.25 lb. Includes materials and shipping only.	Each	$4.54	3	$13.62
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	$191.56	1	$191.56

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), 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: 910 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: $995.58 **Scenario Cost/Unit:** $1.09

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	1636				1	
	1635				1	
	1637				1	
	2019				1	
	1634				1	
	1638				1	
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
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77
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	$78.65	1	$78.65

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), 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: $1,280.38 **Scenario Cost/Unit:** $0.73

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	1639				1	
	1640				1	
	2019				1	
	1643				1	
	1642				1	
	1641				1	
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
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77
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	$78.65	1	$78.65

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), 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: $1,565.18 **Scenario Cost/Unit:** $0.40

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	1644				1	
	2019				1	
	1645				1	
	1646				1	
	1647				1	
	1648				1	
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
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	$543.77	1	$543.77
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	$78.65	1	$78.65
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	3	$854.40

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), 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: $995.58 **Scenario Cost/Unit:** $0.96

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	1652				1	
	1649				1	
	1650				1	
	1651				1	
	2019				1	
	1653				1	
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
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	$78.65	1	$78.65
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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), 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: 1,890 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: $1,280.38 **Scenario Cost/Unit:** $0.68

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	1658				1	
	1657				1	
	2019				1	
	1656				1	
	1655				1	
	1654				1	
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
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	$543.77	1	$543.77
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
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	$78.65	1	$78.65

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), 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: $1,565.18 **Scenario Cost/Unit:** $0.49

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	1663				1	
	1659				1	
	1662				1	
	1660				1	
	2019				1	
	1661				1	
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
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	$78.65	1	$78.65
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	3	$854.40

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), 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: $407.63 **Scenario Cost/Unit:** $0.41

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	1665				1	
	1664				1	
	1666				1	
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
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
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	$78.65	1	$78.65

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: $9,216.90 **Scenario Cost/Unit:** $9.22

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	$8.49	1000	$8,490.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
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	$78.65	2	$157.30

Practice: 367 - Roofs and Covers

Scenario: #2 - Timber or Steel Sheet Roof

Scenario Description:

A timber framed building with a timber or steel "sheet" roof 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), 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 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 timber framed building with a timber or steel "sheet" roof and supporting foundation. 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 building

Scenario Unit: Square Foot

Scenario Typical Size: 1,000

Scenario Cost: $14,492.10 **Scenario Cost/Unit:** $14.49

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, shipping, equipment, and installation. Does not include foundation preparation.	Square Foot	$14.05	1000	$14,050.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
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	$78.65	2	$157.30

Practice: 367 - Roofs and Covers

Scenario: #3 - Steel Frame and Roof

Scenario Description:

A steel framed building with steel "sheet" roof 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 includes 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 steel framed building with steel "sheet" roof and supporting foundation. Engineered and installed in accordance with appropriate building codes and permits. Typical size is 10,000 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 building

Scenario Unit: Square Foot

Scenario Typical Size: 10,000

Scenario Cost: $71,826.90 **Scenario Cost/Unit:** $7.18

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Roof, Steel Frame Monoslope Building, greater than 60' wide	1677	Steel Frame Monoslope Building, greater than 60' width, includes materials, equipment, and installation. Does not include foundation preparation.	Square Foot	$7.11	10000	$71,100.00
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	$78.65	2	$157.30
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 367 - Roofs and Covers

Scenario: #4 - 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).

Scenario Feature Measure: Surface of Membrane

Scenario Unit: Square Foot

Scenario Typical Size: 10,000

Scenario Cost: $77,386.14 **Scenario Cost/Unit:** $7.74

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	$48.07	20	$961.40
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	40	$230.00
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	$98.63	16	$1,578.08
Trencher, 8"	936	Equipment and power unit costs. Labor not included.	Hour	$100.13	8	$801.04
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	28	$529.20
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	$27.30	16	$436.80
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	$26.75	16	$428.00
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	$19.06	32	$609.92
Materials						
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Yard	$5.90	12000	$70,800.00
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	$78.65	2	$157.30
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	3	$854.40

Practice: 367 - Roofs and Covers

Scenario: #5 - Flexible Membrane Cover with Flare

Scenario Description:

A fabricated 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. This scenario includes the gas collection and flare system to convert methane to carbon dioxide.

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 flexible membrane over a 200 ft x 300 ft waste storage pond. The membrane will cover the entire surface of a waste storage or treatment facility (e.g. waste storage pond, waste treatment lagoon or anaerobic digester). A flare is included to burn off the captured emitted methane. Methane collection system under the cover is installed on a per acre rate basis.

Scenario Feature Measure: Surface of Membrane

Scenario Unit: Square Foot

Scenario Typical Size: 60,000

Scenario Cost: $509,309.30 **Scenario Cost/Unit:** $8.49

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	$98.63	40	$3,945.20
Trencher, 8"	936	Equipment and power unit costs. Labor not included.	Hour	$100.13	24	$2,403.12
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	100	$575.00
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	56	$2,691.92
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	80	$1,512.00
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	$27.30	40	$1,092.00
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	$26.75	40	$1,070.00
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	$19.06	96	$1,829.76
Materials						
Covered Lagoon Flare	1666	Flare excess gas to convert from methane to carbon dioxide. Includes labor and equipment.	Each	$12,791.17	1	$12,791.17
Covered Lagoon Gas Collection System	1664	Piping and collection system for biogas. Includes labor and equipment.	Each	$39,705.31	1.4	$55,587.43
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Yard	$5.90	72000	$424,800.00
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	$78.65	2	$157.30
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	3	$854.40

Practice: 367 - Roofs and Covers

Scenario: #6 - Permeable Composite or Inorganic Cover

Scenario Description:

Permeable organic or inorganic cover applied to the liquid surface of a waste storage or treatment facility. Permeable organic or inorganic cover to reduce radiation and wind velocity over the surface of a manure storage to reduce transmission of odors and act as a medium for growth of microorganisms that utilize carbon, nitrogen, and sulfur to decompose odorous compounds.

Associated practices include Waste Storage Facility (313).

Before Situation:

Applicable where the bio-treatment of emissions from an existing or planned waste storage or treatment facility will improve air quality.

After Situation:

Permeable composite or inorganic cover applied to the liquid surface of a waste storage or treatment facility.

Scenario Feature Measure: Storage Surface Area at Normal Full Level

Scenario Unit: Square Foot

Scenario Typical Size: 10,000

Scenario Cost: $77,240.42 **Scenario Cost/Unit:** $7.72

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Composite Cover, floating cover, > 5,000 square feet	1860	Composite material that is used to cover open storages with an area greater than 5,000 sf. Example, Hexa-Cover. Materials only.	Square Foot	$7.67	10000	$76,700.00
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	$78.65	2	$157.30
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	$191.56	2	$383.12

Practice: 372 - Combustion System Improvement

Scenario: #1 - IC Engine Repower, < 50 bhp

Scenario Description:

Older diesel engine replaced with new diesel engine repower (< 50 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 (< 50 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 costs 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: 30

Scenario Cost: $5,848.20 **Scenario Cost/Unit:** $194.94

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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	$27.30	8	$218.40
Materials						
	1428	Most current Tier-level Diesel or Cleaner Engine and required appurtenances. 25 to 49 bhp. Materials only.	Horsepower	$187.66	30	$5,629.80

Practice: 372 - Combustion System Improvement

Scenario: #2 - IC Engine Repower, 50-99 bhp

Scenario Description:

Older diesel engine replaced with new diesel engine repower (50-99 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 (50-99 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 costs 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: 75

Scenario Cost: $14,611.05 **Scenario Cost/Unit:** $194.81

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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	$27.30	16	$436.80
Materials						
	1429	Most current Tier-level Diesel or Cleaner Engine and required appurtenances. 50 to 99 bhp. Materials only.	Horsepower	$188.99	75	$14,174.25

Practice: 372 - Combustion System Improvement

Scenario: #3 - IC Engine Repower, 100-199 bhp

Scenario Description:

Older diesel engine replaced with new diesel engine repower (100-199 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 (100-199 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 costs 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: 150

Scenario Cost: $30,652.80 **Scenario Cost/Unit:** $204.35

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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	$27.30	16	$436.80
Materials						
	1430	Most current Tier-level Diesel or Cleaner Engine and required appurtenances. 100 to 199 bhp. Materials only.	Horsepower	$201.44	150	$30,216.00

Practice: 372 - Combustion System Improvement

Scenario: #4 - IC Engine Repower, >=200 bhp

Scenario Description:

Older diesel engine replaced with new diesel engine repower (>= 200 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 (>= 200 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 costs 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: 350

Scenario Cost: $59,635.80 **Scenario Cost/Unit:** $170.39

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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	$27.30	16	$436.80
Materials						
	1433	Most current Tier-level Diesel or Cleaner Engine and required appurtenances. 300 to 399 bhp. Materials only.	Horsepower	$169.14	350	$59,199.00

Practice: 372 - Combustion System Improvement

Scenario: #5 - 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 IC 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 costs 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: $1,386.18 **Scenario Cost/Unit:** $1,386.18

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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	$27.30	8	$218.40
Materials						
	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: #6 - Electric Motor in-lieu of IC Engine, 12-74 HP

Scenario Description:

Replace an existing IC engine operating an irrigation well with a new electric motor (12-74 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 IC 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 costs 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: $6,232.95 **Scenario Cost/Unit:** $6,232.95

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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	$27.30	12	$327.60
Materials						
	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: #7 - Electric Motor in-lieu of IC Engine, 75-149 HP

Scenario Description:

Replace an existing IC engine operating an irrigation well with a new electric motor (75-149 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 IC 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 costs 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: $7,813.68 **Scenario Cost/Unit:** $7,813.68

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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	$27.30	16	$436.80
Materials						
	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: #8 - Electric Motor in-lieu of IC Engine, 150-299 HP

Scenario Description:

Replace an existing IC engine operating an irrigation well with a new electric motor (150-299 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 IC 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 costs 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: $23,551.88 **Scenario Cost/Unit:** $23,551.88

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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	$27.30	40	$1,092.00
Materials						
	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: #9 - Electric Motor in-lieu of IC Engine, >=300 HP

Scenario Description:

Replace an existing IC engine operating an irrigation well with a new electric motor (>=300 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 IC 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 costs 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: $47,124.00 **Scenario Cost/Unit:** $47,124.00

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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	$27.30	40	$1,092.00
Materials						
	1439	Premium NEMA approved Electric Motor and required appurtenances. 400 to 499 hp (296 - 372 kW). Includes materials and shipping only.	Horsepower	$115.08	400	$46,032.00

Practice: 373 - Dust Control on Unpaved Roads and Surfaces

Scenario: #1 - Water Application - Once per Day

Scenario Description:

Application of water as a dust suppressant once per day 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 three times per year. Water is applied via truck once per day as a dust suppressant to the unpaved surface with a minimization of overlap and avoidance of over-application of water. 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, 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 Yard

Scenario Typical Size: 1,760

Scenario Cost: $2,616.77 **Scenario Cost/Unit:** $1.49

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	$6.47	132.7	$858.57
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	$175.82	10	$1,758.20

Practice: 373 - Dust Control on Unpaved Roads and Surfaces

Scenario: #2 - Water Application - Twice per Day

Scenario Description:

Application of water as a dust suppressant twice per day 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 three times per year. Water is applied via truck twice per day as a dust suppressant to the unpaved surface with a minimization of overlap and avoidance of over-application of water. 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, 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 Yard

Scenario Typical Size: 1,760

Scenario Cost: $3,475.99 **Scenario Cost/Unit:** $1.97

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	$175.82	10	$1,758.20
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	265.5	$1,717.79

Practice: 373 - Dust Control on Unpaved Roads and Surfaces

Scenario: #3 - Water Application - Once per Week

Scenario Description:

Application of water as a dust suppressant once per week 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 three times per year. Water is applied via truck once per week as a dust suppressant to the unpaved surface with a minimization of overlap and avoidance of over-application of water. 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, 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 Yard

Scenario Typical Size: 1,760

Scenario Cost: $1,880.48 **Scenario Cost/Unit:** $1.07

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	$6.47	18.9	$122.28
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	$175.82	10	$1,758.20

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 Yard

Scenario Typical Size: 1,760

Scenario Cost: $4,696.18 **Scenario Cost/Unit:** $2.67

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	$6.47	0.36	$2.33
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	$175.82	5	$879.10
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	$26.75	5	$133.75
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: #5 - Hygroscopic Salt Application - Once per Year

Scenario Description:

Application of a hygroscopic salt (calcium chloride, magnesium chloride, sodium chloride, etc.) 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. Hygroscopic salt solution 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 Yard

Scenario Typical Size: 1,760

Scenario Cost: $2,461.52 **Scenario Cost/Unit:** $1.40

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	$6.47	0.36	$2.33
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	$175.82	5	$879.10
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	$21.42	2	$42.84
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	$26.75	7	$187.25
Materials						
Chemical, dust control, hygroscopic salt solution	1340	Hygroscopic salt solution, such as calcium chloride, magnesium chloride, or sodium chloride. Materials only.	Gallon	$1.50	900	$1,350.00

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 Yard

Scenario Typical Size: 1,760

Scenario Cost: $4,189.52 **Scenario Cost/Unit:** $2.38

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	$6.47	0.36	$2.33
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	$175.82	5	$879.10
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	$21.42	2	$42.84
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	$26.75	7	$187.25
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 Yard

Scenario Typical Size: 1,760

Scenario Cost: $4,738.52 **Scenario Cost/Unit:** $2.69

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	$6.47	0.36	$2.33
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	$175.82	5	$879.10
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	$21.42	2	$42.84
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	$26.75	7	$187.25
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 Yard

Scenario Typical Size: 1,760

Scenario Cost: $4,396.52 **Scenario Cost/Unit:** $2.50

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	$6.47	0.36	$2.33
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	$175.82	5	$879.10
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	$21.42	2	$42.84
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	$26.75	7	$187.25
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: 373 - Dust Control on Unpaved Roads and Surfaces

Scenario: #9 - Clay Additive Application - Once per Year

Scenario Description:

Application of a clay additive as a dust suppressant once per 5 years 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 prior to the application. A clay additive is applied once per 5 years as a dust suppressant to the unpaved surface and mixed into the surface with a water application and road grading or other mechanical mixing. 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 Yard

Scenario Typical Size: 1,760

Scenario Cost: $14,448.49 **Scenario Cost/Unit:** $8.21

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	$6.47	0.36	$2.33
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	$175.82	8	$1,406.56
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	$26.75	8	$214.00
Materials						
Bentonite	41	Bentonite, includes materials (50# bag)	Each	$10.02	1280	$12,825.60

Practice: 374 - Farmstead Energy Improvement

Scenario: #5 - 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: $1,338.66 **Scenario Cost/Unit:** $1,338.66

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	$27.30	3	$81.90
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: #6 - 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: $200.15 **Scenario Cost/Unit:** $200.15

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	$27.30	2	$54.60
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: #7 - 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: $6,537.37 **Scenario Cost/Unit:** $6,537.37

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	$27.30	8	$218.40
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: #8 - 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: Horse Power

Scenario Typical Size: 1

Scenario Cost: $2,704.44 **Scenario Cost/Unit:** $2,704.44

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	$27.30	4	$109.20
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: #9 - 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: HP

Scenario Unit: HP

Scenario Typical Size: 50

Scenario Cost: $11,468.90 **Scenario Cost/Unit:** $229.38

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	$27.30	8	$218.40
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: #10 - 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: $1,392.58 **Scenario Cost/Unit:** $1,392.58

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	$27.30	8	$218.40
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	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
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: 374 - Farmstead Energy Improvement

Scenario: #11 - 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: 150

Scenario Cost: $22,896.68 **Scenario Cost/Unit:** $152.64

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	$27.30	16	$436.80
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: #12 - 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: 50

Scenario Cost: $6,123.75 **Scenario Cost/Unit:** $122.48

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	$27.30	8	$218.40
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: #13 - 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: 5

Scenario Cost: $848.50 **Scenario Cost/Unit:** $169.70

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	$27.30	4	$109.20
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: #14 - 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: $562.11 **Scenario Cost/Unit:** $562.11

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	$27.30	4	$109.20
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: #15 - 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: $8,813.88 **Scenario Cost/Unit:** $1,468.98

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	$27.30	16	$436.80
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: #16 - 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: $6,856.80 **Scenario Cost/Unit:** $9.14

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	$27.30	16	$436.80
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: #17 - 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: $2,146.90 **Scenario Cost/Unit:** $153.35

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	$27.30	24	$655.20
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: #23 - 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: Bu/hr

Scenario Typical Size: 860

Scenario Cost: $77,929.68 **Scenario Cost/Unit:** $90.62

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	$27.30	16	$436.80
Materials						
Grain dryer, Axial 28'	1162	Grain dryer, 28 foot Axial with rated capacity of 990 bushels/hr. Materials only.	Bushels per Hour	$91.87	172	$15,801.64
Grain dryer, Centrifugal, 24'	1161	Grain dryer, 24 foot Centrifugal with rated capacity of 860 bushels/hr. Materials only.	Bushels per Hour	$93.95	172	$16,159.40
Grain dryer, Axial, 16'	1159	Grain dryer, 16 foot Axial with rated capacity of 600 bushels/hour. Materials only.	Bushels per Hour	$82.01	172	$14,105.72
Grain dryer, Centrifugal, 20'	1160	Grain dryer, 20 foot Centrifugal with rated capacity of 785 bushels/hour. Materials only.	Bushels per Hour	$87.72	172	$15,087.84
Grain dryer, Axial, 12'	1158	Grain dryer, 12 foot Axial with rated capacity of 460 bushels/hour. Materials only.	Bushels per Hour	$94.99	172	$16,338.28

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #1 - Manure Harvesting - Once per Year

Scenario Description:

Removal of loose, dry layer of manure from a confined animal operation once per year in addition to a regular annual manure clean-out to reduce emissions of particulate matter. The specific resource concern to be addressed is "Emissions of Particulate Matter (PM) and PM Precursors".

Before Situation:

The confined animal operation conducts a manure clean-out once per year. 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:

In addition to the annual manure clean-out, an additional manure harvesting removes the dry, loose manure layer from the pens and working alleys. This manure harvesting will leave a 1-2 inch layer of well-compacted manure above the mineral soil and a smooth pen/alley surface to deter ponding of moisture.

Scenario Feature Measure: Pen Surface Area, Including Working Alleys

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $471.18 **Scenario Cost/Unit:** $471.18

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
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	$58.44	3	$175.32
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$60.82	3	$182.46
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	6	$113.40

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #2 - Manure Harvesting - Twice per Year

Scenario Description:

Removal of loose, dry layer of manure from a confined animal operation twice per year in addition to a regular annual manure clean-out to reduce emissions of particulate matter. The specific resource concern to be addressed is "Emissions of Particulate Matter (PM) and PM Precursors".

Before Situation:

The confined animal operation conducts a manure clean-out once per year. 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:

In addition to the annual manure clean-out, two additional manure harvesting efforts remove the dry, loose manure layer from the pens and working alleys. Each manure harvesting will leave a 1-2 inch layer of well-compacted manure above the mineral soil and a smooth pen/alley surface to deter ponding of moisture.

Scenario Feature Measure: Pen Surface Area, Including Working Alleys

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $942.36 **Scenario Cost/Unit:** $942.36

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
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	$58.44	6	$350.64
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$60.82	6	$364.92
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	12	$226.80

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #3 - Manure Harvesting - More Than Twice per Year

Scenario Description:

Removal of loose, dry layer of manure from a confined animal operation more than twice per year in addition to a regular annual manure clean-out to reduce emissions of particulate matter. The specific resource concern to be addressed is "Emissions of Particulate Matter (PM) and PM Precursors".

Before Situation:

The confined animal operation conducts a manure clean-out once per year. 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:

In addition to the annual manure clean-out, four additional manure harvesting efforts remove the dry, loose manure layer from the pens and working alleys. Each manure harvesting will leave a 1-2 inch layer of well-compacted manure above the mineral soil and a smooth pen/alley surface to deter ponding of moisture.

Scenario Feature Measure: Pen Surface Area, Including Working Alleys

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $1,884.72 **Scenario Cost/Unit:** $1,884.72

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	$60.82	12	$729.84
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	$58.44	12	$701.28
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	24	$453.60

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 Alleys

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $2,361.55 **Scenario Cost/Unit:** $2,361.55

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	$6.47	365	$2,361.55

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #8 - Manure Harvest-1 per Year and Solid-Set Sprinkler System, Less than 20 Acres

Scenario Description:

Combination of removal of loose, dry layer of manure from a confined animal operation once per year in addition to a regular annual manure clean-out and 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 animal operation conducts a manure clean-out once per year and 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:

In addition to the annual manure clean-out, an additional manure harvesting removes the dry, loose manure layer from the pens and working alleys. This manure harvesting will leave a 1-2 inch layer of well-compacted manure above the mineral soil and a smooth pen/alley surface to deter ponding of moisture. A solid-set dust control sprinkler system is also 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: $181,072.05 **Scenario Cost/Unit:** $12,071.47

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	$60.82	45	$2,736.90
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	$58.44	45	$2,629.80
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
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	90	$1,701.00

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #9 - Manure Harvest-1 per Year and Solid-Set Sprinkler System, 20-60 Acres

Scenario Description:

Combination of removal of loose, dry layer of manure from a confined animal operation once per year in addition to a regular annual manure clean-out and 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 animal operation conducts a manure clean-out once per year and 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:

In addition to the annual manure clean-out, an additional manure harvesting removes the dry, loose manure layer from the pens and working alleys. This manure harvesting will leave a 1-2 inch layer of well-compacted manure above the mineral soil and a smooth pen/alley surface to deter ponding of moisture. A solid-set dust control sprinkler system is also 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: $339,829.35 **Scenario Cost/Unit:** $9,709.41

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	$60.82	105	$6,386.10
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
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	$58.44	105	$6,136.20
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	210	$3,969.00

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #10 - Manure Harvest-1 per Year and Solid-Set Sprinkler System, Greater than 60 Acres

Scenario Description:

Combination of removal of loose, dry layer of manure from a confined animal operation once per year in addition to a regular annual manure clean-out and 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 animal operation conducts a manure clean-out once per year and 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:

In addition to the annual manure clean-out, an additional manure harvesting removes the dry, loose manure layer from the pens and working alleys. This manure harvesting will leave a 1-2 inch layer of well-compacted manure above the mineral soil and a smooth pen/alley surface to deter ponding of moisture. A solid-set dust control sprinkler system is also 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: $636,006.00 **Scenario Cost/Unit:** $6,360.06

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	$60.82	300	$18,246.00
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	$58.44	300	$17,532.00
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
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	600	$11,340.00

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #11 - Manure Harvest-1 per Year and Truck-Mounted Mobile Sprinkler System

Scenario Description:

Combination of removal of loose, dry layer of manure from a confined animal operation once per year in addition to a regular annual manure clean-out and 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 animal operation conducts a manure clean-out once per year and 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:

In addition to the annual manure clean-out, an additional manure harvesting removes the dry, loose manure layer from the pens and working alleys. This manure harvesting will leave a 1-2 inch layer of well-compacted manure above the mineral soil and a smooth pen/alley surface to deter ponding of moisture. 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 Alleys

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $2,832.73 **Scenario Cost/Unit:** $2,832.73

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	$60.82	3	$182.46
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	365	$2,361.55
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	$58.44	3	$175.32
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	6	$113.40

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #12 - Manure Harvest-2 per Year and Solid-Set Sprinkler System, Less than 20 Acres

Scenario Description:

Combination of removal of loose, dry layer of manure from a confined animal operation twice per year in addition to a regular annual manure clean-out and 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 animal operation conducts a manure clean-out once per year and 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:

In addition to the annual manure clean-out, two additional manure harvesting efforts remove the dry, loose manure layer from the pens and working alleys. Each manure harvesting will leave a 1-2 inch layer of well-compacted manure above the mineral soil and a smooth pen/alley surface to deter ponding of moisture. A solid-set dust control sprinkler system is also 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: $188,139.75 **Scenario Cost/Unit:** $12,542.65

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
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	$58.44	90	$5,259.60
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
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$60.82	90	$5,473.80
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	180	$3,402.00

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #13 - Manure Harvest-2 per Year and Solid-Set Sprinkler System, 20-60 Acres

Scenario Description:

Combination of removal of loose, dry layer of manure from a confined animal operation twice per year in addition to a regular annual manure clean-out and 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 animal operation conducts a manure clean-out once per year and 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:

In addition to the annual manure clean-out, two additional manure harvesting efforts remove the dry, loose manure layer from the pens and working alleys. Each manure harvesting will leave a 1-2 inch layer of well-compacted manure above the mineral soil and a smooth pen/alley surface to deter ponding of moisture. A solid-set dust control sprinkler system is also 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: $356,320.65 **Scenario Cost/Unit:** $10,180.59

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	$60.82	210	$12,772.20
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	$58.44	210	$12,272.40
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
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	420	$7,938.00

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #14 - Manure Harvest-2 per Year and Solid-Set Sprinkler System, Greater than 60 Acres

Scenario Description:

Combination of removal of loose, dry layer of manure from a confined animal operation twice per year in addition to a regular annual manure clean-out and 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 animal operation conducts a manure clean-out once per year and 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:

In addition to the annual manure clean-out, two additional manure harvesting efforts remove the dry, loose manure layer from the pens and working alleys. Each manure harvesting will leave a 1-2 inch layer of well-compacted manure above the mineral soil and a smooth pen/alley surface to deter ponding of moisture. A solid-set dust control sprinkler system is also 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: $683,124.00 **Scenario Cost/Unit:** $6,831.24

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	$60.82	600	$36,492.00
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
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	$58.44	600	$35,064.00
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	1200	$22,680.00

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #15 - Manure Harvest-2 per Year and Truck-Mounted Mobile Sprinkler System

Scenario Description:

Combination of removal of loose, dry layer of manure from a confined animal operation twice per year in addition to a regular annual manure clean-out and 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 animal operation conducts a manure clean-out once per year and 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:

In addition to the annual manure clean-out, two additional manure harvesting efforts remove the dry, loose manure layer from the pens and working alleys. Each manure harvesting will leave a 1-2 inch layer of well-compacted manure above the mineral soil and a smooth pen/alley surface to deter ponding of moisture. 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 Alleys

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $3,303.91 **Scenario Cost/Unit:** $3,303.91

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	$60.82	6	$364.92
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	$58.44	6	$350.64
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	365	$2,361.55
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	12	$226.80

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #16 - Manure Harvest-More Than Twice per Year and Solid-Set Sprinkler System, Less than 20 Acres

Scenario Description:

Combination of removal of loose, dry layer of manure from a confined animal operation more than twice per year in addition to a regular annual manure clean-out and 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 animal operation conducts a manure clean-out once per year and 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:

In addition to the annual manure clean-out, four additional manure harvesting efforts remove the dry, loose manure layer from the pens and working alleys. Each manure harvesting will leave a 1-2 inch layer of well-compacted manure above the mineral soil and a smooth pen/alley surface to deter ponding of moisture. A solid-set dust control sprinkler system is also 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: $202,275.15 **Scenario Cost/Unit:** $13,485.01

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
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	$58.44	180	$10,519.20
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$60.82	180	$10,947.60
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	360	$6,804.00

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #17 - Manure Harvest-More Than Twice per Year and Solid-Set Sprinkler System, 20-60 Acres

Scenario Description:

Combination of removal of loose, dry layer of manure from a confined animal operation more than twice per year in addition to a regular annual manure clean-out and 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 animal operation conducts a manure clean-out once per year and 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:

In addition to the annual manure clean-out, four additional manure harvesting efforts remove the dry, loose manure layer from the pens and working alleys. Each manure harvesting will leave a 1-2 inch layer of well-compacted manure above the mineral soil and a smooth pen/alley surface to deter ponding of moisture. A solid-set dust control sprinkler system is also 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: $389,303.25 **Scenario Cost/Unit:** $11,122.95

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
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	$58.44	420	$24,544.80
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$60.82	420	$25,544.40
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	840	$15,876.00

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #18 - Manure Harvest-More Than Twice per Year and Solid-Set Sprinkler System, Greater than 60 Acres

Scenario Description:

Combination of removal of loose, dry layer of manure from a confined animal operation more than twice per year in addition to a regular annual manure clean-out and 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 animal operation conducts a manure clean-out once per year and 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:

In addition to the annual manure clean-out, four additional manure harvesting efforts remove the dry, loose manure layer from the pens and working alleys. Each manure harvesting will leave a 1-2 inch layer of well-compacted manure above the mineral soil and a smooth pen/alley surface to deter ponding of moisture. A solid-set dust control sprinkler system is also 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: $777,360.00 **Scenario Cost/Unit:** $7,773.60

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	$60.82	1200	$72,984.00
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	$58.44	1200	$70,128.00
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
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	2400	$45,360.00

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #19 - Manure Harvest-More Than Twice per Year and Truck-Mounted Mobile Sprinkler System

Scenario Description:

Combination of removal of loose, dry layer of manure from a confined animal operation more than twice per year in addition to a regular annual manure clean-out and 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 animal operation conducts a manure clean-out once per year and 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:

In addition to the annual manure clean-out, four additional manure harvesting efforts remove the dry, loose manure layer from the pens and working alleys. Each manure harvesting will leave a 1-2 inch layer of well-compacted manure above the mineral soil and a smooth pen/alley surface to deter ponding of moisture. 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 Alleys

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $4,246.27 **Scenario Cost/Unit:** $4,246.27

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
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	$58.44	12	$701.28
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	365	$2,361.55
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$60.82	12	$729.84
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	24	$453.60

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #20 - Solid-Set Sprinkler System Labor

Scenario Description:

Labor for the active management of an installed solid-set sprinkler system for dust control at a confined animal operation to improve the system performance. The specific resource concern to be addressed is "Emissions of Particulate Matter (PM) and PM Precursors".

Before Situation:

A solid-set dust control sprinkler system is installed. However, the confined animal operation is not actively managing the sprinkler system to optimize performance.

After Situation:

In subsequent years following the installation of a solid-set dust control sprinkler system, the confined animal operation provides appropriate labor to actively manage the sprinkler system, thereby improving the reliability and effectiveness of the system.

Scenario Feature Measure: Pen Surface Area, Including Working Alleys

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $54.65 **Scenario Cost/Unit:** $54.65

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	$19.06	2	$38.12
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	$33.06	0.5	$16.53

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #21 - Manure Harvest-1 per Year and Solid-Set Sprinkler System Labor

Scenario Description:

Combination of removal of loose, dry layer of manure from a confined animal operation once per year in addition to a regular annual manure clean-out and labor for the active management of an installed solid-set sprinkler system for dust control at a confined animal operation to improve the system performance. The specific resource concern to be addressed is "Emissions of Particulate Matter (PM) and PM Precursors".

Before Situation:

The confined animal operation conducts a manure clean-out once per year and a solid-set dust control sprinkler system is installed. However, the confined animal operation is not actively managing the sprinkler system to optimize performance.

After Situation:

In addition to the annual manure clean-out, an additional manure harvesting removes the dry, loose manure layer from the pens and working alleys. This manure harvesting will leave a 1-2 inch layer of well-compacted manure above the mineral soil and a smooth pen/alley surface to deter ponding of moisture. In subsequent years following the installation of a solid-set dust control sprinkler system, the confined animal operation provides appropriate labor to actively manage the sprinkler system, thereby improving the reliability and effectiveness of the system.

Scenario Feature Measure: Pen Surface Area, Including Working Alleys

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $525.83 **Scenario Cost/Unit:** $525.83

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	$60.82	3	$182.46
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	$58.44	3	$175.32
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	6	$113.40
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	$33.06	0.5	$16.53
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	2	$38.12

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #22 - Manure Harvest-2 per Year and Solid-Set Sprinkler System Labor

Scenario Description:

Combination of removal of loose, dry layer of manure from a confined animal operation twice per year in addition to a regular annual manure clean-out and labor for the active management of an installed solid-set sprinkler system for dust control at a confined animal operation to improve the system performance. The specific resource concern to be addressed is "Emissions of Particulate Matter (PM) and PM Precursors".

Before Situation:

The confined animal operation conducts a manure clean-out once per year and a solid-set dust control sprinkler system is installed. However, the confined animal operation is not actively managing the sprinkler system to optimize performance.

After Situation:

In addition to the annual manure clean-out, two additional manure harvesting efforts remove the dry, loose manure layer from the pens and working alleys. Each manure harvesting will leave a 1-2 inch layer of well-compacted manure above the mineral soil and a smooth pen/alley surface to deter ponding of moisture. In subsequent years following the installation of a solid-set dust control sprinkler system, the confined animal operation provides appropriate labor to actively manage the sprinkler system, thereby improving the reliability and effectiveness of the system.

Scenario Feature Measure: Pen Surface Area, Including Working Alleys

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $997.01 **Scenario Cost/Unit:** $997.01

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	$60.82	6	$364.92
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	$58.44	6	$350.64
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	12	$226.80
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	$19.06	2	$38.12
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	$33.06	0.5	$16.53

Practice: 375 - Dust Control from Animal Activity on Open Lot Surfaces

Scenario: #23 - Manure Harvest-More Than Twice per Year and Solid-Set Sprinkler System Labor

Scenario Description:

Combination of removal of loose, dry layer of manure from a confined animal operation more than twice per year in addition to a regular annual manure clean-out and labor for the active management of an installed solid-set sprinkler system for dust control at a confined animal operation to improve the system performance. The specific resource concern to be addressed is "Emissions of Particulate Matter (PM) and PM Precursors".

Before Situation:

The confined animal operation conducts a manure clean-out once per year and a solid-set dust control sprinkler system is installed. However, the confined animal operation is not actively managing the sprinkler system to optimize performance.

After Situation:

In addition to the annual manure clean-out, four additional manure harvesting efforts remove the dry, loose manure layer from the pens and working alleys. Each manure harvesting will leave a 1-2 inch layer of well-compacted manure above the mineral soil and a smooth pen/alley surface to deter ponding of moisture. In subsequent years following the installation of a solid-set dust control sprinkler system, the confined animal operation provides appropriate labor to actively manage the sprinkler system, thereby improving the reliability and effectiveness of the system.

Scenario Feature Measure: Pen Surface Area, Including Working Alleys

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $1,939.37 **Scenario Cost/Unit:** $1,939.37

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	$60.82	12	$729.84
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	$58.44	12	$701.28
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	$33.06	0.5	$16.53
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	24	$453.60
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	$19.06	2	$38.12

Practice: 378 - Pond

Scenario: #1 - Excavated Pit

Scenario Description:

A low-hazard water impoundment structure on agricultural lands to improve water quality and to provide water for livestock, fish and wildlife, recreation, fire control, crop and orchard irrigation, 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.

Before Situation:

Area exists where water could naturally pool or run off to create a pond for livestock, wildlife, fire control or irrigation. 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, 516, 521A, 533, 614, 587, 396.

Scenario Feature Measure: Excavated Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 3,100

Scenario Cost: $10,586.40 **Scenario Cost/Unit:** $3.41

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
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	$58.44	40	$2,337.60
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$138.48	40	$5,539.20
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	$26.75	80	$2,140.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 378 - Pond

Scenario: #1 - Excavated Pit

Scenario Description:

A low-hazard water impoundment structure on agricultural lands to improve water quality and to provide water for livestock, fish and wildlife, recreation, fire control, crop and orchard irrigation, 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.

Before Situation:

Area exists where water could naturally pool or run off to create a pond for livestock, wildlife, fire control or irrigation. 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, 516, 521A, 533, 614, 587, 396.

Scenario Feature Measure: Excavated Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 3,100

Scenario Cost: $12,399.50 **Scenario Cost/Unit:** $4.00

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	$138.48	40	$5,539.20
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	$58.44	40	$2,337.60
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.93	310	$1,528.30
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	$26.75	80	$2,140.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	3	$854.40

Practice: 378 - Pond

Scenario: #2 - Embankment Pond without Pipe

Scenario Description:

A water impoundment structure on agricultural land to improve water quality or to provide water for livestock, fish and wildlife, fire control, and other related uses. 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.

Before Situation:

Area exists where water could naturally pool or run off to create a pond for livestock, wildlife, and fire control. 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 8933 cubic yards (200 foot long dam; 20 foot tall) to create an embankment. Cut-off trench using 307 cubic yards (200-foot long with side slopes of 2:1)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, 516, 521A, 533, 614, 587, 396.

Scenario Feature Measure: Embankment Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 9,240

Scenario Cost: $37,214.54 **Scenario Cost/Unit:** $4.03

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	$60.82	231	$14,049.42
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$138.48	73.5	$10,178.28
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	$17.26	231	$3,987.06
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	$26.75	304.5	$8,145.38
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	3	$854.40

Practice: 378 - Pond

Scenario: #3 - Embankment Pond with Pipe

Scenario Description:

A water impoundment structure on agricultural land to improve water quality or to provide water for livestock, fish and wildlife, fire control, and other related uses. 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.

Before Situation:

Area exists where water could naturally pool or run off to create a pond for livestock, wildlife, and fire control. 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 8933 cubic yards (200 foot long dam; 20 foot tall) to create an embankment. Cut-off trench using 307 cubic yards (200-foot long with side slopes of 2:1)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. Vegetation will be completed under critical area planting (342). Other associated practices include 382, 516, 521A, 533, 614, 587, 396.

Scenario Feature Measure: Embankment Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 9,240

Scenario Cost: $55,877.97 **Scenario Cost/Unit:** $6.05

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	$60.82	231	$14,049.42
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	43.33	$249.15
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	$401.46	1	$401.46
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	10	$623.80
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$138.48	73.5	$10,178.28
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	$17.26	231	$3,987.06
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	$2.35	25.83	$60.70
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	$26.75	304.5	$8,145.38
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	$27.30	250	$6,825.00
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	$19.06	256	$4,879.36

Labor

Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	10	$189.00

Materials

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
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$27.99	5.85	$163.74
Pipe, CMP, 30", 16 Gauge	1742	30" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$29.10	15	$436.50
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	$2.44	258	$629.52
Pipe, CMP, 18", 16 Gauge	1743	18" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$18.19	165	$3,001.35

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	3	$854.40
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	$78.65	2	$157.30

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #1 - 1 row windbreak, shrubs, hand planted

Scenario Description:

Single 500 foot row of shrubs for wind protection, wildlife habitat, or snow management. Shrubs planted by hand 4 feet apart. This practice is typically applied to crop, pasture or range lands. Resource Concerns to be addressed may include: Soil Erosion (wind); Excess/Insufficient Water (drifted snow, inefficient moisture management); Water Quality Degradation (excess nutrients in 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, livestock paddock, feedlot or farmstead needing protection from wind, additional wildlife food and cover, or management of snow deposition

After Situation:

Wind velocity suitably reduced to reduce soil erosion, or to manage snow deposition. Additional wildlife food and cover.

Scenario Feature Measure: length of windbreak row(s)

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $1,055.75 **Scenario Cost/Unit:** $2.11

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	$41.41	2	$82.82
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
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	334	$784.90
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	$33.06	2	$66.12
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	$19.06	2	$38.12
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	125	$58.75
Wire flags	1586	Small vinyl flags attached to wire stakes, typically, 36" in length, for marking tree rows	Each	$0.09	20	$1.80

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #2 - 1 row windbreak, trees, hand planted

Scenario Description:

Single 500 foot row of conifer tree seedlings for wind protection, wildlife habitat, or snow management. Trees planted by hand 10 feet apart. This practice is typically applied to crop, pasture or range lands. Resource Concerns to be addressed may include: Soil Erosion (wind); Excess/Insufficient Water (drifted snow, inefficient moisture management); Water Quality Degradation (excess nutrients in 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, livestock paddock, feedlot or farmstead needing protection from wind, additional wildlife food and cover, or management of snow deposition

After Situation:

Wind velocity suitably reduced to reduce soil erosion, or to manage snow deposition. Additional wildlife food and cover.

Scenario Feature Measure: length of windbreak row(s)

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $920.35 **Scenario Cost/Unit:** $1.84

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	$2.35	334	$784.90
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	1	$41.41
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	1	$11.62
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	$33.06	1	$33.06
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	1	$19.06
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	50	$28.50
Wire flags	1586	Small vinyl flags attached to wire stakes, typically, 36" in length, for marking tree rows	Each	$0.09	20	$1.80

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #3 - 2-row windbreak, shrubs, machine planted

Scenario Description:

Two 500 foot 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. 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.

Scenario Feature Measure: length of windbreak row(s)

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $1,833.70 **Scenario Cost/Unit:** $3.67

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	$2.35	667	$1,567.45
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	$41.41	1	$41.41
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$26.12	1	$26.12
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	$19.06	1	$19.06
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	1	$18.90
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	$33.06	1	$33.06
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: #4 - 2-row windbreak, trees, machine planted

Scenario Description:

Two 500 foot rows of hardwood trees 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. 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 screening.

Scenario Feature Measure: length of windbreak row(s)

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $1,908.35 **Scenario Cost/Unit:** $3.82

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	$2.35	667	$1,567.45
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
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	2	$82.82
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$26.12	2	$52.24
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	$19.06	2	$38.12
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	2	$37.80
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	$33.06	2	$66.12
Materials						
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.47	100	$47.00
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: #5 - 2-row windbreak, trees, machine planted, with tubes

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.

Scenario Feature Measure: length of windbreak row(s)

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $2,358.85 **Scenario Cost/Unit:** $4.72

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	$2.35	667	$1,567.45
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
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$26.12	2	$52.24
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	2	$82.82
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	$33.06	2	$66.12
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	$19.06	2	$38.12
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	2	$37.80
Materials						
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.47	100	$47.00
Wire flags	1586	Small vinyl flags attached to wire stakes, typically, 36" in length, for marking tree rows	Each	$0.09	40	$3.60
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	150	$234.00
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
Cable ties, plastic	1575	Plastic cable ties (typ. 8-12") to assist in securing items. Materials only.	Each	$0.05	150	$7.50

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #6 - 3 or more row windbreak, shrub, machine planted

Scenario Description:

Three or more 500 foot rows of shrubs for wind protection, energy conservation, wildlife habitat, air quality, snow management. Shrubs planted with a tree planting machine, 4 feet apart in the row with rows 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 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: $2,967.10 **Scenario Cost/Unit:** $5.93

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	$26.12	3	$78.36
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	3	$124.23
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	3	$19.80
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	1000	$2,350.00
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	3	$56.70
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	$19.06	3	$57.18
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$33.06	3	$99.18
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	375	$176.25
Wire flags	1586	Small vinyl flags attached to wire stakes, typically, 36" in length, for marking tree rows	Each	$0.09	60	$5.40

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #7 - 3 or more tree rows machine planted windbreak

Scenario Description:

Three or more 500 foot rows of trees for wind protection, energy conservation, wildlife habitat, air quality, snow management or to provide a visual screen. The outside rows are conifers the inside row(s) are hardwoods. Trees 10 feet apart with rows 16 feet apart, planted with a tree planting machine. Herbivores are not expected to browse planted seedlings, so tree shelters are 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 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: $2,686.60 **Scenario Cost/Unit:** $5.37

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	$41.41	2	$82.82
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$26.12	2	$52.24
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	1000	$2,350.00
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	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	$19.06	2	$38.12
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	$33.06	2	$66.12
Materials						
Wire flags	1586	Small vinyl flags attached to wire stakes, typically, 36" in length, for marking tree rows	Each	$0.09	40	$3.60
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.47	50	$23.50
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	100	$57.00

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #8 - 3 or more row windbreak, trees, machine planted, with tubes

Scenario Description:

Three or more 500 foot rows of hardwood trees 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.

Scenario Feature Measure: length of windbreak row(s)

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $3,271.20 **Scenario Cost/Unit:** $6.54

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	2	$13.20
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	1000	$2,350.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	2	$82.82
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$26.12	2	$52.24
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	2	$37.80
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	$19.06	2	$38.12
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	$33.06	2	$66.12
Materials						
Tree shelter, solid tube type, 5" x 48"	1571	5" x 48" tree tube for protection from animal damage. Materials only.	Each	$2.09	150	$313.50
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	150	$234.00
Wire flags	1586	Small vinyl flags attached to wire stakes, typically, 36" in length, for marking tree rows	Each	$0.09	60	$5.40
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.47	150	$70.50
Cable ties, plastic	1575	Plastic cable ties (typ. 8-12") to assist in securing items. Materials only.	Each	$0.05	150	$7.50

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #9 - 2-row windbreak, trees, machine planted, no fabric

Scenario Description:

Two 500 foot rows of hardwood trees 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. 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 screening.

Scenario Feature Measure: length of windbreak row(s)

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $340.90 **Scenario Cost/Unit:** $0.68

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	2	$13.20
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$26.12	2	$52.24
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	2	$82.82
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	$33.06	2	$66.12
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	2	$37.80
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	$19.06	2	$38.12
Materials						
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.47	100	$47.00
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: 381 - Silvopasture

Scenario: #1 - Commercial Thin & Est NTV Grasss

Scenario Description:

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 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. Since thinning is done commercially, no harvesting costs are incurred. 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: $5,740.84 **Scenario Cost/Unit:** $574.08

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	$22.51	10	$225.10
Chemical, ground application	948	Chemical 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	$10.70	10	$107.00
Cultipacking	1100	Includes equipment, power unit and labor costs.	Acre	$8.94	10	$89.40
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$11.74	10	$117.40
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$7.18	10	$71.80
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	$108.13	8	$865.04
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
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
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.56	500	$280.00
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	$0.65	500	$325.00

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: 381 - Silvopasture

Scenario: #2 - Commercial thinning & establishment of introduced grasses.

Scenario Description:

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 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. Since thinning is done commercially, no harvesting costs are incurred. 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: $1,042.10 **Scenario Cost/Unit:** $104.21

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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
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
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	$0.65	500	$325.00

Practice: 381 - Silvopasture

Scenario: #3 - Non-commercial thinning & establishment of 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: $2,755.40 **Scenario Cost/Unit:** $275.54

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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	$0.65	500	$325.00
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
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 & establishment of 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: $1,042.10 **Scenario Cost/Unit:** $104.21

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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	$0.65	500	$325.00
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	10	$496.50
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	10	$156.30
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: 381 - Silvopasture

Scenario: #5 - Native grasses established in existing tree stand

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: $2,691.10 **Scenario Cost/Unit:** $269.11

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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	$0.65	500	$325.00
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
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: 381 - Silvopasture

Scenario: #6 - Introduced grasses established into existing tree stand

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: $481.30 **Scenario Cost/Unit:** $48.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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	$0.65	500	$325.00

Practice: 381 - Silvopasture

Scenario: #7 - Tree and native grass establishment

Scenario Description:

Establishment of trees and native grasses into a field that contains neither suitable forage nor suitable tree cover for a silvopasture system.

Before Situation:

10-acre old field without suitable forage for livestock nor tree cover. 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, and Inadequate Livestock Shelter.

After Situation:

The site will be prepared using chemical and mechanical means, a mix of native warm-season grasses will be established, and then 200 hardwood trees per acre will be planted, providing forage 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: $481.30 **Scenario Cost/Unit:** $48.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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	$0.65	500	$325.00
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

Practice: 381 - Silvopasture

Scenario: #8 - Tree and introduced grass establishment

Scenario Description:

Establishment of trees and introduced grasses and legumes into a field that contains neither suitable forage nor suitable tree cover for a silvopasture system.

Before Situation:

10-acre old field without suitable forage for livestock nor tree cover. 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, and Inadequate Livestock Shelter.

After Situation:

The site will be prepared using chemical and mechanical means, a mix of cool-season grasses and legumes will be established, and then 200 pine trees per acre will be planted, providing forage 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: $977.80 **Scenario Cost/Unit:** $97.78

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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	$0.65	500	$325.00
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
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

Practice: 381 - Silvopasture

Scenario: #9 - Tree establishment

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: $1,282.68 **Scenario Cost/Unit:** $128.27

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	$7.18	10	$71.80
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$26.12	4	$104.48
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
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	$0.45	2000	$900.00

Practice: 382 - Fence

Scenario: #1 - Multi Strand Barbed/Smooth Wire

Scenario Description:

Multi-strand, Barbed or Smooth Wire - 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. Constructed using fencing materials rather than a pre-manufactured gate.

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 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, 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: 1,320

Scenario Cost: $2,787.41 **Scenario Cost/Unit:** $2.11

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	$36.52	5	$182.60
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.21	5	$41.05
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.03	5	$115.15
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	$19.76	33	$652.08
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.01	5	$110.05
Materials						
Post, Steel T, 1.33 lbs, 6'	15	Steel Post, Studded 6' - 1.33 lb. Includes materials and shipping only.	Each	$6.62	90	$595.80
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	20	$124.00
Post, Wood, CCA treated, 6" x 8'	12	Wood Post, End 6" X 8', CCA Treated. Includes materials and shipping only.	Each	$14.96	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	4	$282.12
Gate, Pipe, 12'	1057	6 rail tube gate, 16 gauge. Includes materials and shipping only.	Each	$164.75	1	$164.75
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	500	$20.00
Fence, Wire Assembly, Barbed Wire	30	Brace pins, battens, clips, staples. Includes materials and shipping only.	Foot	$0.16	1320	$211.20
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	$168.93	1	$168.93

Practice: 382 - Fence

Scenario: #2 - Multi Strand Barbed or smooth Wire Difficult terrrain

Scenario Description:

Barbed, Smooth ,or Woven Wire Difficult Installation - Installation of fence in difficult situations 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. Constructed using fencing materials rather than a pre-manufactured gate.

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 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: 1,320

Scenario Cost: $3,593.36 **Scenario Cost/Unit:** $2.72

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	$8.21	10	$82.10
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.18	1	$6.18
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.03	10	$230.30
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$36.52	5	$182.60
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.01	10	$220.10
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	$19.76	60	$1,185.60
Materials						
Fence, Wire Assembly, Barbed Wire	30	Brace pins, battens, clips, staples. Includes materials and shipping only.	Foot	$0.16	1320	$211.20
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	4	$282.12
Gate, Pipe, 12'	1057	6 rail tube gate, 16 gauge. Includes materials and shipping only.	Each	$164.75	1	$164.75
Post, Steel T, 1.33 lbs, 6'	15	Steel Post, Studded 6' - 1.33 lb. Includes materials and shipping only.	Each	$6.62	90	$595.80
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	500	$20.00
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	20	$124.00
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	$168.93	1	$168.93

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 area, improved water quality, reduction of noxious and invasive weeds. Woven wire is typically used in applications with sheep, goats, hogs, wildlife exclusion, shelterbelt/tree protection, etc. Constructed using fencing materials rather than a pre-manufactured gate.

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, 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... Woven wire is typically used in applications with sheep, goats, hogs, wildlife exclusion, shelterbelt/tree protection, etc.

Scenario Feature Measure: Length of Fence

Scenario Unit: Feet

Scenario Typical Size: 1,320

Scenario Cost: $3,719.23 **Scenario Cost/Unit:** $2.82

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	$36.52	5	$182.60
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.03	5	$115.15
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.21	5	$41.05
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.76	45	$889.20
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.01	5	$110.05
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	2	$141.06
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	20	$124.00
Post, Steel T, 1.33 lbs, 6'	15	Steel Post, Studded 6' - 1.33 lb. Includes materials and shipping only.	Each	$6.62	90	$595.80
Fence, Wire Assembly, Woven Wire	35	Brace pins, twist sticks, staples. Includes materials and shipping only.	Foot	$0.12	1320	$158.40
Fence, Wire Assembly, Barbed Wire	30	Brace pins, battens, clips, staples. Includes materials and shipping only.	Foot	$0.16	1320	$211.20
Wire, Woven, Galvanized, 12.5 Gauge, 32"	3	Galvanized 12.5 gauge, 32" - 330' roll. Includes materials and shipping only.	Each	$174.34	4	$697.36
Gate, Pipe, 12'	1057	6 rail tube gate, 16 gauge. Includes materials and shipping only.	Each	$164.75	1	$164.75
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	$168.93	1	$168.93

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 area, improved water quality, reduction of noxious and invasive weeds.

Before Situation:

On grazinglands 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: 1,320

Scenario Cost: $2,231.58 **Scenario Cost/Unit:** $1.69

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	$8.21	3	$24.63
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$36.52	2	$73.04
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.03	3	$69.09
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	$19.76	20	$395.20
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.01	3	$66.03
Materials						
Gate, Pipe, 10'	1056	6 rail tube gate, 16 gauge. Includes materials and shipping only.	Each	$145.94	1	$145.94
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, 3-4" x 7'	9	Wood Post, Line 3-4" X 7', CCA Treated. Includes materials and shipping only.	Each	$6.20	2	$12.40
Post, Fiberglass, ⅞" X 6'	18	Fiberglass line post, ⅞" diameter X 6' length. Includes materials and shipping only.	Each	$9.82	60	$589.20
Electric, Energizer, 6 joule	29	Electric, Energizer, 6 joule for electric fence. Includes materials and shipping only.	Each	$321.21	1	$321.21
Electric, Ground Rod Clamps	21	Electric, Ground Rod Clamps for electric fence. Includes materials and shipping only.	Each	$1.79	6	$10.74
Electric, Ground Rods	20	Electric, Ground Rod for electric fence. Includes materials and shipping only.	Each	$10.41	6	$62.46
Electric, Insulated cable	23	Electric, Insulated cable for electric fence. Typically in spools of 100 to 200 feet. Includes materials and shipping only.	Each	$29.70	1	$29.70
Electric, Lightening Diverter	22	Electric, Lightening diverter for electric fence. Includes materials and shipping only.	Each	$10.17	1	$10.17

Materials

Electric, Tester	26	Electric, Tester for electric fence. Includes materials and shipping only.	Each	$40.76	1	$40.76
Fence, Wire Assembly, High Tensile, Electric, 2 Strand	33	Brace pins, springs, strainers, battens, clips, crimp sleeves, staples, insulators, wrap around sleeves. Includes materials and shipping only.	Foot	$0.07	1320	$92.40

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	$168.93	1	$168.93

Practice: 382 - Fence

Scenario: #5 - Confinement

Scenario Description:

Installation of fence reduces resource concerns associated with livestock feeding operations and/or wildlife access to prevent conflicts between humans and livestock or wildlife species.

Before Situation:

Wildlife negatively impacting sensitive areas such as riparian areas, windbreaks and shelterbelts or feed storage. Disease transmission from wildlife posses a significant health risk to domestic animals.

After Situation:

Installation of fence reduces resource concerns associated with livestock and/or wildlife access and prevents conflicts between humans and threatened, endangered or sensitive species. Fence includes posts, wire, fasteners, gates, etc...

Scenario Feature Measure: Length of Fence

Scenario Unit: Feet

Scenario Typical Size: 1,320

Scenario Cost: $5,616.71 **Scenario Cost/Unit:** $4.26

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	$23.03	5	$115.15
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$36.52	4	$146.08
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.21	5	$41.05
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.01	5	$110.05
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.76	60	$1,185.60
Materials						
Wire, Woven, Wildlife, 96"	6	High Tensile 12.5 gauge, 96" - 330' roll. Includes materials and shipping only.	Each	$451.18	4	$1,804.72
Gate, Game, 8' High X 16'	1086	16' Wide Game Gate (8' Tall). Includes materials and shipping only.	Each	$416.15	1	$416.15
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, 6" x 12-14'	13	Wood Post, Line/End 6" X 12-14', CCA Treated. Includes materials and shipping only.	Each	$26.73	20	$534.60
Post, Steel T, 1.33 lbs, 10'	17	Steel Post, Studded 10' - 1.33 lb. Includes materials and shipping only.	Each	$10.83	90	$974.70
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	$168.93	1	$168.93

Practice: 382 - Fence

Scenario: #6 - Safety

Scenario Description:

A barrier (fence) implemented on an NRCS constructed waste storage system according to engineering design to exclude human access. Permanently installed fence built to (1) keep humans away from waste ponds & lagoons, or (2) to protect sensitive areas (riparian areas, wetlands, springs, etc.) from heavy livestock pressure. Heavy grade fence materials and close post spacing required.

Before Situation:

Where a NRCS designed and constructed waste storage pond 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:

Humans and livestock are excluded from the waste storage pond for safety purposes by installing a fence around a waste holding pond. The fence would typically be 100 wide x 175 long with one gate and installed by a fencing contractor. Woven wire fence with one strand of barb wire on top with a gate. 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.Associated practices may include 614-Watering Facility, 516-Pipeline, 533-Pumping Plant, 342 - Critical Area Planting

Scenario Feature Measure: Length of Fence

Scenario Unit: Foot

Scenario Typical Size: 450

Scenario Cost: $2,304.43 **Scenario Cost/Unit:** $5.12

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	$8.21	12	$98.52
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$36.52	12	$438.24
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.03	12	$276.36
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$22.01	12	$264.12
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	$19.76	12	$237.12
Materials						
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	8	$49.60
Wire, Woven, Galvanized, 12.5 Gauge, 32"	3	Galvanized 12.5 gauge, 32" - 330' roll. Includes materials and shipping only.	Each	$174.34	1	$174.34
Post, Wood, CCA treated, 6" x 8'	12	Wood Post, End 6" X 8', CCA Treated. Includes materials and shipping only.	Each	$14.96	4	$59.84
Post, Steel T, 1.33 lbs, 6'	15	Steel Post, Studded 6' - 1.33 lb. Includes materials and shipping only.	Each	$6.62	45	$297.90
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
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	$168.93	2	$337.86

Practice: 382 - Fence

Scenario: #7 - Temporary

Scenario Description:

Electric - Installation of temporary 1-2 wire fence to 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 is only present when livestock are present, may be removed when grazing period is finished.

Before Situation:

On grazinglands 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. Existing fence on pasture boundaries will be utilized to tie in with the temporary elctric fence.

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... Single strand wire is commonly installed. Fence will be installed with wildlife friendly considerations. Associated practices may include 614-Watering Facility, 516-Pipeline, 533-Pumping Plant.

Scenario Feature Measure: length of fence

Scenario Unit: Foot

Scenario Typical Size: 1,320

Scenario Cost: $795.73 **Scenario Cost/Unit:** $0.60

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Electric, Energizer, Solar	27	Electric, Energizer, Solar for electric fence. Includes materials and shipping only.	Each	$316.48	1	$316.48
Post, Fiberglass, ⅞" X 6'	18	Fiberglass line post, ⅞" diameter X 6' length. Includes materials and shipping only.	Each	$9.82	44	$432.08
Wire, Polywire	8	Wire, Polywire for electric fence - 1,300 roll. Includes materials and shipping only.	Each	$47.17	1	$47.17

Practice: 383 - Fuel Break

Scenario: #1 - Sprouting Species - Mechanical

Scenario Description:

Fuel Break installation requires tree thinning, treating woody residue, and/or mowing on sprouting species such as Gambel oak. Thinning treatment is done with equipment, treating woody residue (piling/burning, crushing, or off-site removal) and mowing are mechanized. 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 and/or shrubs. 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 moderately to steeply sloped (1-30%), 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: $4,514.85 **Scenario Cost/Unit:** $1,128.71

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	$138.48	10	$1,384.80
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$143.05	8	$1,144.40
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$34.13	3	$102.39
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	2	$82.82
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	$63.26	4	$253.04
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	8	$151.20
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	$33.06	12	$396.72
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	$26.75	10	$267.50
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	3	$126.90
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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	$191.56	1	$191.56
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 - Nonsprouting Species - Mechanical

Scenario Description:

Fuel Break installation requires tree thinning, treating woody residue, pruning, and/or masticating on nonsprouting species such as pinon and juniper or mixed conifer stands. Thinning treatment is done with equipment or with chainsaws, any pruning is done by hand, treating woody residue (piling/burning, crushing, or off-site removal) and masticating are mechanized. 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 and/or shrubs. Overstocking creates conditions conducive to wildfire movement across the landscape, and severe loss/damage of the forest stand. Shrub and/or tree 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 moderately to steeply sloped (1-30%), 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 4 to 5 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 mmasticated down to less than 1 foot in height.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 4

Scenario Cost: $5,657.98 **Scenario Cost/Unit:** $1,414.50

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	$138.48	7	$969.36
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	2	$82.82
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	100	$701.00
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$143.05	5	$715.25
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	5	$94.50
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	$19.06	100	$1,906.00
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	$33.06	12	$396.72
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	$26.75	7	$187.25
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	$284.80	1	$284.80

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	$191.56	1	$191.56
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 - Hand Fuel Break

Scenario Description:

Fuel Break installation requires tree thinning, treating woody residue, and/or pruning. Thinning treatment, pruning, brush cutting and treating woody residue (piling/burning, chipping and/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 and/or brush. 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, chipping or removal of woody residue from tree cutting and pruning. FB 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: $5,606.46 **Scenario Cost/Unit:** $1,401.62

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	$7.01	40	$280.40
Brush Chipper, 6" capacity	938	Brush Chipper, 6" capacity, typically 35 HP. Includes chipper and power unit. Labor not included.	Hour	$24.61	80	$1,968.80
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	12	$496.92
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	$19.06	120	$2,287.20
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	$33.06	12	$396.72
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 included in the component price.	Dollar	$1.03	100	$103.00

Practice: 383 - Fuel Break

Scenario: #4 - Non ForestFuel Break

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: $647.48 **Scenario Cost/Unit:** $161.87

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	$41.41	2	$82.82
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$56.58	4	$226.32
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	$33.06	1	$33.06
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	2	$38.12
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	4	$75.60
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	$191.56	1	$191.56

Practice: 384 - Woody Residue Treatment

Scenario: #1 - Lop and Scatter, light

Scenario Description:

Treating an area of forest slash or following a juniper chaining to reduce hazardous fuels and the risk of insect and disease, improve organic matter and reduce erosion while improving water quality. Typically done by hand and light equipment. 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. Up to 100 trees and/or slash per acre needing treatment, or majority of small (less than 3 inches) material.

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: $2,208.32 **Scenario Cost/Unit:** $55.21

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	$41.41	8	$331.28
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	72	$504.72
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	$19.06	72	$1,372.32

Practice: 384 - Woody Residue Treatment

Scenario: #2 - Lop and Scatter, medium

Scenario Description:

Treating an area of forest slash or following a juniper chaining to reduce hazardous fuels and the risk of insect and disease, improve organic matter and reduce erosion while improving water quality. Typically done by hand and light equipment. 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. Up to 100-300 trees and/or slash per acre needing treatment, or majority of 3-6 inch material.

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: $3,668.24 **Scenario Cost/Unit:** $91.71

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	$7.01	128	$897.28
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	8	$331.28
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	128	$2,439.68

Practice: 384 - Woody Residue Treatment

Scenario: #3 - Lop and Scatter, heavy

Scenario Description:

Treating an area of forest slash or following a juniper chaining to reduce hazardous fuels and the risk of insect and disease, improve organic matter and reduce erosion while improving water quality. Typically done by hand and light equipment. 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. Greater than 300 trees and/or slash per acre needing treatment, or majority of greater than 6 inch material.

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: $5,545.28 **Scenario Cost/Unit:** $138.63

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	$41.41	8	$331.28
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	200	$1,402.00
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	$19.06	200	$3,812.00

Practice: 384 - Woody Residue Treatment

Scenario: #4 - Piling and Burning

Scenario Description:

Reducing woody waste created during forestry, agroforestry and horticultural activities by gathering, piling, and burning (under appropriate weather conditions) to remove piles to achieve management objectives. Does not include transport from property to a commercial facility. Resource concerns include reducing potential Excessive plant pest pressure, and Wildfire hazard from excessive biomass accumulation .

Before Situation:

Woody residue causes management issues including resource access, fire hazard and sites for harboring pests.

After Situation:

Fire and pest issues are reduced.

Scenario Feature Measure: Acres treated

Scenario Unit: Acres

Scenario Typical Size: 20

Scenario Cost: $3,231.90 **Scenario Cost/Unit:** $161.60

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	$7.01	40	$280.40
Log skidder	942	Equipment and power unit costs. Labor not included.	Hour	$143.05	10	$1,430.50
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	10	$189.00
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	$19.06	40	$762.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 384 - Woody Residue Treatment

Scenario: #5 - Chipping and hauling off-site

Scenario Description:

Reducing woody waste created during forestry, agroforestry and horticultural 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, and Wildfire hazard from excessive biomass accumulation .

Before Situation:

Woody residue causes management issues including resource access, fire hazard and sites for harboring pests.

After Situation:

Fire and pest issues are reduced. Air and energy resources are conserved.

Scenario Feature Measure: Acres treated

Scenario Unit: Acres

Scenario Typical Size: 20

Scenario Cost: $5,154.10 **Scenario Cost/Unit:** $257.71

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	$64.89	20	$1,297.80
Log skidder	942	Equipment and power unit costs. Labor not included.	Hour	$143.05	10	$1,430.50
Brush Chipper, 6" capacity	938	Brush Chipper, 6" capacity, typically 35 HP. Includes chipper and power unit. Labor not included.	Hour	$24.61	30	$738.30
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	10	$70.10
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	10	$189.00
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	$19.06	60	$1,143.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 384 - Woody Residue Treatment

Scenario: #6 - Forest Slash Treatment - Heavy

Scenario Description:

Treating an area of significant woody plant residues to reduce hazardous fuels and the risk of insect and disease, improve organic matter, decrease unwanted habitat, and reduce erosion while improving water quality. Slash is to be lopped/treated/crushed within a foot of the ground or moved off site to meet state fire hazard reduction standards. Typically heavy equipment are used such as masticators, mulchers, drum choppers, etc. Hand work with chainsaws are used on steep slopes. 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: $18,194.17 **Scenario Cost/Unit:** $454.85

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	$7.01	40	$280.40
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	40	$1,656.40
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$143.05	40	$5,722.00
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	$166.75	40	$6,670.00
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	$19.06	80	$1,524.80
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	80	$1,512.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77

Practice: 384 - Woody Residue Treatment

Scenario: #7 - 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: $16,430.00 **Scenario Cost/Unit:** $821.50

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	$98.63	40	$3,945.20
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	80	$560.80
Log skidder	942	Equipment and power unit costs. Labor not included.	Hour	$143.05	40	$5,722.00
Truck, dump, 8 CY	1401	Dump truck for moving bulk material. Typically capacity is 12 ton or 8 cubic yards. Includes equipment only.	Hour	$64.89	40	$2,595.60
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	80	$1,512.00
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	$19.06	80	$1,524.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 384 - Woody Residue Treatment

Scenario: #8 - Orchard/Vineyard prunings/removals

Scenario Description:

Slash created from orchard/vineyard prunings is chipped or mulched and removed from the site in order to accomplish one or more purposes: reducing wildfire fuels and 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 Wildfire hazard from excessive biomass accumulation and 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: $4,499.56 **Scenario Cost/Unit:** $224.98

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	$64.89	16	$1,038.24
Brush Chipper, 6" capacity	938	Brush Chipper, 6" capacity, typically 35 HP. Includes chipper and power unit. Labor not included.	Hour	$24.61	16	$393.76
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	16	$769.12
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	$19.06	48	$914.88
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	48	$907.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
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	$191.56	1	$191.56

Practice: 384 - Woody Residue Treatment

Scenario: #9 - Woody residue/silvicultural 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 with both hand (cutting, lopping, etc.) and mechanically (masticating, chipping, etc.). Typically done by hand and light equipment. 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: $9,609.76 **Scenario Cost/Unit:** $240.24

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	$7.01	20	$140.20
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	40	$1,656.40
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$143.05	40	$5,722.00
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	$19.06	60	$1,143.60
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	40	$756.00
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	$191.56	1	$191.56

Practice: 386 - Field Border

Scenario: #1 - Native, with Foregone Income

Scenario Description:

A strip of permanent vegetation established at the edge or around the perimeter of a field. 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.

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. Native grasses, legumes and forbs 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: $381.26 **Scenario Cost/Unit:** $381.26

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	$22.51	1	$22.51
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	1	$6.47
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$115.67	1	$115.67
Materials						
Three plus Species Mix, Warm Season, Native Perennial	2327	Native, warm season perennial grass. Includes material and shipping only.	Acre	$220.98	1	$220.98
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: 386 - Field Border

Scenario: #2 - Introduced, with Foregone Income

Scenario Description:

A strip of permanent vegetation established at the edge or around the perimeter of a field. 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 introduced species. The area of the field border is 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 will support and connect other buffer practices within and between fields. Introduced grasses and legumes 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: $209.93 **Scenario Cost/Unit:** $209.93

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	$22.51	1	$22.51
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	1	$6.47
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$115.67	1	$115.67
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	1	$15.63

Practice: 386 - Field Border

Scenario: #3 - Pollinator, with Foregone Income

Scenario Description:

A strip of permanent vegetation established at the edge or around the perimeter of a field. 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 pollinator friendly herbaceous species. The area of the field border is 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 will support and connect other buffer practices within and between fields. Pollinator herbaceous plantings will provide species 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: $421.57 **Scenario Cost/Unit:** $421.57

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	$22.51	1	$22.51
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	1	$6.47
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$115.67	1	$115.67
Materials						
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	1	$261.29
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: 386 - Field Border

Scenario: #4 - Trees, with Foregone Income

Scenario Description:

A strip of permanent vegetation and trees established at the edge or around the perimeter of a field. 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 herbaceous and woody species. The area of the field border is 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 will support and connect other buffer practices within and between fields. Herbaceous plantings will be established to meet Field Border specifications and in addition trees 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. Tree species selected shall 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: $262.95 **Scenario Cost/Unit:** $262.95

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	$6.47	1	$6.47
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	1	$11.62
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	1	$22.51
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$115.67	1	$115.67
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	$19.06	1	$19.06
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	135	$47.25
Introduced, cool season perennial grass. Includes material and shipping only.	2318	Introduced, cool season perennial grass. Includes material and shipping only.	Acre	$24.74	1	$24.74
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: 386 - Field Border

Scenario: #5 - Organic Seed, with Foregone Income

Scenario Description:

A strip of permanent vegetation established at the edge or around the perimeter of a field. 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 organic seed for herbaceous species. The area of the field border is 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 will support and connect other buffer practices while creating a buffer between organic systems and conventional cropping systems. Organic grasses and legumes 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. Species selected shall 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: $298.94 **Scenario Cost/Unit:** $298.94

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	$22.51	1	$22.51
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$17.50	1	$17.50
Site Preparation, Mechanical	944	Aerator, rolling drum chopper, etc. Includes equipment, power unit and labor costs.	Acre	$73.64	1	$73.64
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$115.67	1	$115.67
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: 386 - Field Border

Scenario: #6 - Native

Scenario Description:

A strip of permanent vegetation established at the edge or around the perimeter of a field. 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.

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. Native grasses, legumes and forbs 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: $265.59 **Scenario Cost/Unit:** $265.59

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	$22.51	1	$22.51
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	1	$6.47
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
Three plus Species Mix, Warm Season, Native Perennial	2327	Native, warm season perennial grass. Includes material and shipping only.	Acre	$220.98	1	$220.98

Practice: 386 - Field Border

Scenario: #7 - Introduced

Scenario Description:

A strip of permanent vegetation established at the edge or around the perimeter of a field. 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 introduced species. The area of the field border is 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 will support and connect other buffer practices within and between fields. Introduced grasses and legumes 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: $127.66 **Scenario Cost/Unit:** $127.66

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	$22.51	1	$22.51
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	1	$6.47
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	$0.68	30	$20.40
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	$0.65	20	$13.00
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	1	$15.63
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: 386 - Field Border

Scenario: #8 - Pollinator

Scenario Description:

A strip of permanent vegetation established at the edge or around the perimeter of a field. 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 pollinator friendly species. The area of the field border is 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 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: $305.90 **Scenario Cost/Unit:** $305.90

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	$6.47	1	$6.47
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	1	$22.51
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
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	1	$261.29

Practice: 386 - Field Border

Scenario: #9 - Trees

Scenario Description:

A strip of permanent vegetation and trees established at the edge or around the perimeter of a field. 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 herbaceous and woody species. The area of the field border is 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 will support and connect other buffer practices within and between fields. Herbaceous plantings will be established to meet Field Border specifications and in addition trees 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. Tree species selected shall 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: $147.28 **Scenario Cost/Unit:** $147.28

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	1	$11.62
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	1	$6.47
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	1	$22.51
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	1	$19.06
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	$15.63	1	$15.63
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	135	$47.25
Introduced, cool season perennial grass. Includes material and shipping only.	2318	Introduced, cool season perennial grass. Includes material and shipping only.	Acre	$24.74	1	$24.74

Practice: 386 - Field Border

Scenario: #10 - Organic Seed

Scenario Description:

A strip of permanent vegetation established at the edge or around the perimeter of a field. 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 organic seed for herbaceous species. The area of the field border is 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 will support and connect other buffer practices while creating a buffer between organic systems and conventional cropping systems. Organic grasses and legumes 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. Species selected shall 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: $183.27 **Scenario Cost/Unit:** $183.27

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	$17.50	1	$17.50
Site Preparation, Mechanical	944	Aerator, rolling drum chopper, etc. Includes equipment, power unit and labor costs.	Acre	$73.64	1	$73.64
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	1	$22.51
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: 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: $1,762.57 **Scenario Cost/Unit:** $3.00

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	$2.35	587	$1,379.45
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	$191.56	2	$383.12

Practice: 390 - Riparian Herbaceous Cover

Scenario: #1 - Aquatic Wildlife

Scenario Description:

Aquatic Wildlife: This scenario addresses inadequate herbaceous plant community function or diversity within the specific transitional zone between terrestrial and aquatic habitats 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. This scenario applies to work not covered under NRCS Conservation Practice Range Planting (528), Forage and Biomass Planting (512), Critical Area Planting (342), Filter Strip (393), Restoration and Management of Rare and Declining Habitats (643), Streambank and Shoreline Protection (580), Vegetated Treatment Area (635), Wetland Enhancement (659), or Wetland Restoration (657). This practice can be used nation wide. The typical setting for this scenario 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. Where the establishment of a diverse riparian herbaceous plant community is desired, an adapted mix of grasses, sedges, rushes, ferns, legumes, and/or forbs tolerant to the site conditions will be planted. Grasses such as prairie cordgrass (Spartina pectinata), sedges, rushes, and/or ferns will be planted using plugs. Additional site adapted species of grasses, legumes, and/or forbs may be added by broadcast and/or no-till or range drill seeding methods as necessary to accomplish the intended purpose(s). Where chemical control of undesirable vegetation, including invasives, is required to reduce competition for the desired plant community the Herbaceous Weed Control (315) practice should be used. Seedbed preparation may require LIGHT TILLAGE (disking). WHEN POLLINATOR HABITAT IS A CONSIDERATION: Include 5-10 adapted forb species that bloom sequentially throughout the growing season where feasible. To address the high diversity of riparian plant communities and their adjacent stream types that exist from the tropics to the tundra, and the deserts, prairies, mountains, and lowlands across the various regions and/or MLRA's, up to 20 adapted riparian plant community-specific scenarios may be required.

Before Situation:

The riparian zone, the specific area between terrestrial and aquatic habitats, 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 and 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. Existing conditions often require suppression or eradication of current vegetation by conventional mechanical or chemical (Herbaceous Weed Control (315)) methods to ensure establishment success of the new planting. Soil quality may be reduced due to compaction and may require light tillage to prepare a proper seedbed.

After Situation:

The riparian zone, the transitional zone between the terrestrial and aquatic habitats, is established to an adapted, diverse vegetative plant community and is under close management to insure 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: $1,497.83 **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	$11.74	1	$11.74
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	1	$22.51
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$60.82	1	$60.82
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	40	$762.40

Labor

Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	2	$37.80

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	300	$411.00

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	$191.56	1	$191.56

Practice: 390 - Riparian Herbaceous Cover

Scenario: #2 - Plugging and Seeding

Scenario Description:

Plugging: This scenario addresses inadequate herbaceous plant community function or diversity within the specific transitional zone between terrestrial and aquatic habitats 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. This scenario applies to work not covered under NRCS Conservation Practice Range Planting (528), Forage and Biomass Planting (512), Critical Area Planting (342), Filter Strip (393), Restoration and Management of Rare and Declining Habitats (643), Streambank and Shoreline Protection (580), Vegetated Treatment Area (635), Wetland Enhancement (659), or Wetland Restoration (657). This practice can be used nation wide. The typical setting for this scenario 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 proper function and/or adequate habitat. Where the establishment of a diverse riparian herbaceous plant community is desired, an adapted mix of grasses, sedges, rushes, ferns, legumes, and/or forbs tolerant to the site conditions will be planted. Grasses such as prairie cordgrass (Spartina pectinata), sedges, rushes, and/or ferns will be planted using plugs. Additional site adapted species of grasses, legumes, and/or forbs may be added by broadcast and/or no-till or range drill seeding methods as necessary to accomplish the intended purpose(s). Where chemical control of undesirable vegetation, including invasives, is required to reduce competition for the desired plant community the Herbaceous Weed Control (315) practice should be used. Seedbed preparation may require LIGHT TILLAGE (disking). WHEN POLLINATOR HABITAT IS A CONSIDERATION: Include 5-10 adapted forb species that bloom sequentially throughout the growing season where feasible. To address the high diversity of riparian plant communities and their adjacent stream types that exist from the tropics to the tundra, and the deserts, prairies, mountains, and lowlands across the various regions and/or MLRA's, up to 20 adapted riparian plant community-specific scenarios may be required

Before Situation:

The riparian zone, the specific area between terrestrial and aquatic habitats, is currently an undesirable or inadequate stand of perennial or annual vegetation and natural reseeding or vegetation management is unlikely to improve the plant community within a reasonable amount of time to adequately address streambank and/or shoreline stability, dissipate stream energy and trap sediment, improve and/or maintain water quality, and/or provide adequate habitat corridors, food and/or cover for fish, wildlife, pollinators, and/or livestock resource conern(s). Existing conditions often require suppression or eradication of current vegetation by conventional mechanical or chemical (Herbaceous Weed Control (315)) methods to ensure establishment success of the new planting.

After Situation:

The riparian zone, the transitional zone between the terrestrial and aquatic habitats, is established to an adapted, diverse vegetative plant community and is under close management to insure 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: $1,805.38 **Scenario Cost/Unit:** #Div/0!

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	$22.51	1	$22.51
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$60.82	2	$121.64
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$11.74	1	$11.74
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	$19.06	40	$762.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	2	$37.80
Materials						

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	100	$137.00
One Species, Native Forb, Moderate/High Cost	2331	Native forb. Includes material and shipping only.	Acre	$658.33	0.5	$329.17

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	$191.56	2	$383.12

Practice: 390 - Riparian Herbaceous Cover

Scenario: #3 - Warm & Cool Season Plants

Scenario Description:

Warm & Cool Season Grasses with Forbs: This scenario addresses inadequate herbaceous plant community function or diversity within the specific transitional zone between terrestrial and aquatic habitats 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. This scenario applies to work not covered under NRCS Conservation Practice Range Planting (528), Forage and Biomass Planting (512), Critical Area Planting (342), Filter Strip (393), Restoration and Management of Rare and Declining Habitats (643), Streambank and Shoreline Protection (580), Vegetated Treatment Area (635), Wetland Enhancement (659), or Wetland Restoration (657). This practice can be used nation wide. The typical setting for this scenario 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 proper function and/or adequate habitat. Where the establishment of a diverse riparian herbaceous plant community is desired, an adapted mix of primarily warm season grasses, legumes, and/or forbs tolerant to the site conditions will be planted by broadcast and/or no-till or range drill seeding methods as necessary to accomplish the intended purpose(s). Where chemical control of undesirable vegetation, including invasives, is required to reduce competition for the desired plant community the Herbaceous Weed Control (315) practice should be used. Seedbed preparation may require LIGHT TILLAGE (disking). WHEN POLLINATOR HABITAT IS A CONSIDERATION: Include 5-10 adapted forb species that bloom sequentially throughout the growing season where feasible. To address the high diversity of riparian plant communities and their adjacent stream types that exist from the tropics to the tundra, and the deserts, prairies, mountains, and lowlands across the various regions and/or MLRA's, up to 20 adapted riparian plant community-specific scenarios may be required

Before Situation:

The riparian zone, the specific area between terrestrial and aquatic habitats, is currently an undesirable or inadequate stand of perennial or annual vegetation and natural reseeding or vegetation management is unlikely to improve the plant community within a reasonable amount of time to adequately address streambank and/or shoreline stability, dissipate stream energy and trap sediment, improve and/or maintain water quality, and/or provide adequate habitat corridors, food and/or cover for fish, wildlife, pollinators, and/or livestock resource conern(s). Existing conditions often require suppression or eradication of current vegetation by conventional mechanical or chemical (Herbaceous Weed Control (315)) methods to ensure establishment success of the new planting.

After Situation:

The riparian zone, the transitional zone between the terrestrial and aquatic habitats, is established to an adapted, diverse vegetative plant community and is under close management to insure 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: $1,020.92 **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	$11.74	1	$11.74
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$11.74	1	$11.74
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	1	$22.51
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	1	$22.51
Materials						
Two Species Mix, Warm Season, Native Perennial Grass	2325	Native, warm season perennial grass. Includes material and shipping only.	Acre	$94.57		$0.00
One Species, Native Forb, Low Cost	2329	Native forb. Includes material and shipping only.	Acre	$186.18	0.5	$93.09
One Species, Native Forb, Low Cost	2329	Native forb. Includes material and shipping only.	Acre	$186.18	0.5	$93.09
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	$191.56	2	$383.12
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	$191.56	2	$383.12

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: $2,006.98 **Scenario Cost/Unit:** $200.70

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
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	$2.21	6	$13.26
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$26.12	6	$156.72
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	8	$151.20
Materials						
Trees and shrubs, seed	1871	Brush Chipper, 12" capacity, typically 35 HP. Includes chipper and power unit. Does not include labor.	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	$284.80	1	$284.80

Practice: 391 - Riparian Forest Buffer

Scenario: #2 - Cuttings

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. Materials will be from a nearby, off-site location. 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: $5,511.53 **Scenario Cost/Unit:** $5,511.53

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	$34.13	10	$341.30
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	$2.87	10	$28.70
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	10	$116.20
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	$5.85	10	$58.50
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	10	$414.10
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$9.31	10	$93.10
Tractor, agricultural, 30 HP	1501	Agricultural tractor with horsepower range of less than 50. Equipment and power unit costs. Labor not included.	Hour	$9.84	10	$98.40
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	$19.06	70	$1,334.20
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	10	$189.00
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	$108.13	4	$432.52

Materials

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
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, 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	$191.56	4	$766.24
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77

Practice: 391 - Riparian Forest Buffer

Scenario: #3 - 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.

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: $5,972.16 **Scenario Cost/Unit:** $1,990.72

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	$34.13	16	$546.08
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	$3.65	8	$29.20
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	8	$331.28
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	$33.06	16	$528.96
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	$19.06	112	$2,134.72
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	800	$464.00
Tree, hardwood, seedling or transplant, bare root, 16-36"	1510	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.75	200	$150.00
Tree, conifer, seedling, bare root, 1-1	1513	Bare root conifer trees, 1-1 (2 years old). Includes materials and shipping only.	Each	$0.45	200	$90.00
Tree shelter, solid tube type, 4" x 36"	1565	4" x 36" tree tube for protection from animal damage. Materials only.	Each	$3.19	400	$1,276.00
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	400	$236.00

Practice: 391 - Riparian Forest Buffer

Scenario: #4 - 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: $3,553.48 **Scenario Cost/Unit:** $1,184.49

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	8	$52.80
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$26.12	8	$208.96
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$34.13	8	$273.04
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	$33.06	8	$264.48
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	8	$151.20
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	$19.06	24	$457.44
Materials						
Tree, hardwood, seedling or transplant, bare root, 16-36"	1510	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.75	160	$120.00
Tree, conifer, seedling, bare root, 1-1	1513	Bare root conifer trees, 1-1 (2 years old). Includes materials and shipping only.	Each	$0.45	200	$90.00
Shrub, seedling or transplant, bare root, 18"-36"	1507	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.58	400	$232.00
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	400	$236.00
Tree shelter, solid tube type, 4" x 36"	1565	4" x 36" tree tube for protection from animal damage. Materials only.	Each	$3.19	400	$1,276.00
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	$191.56	1	$191.56

Practice: 391 - Riparian Forest Buffer

Scenario: #5 - 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. All seedlings will be planted at 15 foot by 15 foot spacing. Shrubs will be planted immediately adjacent to the waterbody. Tree shelters wil be placed on all plant materials. 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: $8,535.96 **Scenario Cost/Unit:** $2,845.32

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	16	$185.92
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	$3.65	16	$58.40
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$34.13	16	$546.08
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	16	$662.56
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	$19.06	112	$2,134.72
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	$33.06	16	$528.96
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
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	194	$209.52
Tree, conifer, seedling or transplant, potted, 1 qt.	1534	Potted conifer tree, 1 quart. Includes materials and shipping only.	Each	$3.05	194	$591.70
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	582	$1,175.64
Tree shelter, solid tube type, 4" x 48"	1566	4" x 48" tree tube for protection from animal damage. Materials only.	Each	$4.10	194	$795.40
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.17	194	$420.98
Shrub, seedling or transplant, potted, 1 qt.	1524	Potted shrub, 1 quart. Includes materials and shipping only.	Each	$3.12	194	$605.28

Practice: 391 - Riparian Forest Buffer

Scenario: #6 - 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. All seedlings will be planted at 15 feet by 15 feet spacing. Shrubs will be planted immediately adjacent to the water body. Tree shelters will be placed on all plant materials. 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: $5,617.72 **Scenario Cost/Unit:** $1,872.57

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	8	$52.80
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$34.13	8	$273.04
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$26.12	8	$208.96
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	$19.06	24	$457.44
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	8	$151.20
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	$33.06	8	$264.48
Materials						
Tree shelter, solid tube type, 4" x 48"	1566	4" x 48" tree tube for protection from animal damage. Materials only.	Each	$4.10	194	$795.40
Tree, conifer, seedling or transplant, potted, 1 qt.	1534	Potted conifer tree, 1 quart. Includes materials and shipping only.	Each	$3.05	194	$591.70
Shrub, seedling or transplant, potted, 1 qt.	1524	Potted shrub, 1 quart. Includes materials and shipping only.	Each	$3.12	194	$605.28
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.17	194	$420.98
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	582	$1,175.64

Practice: 391 - Riparian Forest Buffer

Scenario: #7 - 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. Planting for shrubs will be done at 20' x 20' spacing Shrubs will be planted immediately adjacent to the water body. Evergreen and deciduous trees will be planted at approximately 30 feet X 30 feet spacing. Tree shelters will be placed on all planting stock. 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: $12,393.30 **Scenario Cost/Unit:** $4,131.10

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	$34.13	16	$546.08
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	32	$1,325.12
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	16	$769.12
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
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	$5.85	16	$93.60
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	$3.65	16	$58.40
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	$33.06	16	$528.96
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	$19.06	320	$6,099.20
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	16	$302.40
Materials						
Tree shelter, solid tube type, 4" x 24"	1563	4" x 24" tree tube for protection from animal damage. Materials only.	Each	$2.17	100	$217.00
Tree shelter, solid tube type, 4" x 60"	1567	4" x 60" tree tube for protection from animal damage. Materials only.	Each	$5.07	50	$253.50
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	100	$921.00

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
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
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	50	$370.50
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	200	$312.00

Practice: 393 - Filter Strip

Scenario: #5 - Filter Strip, Native species

Scenario Description:

A strip or area of native herbaceous vegetation situated between cropland, grazing land or disturbed land and sensitive areas. Practice includes seedbed prep and planting of native species.

Before Situation:

Annual 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: $243.49 **Scenario Cost/Unit:** $243.49

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	$22.51	1	$22.51
Materials						
Three plus Species Mix, Warm Season, Native Perennial	2327	Native, warm season perennial grass. Includes material and shipping only.	Acre	$220.98	1	$220.98

Practice: 393 - Filter Strip

Scenario: #10 - Annual Irrigated

Scenario Description:

A strip or area of introduced annual vegetation situated between irrigated cropland and sensitive areas. Practice includes seedbed prep and planting of introduced species. The area of the filter strip is taken out of production.

Before Situation:

Tailwater from irrigated cropland transports suspended solids and associated contaminants to down gradient 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 annual filter strip is established early enough prior to the irrigation season such that vegetation is mature enough to filter sediment from the first irrigation.

Scenario Feature Measure: Number of acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $66.97 **Scenario Cost/Unit:** $66.97

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	$11.74	1	$11.74
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	1	$22.51
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

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.

Scenario Feature Measure: Area of Firebreak

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $179.42 **Scenario Cost/Unit:** $179.42

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$11.74	2	$23.48
	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$17.50	2	$35.00
	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	2	$82.82
Labor						
	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	2	$38.12

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. 10' wide 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: Area of Firebreak

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $797.94 **Scenario Cost/Unit:** $797.94

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	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	$2.61	150	$391.50
	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	4	$299.44
Labor						
	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$26.75	4	$107.00

Practice: 394 - Firebreak

Scenario: #3 - Constructed - Medium equipment, steep slopes

Scenario Description:

Use of medium equipment such as small dozers to blade, disk, plow, etc. 10' wide 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. 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: Area of Firebreak

Scenario Unit: Acre

Scenario Typical Size: 0

Scenario Cost: $1,278.49 **Scenario Cost/Unit:** #Div/0!

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	4	$299.44
	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	$2.61	225	$587.25
Labor						
	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$26.75	4	$107.00
Mobilization						
	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 394 - Firebreak

Scenario: #4 - Vegetated permanent firebreak

Scenario Description:

Establishing a 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. 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: Area of Firebreak

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $1,162.82 **Scenario Cost/Unit:** $116.28

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	4	$165.64
	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$11.74	10	$117.40
	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$17.50	10	$175.00
	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	10	$225.10
Labor						
	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	8	$152.48
Materials						
	2313	Introduced, cool season perennial grass. Includes material and shipping only.	Acre	$32.72	10	$327.20

Practice: 394 - Firebreak

Scenario: #5 - Constructed - Wide, bladed or disked firebreak

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: Area of Firebreak

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $2,131.37 **Scenario Cost/Unit:** $2,131.37

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	8	$598.88
	1306	Heavy wildland plow or disk used for installing firebreaks. Equipment costs only for plow, use with a dozer component. Labor not included.	Hour	$52.31	4	$209.24
	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	$2.61	425	$1,109.25
Labor						
	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$26.75	8	$214.00

Practice: 395 - Stream Habitat Improvement and Management

Scenario: #1 - Riparian Zone Improvement-Forested

Scenario Description:

This scenario describes fish and wildlife habitat improvement and/or management actions focused on the community structure and function of forested riparian zone plant communities. The planned activity meets the 395 standard, and facilitating practice standards, especially Codes 390 and 391, utilized in combination to satisfy all requirements specific to habitats needed for the stream and riparian species for which the practice is being implemented. Implementation will improve instream and riparian habitat complexity, water quality, hiding and resting cover, and/or increased food availability for desired riparian and stream species. Because species and habitats differ dramatically within and across regions and/or MLRAs, up to 12 riparian plant community-specific scenarios may be required across the US.

Before Situation:

Riparian quality and quantity are at risk as determined by the NRCS Stream Visual Assessment Protocol score of less than 5 for those elements. The site does not have adequate food, cover, and/or connectivity for riparian wildlife, and contributes insufficient amounts of organic matter andor large woody material for stream species food and cover. The site's riparian vegetation is compromised by human activities and/or access of vehicles, people, and/or livestock is not controlled adequately to protect riparian functions and stream habitat quality. 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 reduced due to compaction. Riparian vegetation quality and/or quantity is compromised to the extent that the riparian area and floodplain are not functioning to provide necessary stream and riparian habitat components.

After Situation:

Revegetation/reforestation of the riparian zone is completed and the vegetation community is under close management to insure long-term survival and ecological succession of the plant community. The quality and quantity of the riparian zone components of the site are managed to support a diverse vegetation community suitable for the site, the species that depend on it for habitat, and the functions it performs or will eventually perform as the vegetation matures. These functions include: stream temperature moderation thru shading, recruitment of instream large wood and/or non-woody organic matter, riparian 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

Scenario Unit: Acre

Scenario Typical Size: 2

Scenario Cost: $13,936.56 **Scenario Cost/Unit:** $6,968.28

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	$62.38	16	$998.08
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	8	$598.88
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	$26.75	24	$642.00
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	$108.13	40	$4,325.20
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	$27.30	160	$4,368.00
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	$19.06	40	$762.40
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	$33.06	40	$1,322.40

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	200	$216.00
Tree, willow	1426	Willow tree for planting, 18" to 36" seedling. Includes materials and shipping only.	Each	$0.67	200	$134.00

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 395 - Stream Habitat Improvement and Management

Scenario: #2 - Instream wood placement

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. A stream assessment (i.e. Stream Visual Assessment Protocol) should be conducted in order to document habitat components lacking for aquatic species (i.e. large wood, pools). A project design for wood 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 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. 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. 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. Monitoring records demonstrating implementation of this scenario will address resource concerns for stream species of concern are 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 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.

Scenario Feature Measure: Bankfull width x reach length

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $9,132.49 **Scenario Cost/Unit:** $9,132.49

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	$107.86	8	$862.88
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	$212.37	16	$3,397.92
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	$26.75	24	$642.00
Materials						
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
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	$23.79	15	$356.85
Log, un-anchored	2035	Price of log picked up at the Mill. Includes material only.	Ton	$40.21	30	$1,206.30
Steel, rebar	1832	Steel rebar, grade 60. Materials only.	Pound	$0.56	50	$28.00
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	$543.77	2	$1,087.54

Practice: 395 - Stream Habitat Improvement and Management

Scenario: #3 - 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: Bankfull width x reach length

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $8,830.30 **Scenario Cost/Unit:** $8,830.30

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	$107.86	8	$862.88
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	$212.37	16	$3,397.92
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	$26.75	24	$642.00
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	$19.06	16	$304.96
Materials						
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$23.79	20	$475.80
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
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	$543.77	2	$1,087.54

Practice: 395 - Stream Habitat Improvement and Management

Scenario: #4 - 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: stream length X bankfull width

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $20,335.95 **Scenario Cost/Unit:** $20,335.95

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	$212.37	16	$3,397.92
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$107.86	8	$862.88
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	$19.06	24	$457.44
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	$27.30	60	$1,638.00
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	$108.13	32	$3,460.16

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	$33.06	180	$5,950.80
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	$26.75	24	$642.00

Materials

Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$23.79	7	$166.53
Steel, rebar	1832	Steel rebar, grade 60. Materials only.	Pound	$0.56	8	$4.48
Root Wad	2045	Tree stump buried into the streambank with the roots left exposed. Includes material only.	Ton	$8.91	10	$89.10
Log, un-anchored	2035	Price of log picked up at the Mill. Includes material only.	Ton	$40.21	30	$1,206.30
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	$543.77	2	$1,087.54

Practice: 395 - Stream Habitat Improvement and Management

Scenario: #5 - Fish Barrier

Scenario Description:

This scenario describes the implementation of a stream habitat improvement and management project where practices are focused on the stream channel. The planned activity will meet the current 395 standard, and facilitating practice standards utilized. Implementation will result in protecting native aquatic fauna in the reach from competition or harrassament from non-native fish. This action may also increase food availability for fish and other stream species located above the constructed barrier. Payment for implementation is to defray the costs of stream habitat assessment above the barrier, and project implementation. Records demonstrating implementation of this scenario will address resource concerns for aquatic and riparian species of concern will be required.

Before Situation:

In this stream corridor, native aquatic species are at risk as determined by the state fish and wildlife agency. NRCS Stream Visual Assessment Protocol for the reach being protected by a barrier meets quality criteria and provides habitat for native species of concern, as determined by a Stream Visual Assessment Protocol score of greater than 5 .

After Situation:

Native fish inhabiting areas upstream of the newly constructed concrete barrier will not be adversely affected by interactions with non-native species/competitors.

Scenario Feature Measure: Each

Scenario Unit: Cubic Yard

Scenario Typical Size: 5

Scenario Cost: $29,316.68 **Scenario Cost/Unit:** $5,863.34

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	$212.37	10	$2,123.70
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	$401.46	60	$24,087.60
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	$19.06	10	$190.60
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	$26.75	10	$267.50
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	$27.30	10	$273.00
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	$108.13	8	$865.04
Materials						
Plywood, 3/4 inch, untreated	1833	Untreated 4' x 8' sheets of 3/4 inch exterior grade plywood. Includes materials only.	Each	$26.62	15	$399.30
Steel, rebar	1832	Steel rebar, grade 60. Materials only.	Pound	$0.56	40	$22.40
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	$543.77	2	$1,087.54

Practice: 396 - Aquatic Organism Passage

Scenario: #1 - Concrete Dam Removal

Scenario Description:

Full or partial removal of a concrete or earthen dam to restore aquatic organism passage, improve water quality, and promote functional river ecology and geomorphology. The extent of removal (full or partial) is determined through consultations with the dam owner in consideration of prevailing regulations and site historical status. Adjacent floodplain surfaces above and below the target dam are considered in the planning process to account for shifts in streamflow and geomorphic regime. Resulting channel dimensions and profile are determined on a site-specific basis to reflect--to the fullest extent possible--pre-dam conditions.

Pre-removal sediment assays are completed to determine the toxicity of sediment stored behind the dam. Planning for the reclamation and management of stored sediments is completed according to geomorphic conditions, prevailing regulations, and the results of sediment toxicity investigations. Removal is done 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. Alternative demolition techniques may include the use of high explosives, diamond-chain, or similar circular saws to remove the dam in a piecewise manner. Removed materials are trucked away and disposed or recycled off-site. Disturbed areas are revegetated with a mix of site-adapted species. 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.

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, (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.

Scenario Feature Measure: Cubic Yards of concrete in dam and abutments (if present)

Scenario Unit: Cubic Yard

Scenario Typical Size: 250

Scenario Cost: $41,084.97 **Scenario Cost/Unit:** $164.34

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	$142.30	6	$853.80
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$107.86	80	$8,628.80

Equipment/Installation

Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$296.42	1.5	$444.63
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$138.48	20	$2,769.60
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	$212.37	60	$12,742.20
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	60	$2,884.20

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	$19.06	60	$1,143.60
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	$26.75	220	$5,885.00
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	$27.30	80	$2,184.00
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	$33.06	40	$1,322.40

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	4	$1,139.20
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	2	$1,087.54

Practice: 396 - Aquatic Organism Passage

Scenario: #2 - Earthen Dam Removal

Scenario Description:

Full removal of an earthen dam to restore aquatic organism passage, improve water quality, and promote functional river ecology and geomorphology. The removal extent is determined through consultations with the dam owner in consideration of prevailing regulations and site historical status. Adjacent floodplain surfaces above and below the target dam are considered in the planning process to account for shifts in streamflow and geomorphic regime. Resulting channel dimensions and profile are determined on a site-specific basis to reflect, to the fullest extent possible, pre-dam conditions.

Pre-removal sediment assays are be completed as necessary to determine the toxicity of sediment stored behind the dam. Planning for the reclamation and management of stored sediments is completed according to geomorphic conditions, prevailing regulations, and the results of sediment toxicity investigations. Removal is done 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. Removed materials are trucked away and disposed or recycled off-site, unless native streambed material found in the embankment can be used in site reclamation. Disturbed areas are revegetated with a mix of site-adapted species. 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 head gates, canals, raceways, 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.

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, (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.

Scenario Feature Measure: Cubic Yards of earthen embankment

Scenario Unit: Cubic Yard

Scenario Typical Size: 500

Scenario Cost: $36,235.00 **Scenario Cost/Unit:** $72.47

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	$142.30	6	$853.80
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$107.86	60	$6,471.60
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$296.42	3	$889.26

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	$138.48	40	$5,539.20
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	$212.37	60	$12,742.20
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	60	$2,884.20

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	$26.75	40	$1,070.00
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	$33.06	40	$1,322.40
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	$27.30	40	$1,092.00
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	$19.06	60	$1,143.60

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	4	$1,139.20
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	2	$1,087.54

Practice: 396 - Aquatic Organism Passage

Scenario: #3 - Blockage Removal

Scenario Description:

Removal of passage barriers, including small relict earthen diversions (e.g., splash dams), failing or undersized culverts, and sediment or large woody material (>10cm diameter and 2m length) from mass wasting or major flood events. Instream material associated with the previously mentioned circumstances or structures prevents aquatic organism passage by the creation of channel-spanning blockages, or areas of shallow depth, high velocities, or extensive changes in water surface elevation. In addition, these features may encourage abrupt channel changes that endanger adjacent capital infrastructure or transportation corridors. Excessive streambank erosion by flows deflected around or impounded behind these features may impair water quality by introducing fine sediment out of phase with the natural hydrograph and the life history requirements of native aquatic species.

Removal is done with an assortment of equipment, including tracked excavators outfitted with buckets with "thumbs", bull dozers, skid steers, front-end loaders, and dump trucks. The channel and adjacent floodplain are restored to pre-blockage conditions to the fullest extent practicable. Removed materials are trucked away and disposed or recycled off-site, unless native streambed material found in the blockage can be used in site reclamation. Large woody material, if present, is used for instream reclamation, replaced in the channel downstream of the blockage, or trucked offsite for disposal or stockpiling for future projects. Disturbed areas are revegetated with a mix of site-adapted species. Scenario does not include additional measures needed in the active channel and floodplain.

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

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: (342) Critical Area Planting, (382) Fence, (390) Riparian Herbaceous Cover, (391) Riparian Forest Buffer, (612) Tree/Shrub Establishment; (643) Restoration and Management of Rare and Declining Habitats.

---Reach Planning/Habitat Enhancement: (395) Stream Habitat Improvement and Management,

---Structural Measures Associated with Scenario but outside of project footprint: (410) Grade Stabilization Structure, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection

Before Situation:

An instream feature spanning the active channel creates hydraulic conditions that exceed the swimming or crawling abilities of native aquatic organisms. Event-driven mass wasting or instream deposits of coarse sediment create channel blockages or areas of shallow, fast-moving water. An instream plug of material transported to the site by flood flows or delivered to the channel from a hillslope failure not only blocks passage, but may deflect the stream toward a new course than endangers adjacent capital infrastructure or transportation corridors. Elevated risks associated with eventual over-topping or failure of the blockage to downstream features or communities are imminent in the event of a blockage that forms a temporary dam. Accelerated instream or lateral channel erosion may introduce fine sediment that impairs water quality.

After Situation:

The instream barrier is removed by a combination of methods and equipment and the channel and affected floodplain are restored to pre-blockage conditions to the fullest extent practicable. Resource Concerns are addressed within the context of the site.

Scenario Feature Measure: Cubic Yards of mineral sediment, fill or large woody material

Scenario Unit: Cubic Yard

Scenario Typical Size: 200

Scenario Cost: $22,821.14 **Scenario Cost/Unit:** $114.11

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	$212.37	20	$4,247.40
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	20	$961.40

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	$138.48	20	$2,769.60
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	40	$2,495.20
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$107.86	40	$4,314.40
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$142.30	2	$284.60

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	$26.75	140	$3,745.00
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	$33.06	20	$661.20
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	$27.30	20	$546.00

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	6	$1,708.80
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	2	$1,087.54

Practice: 396 - Aquatic Organism Passage

Scenario: #4 - Nature-Like Fishway

Scenario Description:

Nature-like fishways, also known as roughened channels, rock ramps, or bypass channels, are constructed features that provide passage around an instream barrier or in place of a removed barrier. Fishway design is based on simulating or mimicking adjacent stream characteristics, using natural materials, and providing suitable passage conditions over a range of flows for a wide variety of fish species and other aquatic organisms. Nature-like fishways provide enhanced passage conditions compared to concrete or aluminum (Alaskan Steeppass) ladders, and are not as susceptible to debris-related operational issues. When used to bypass an instream barrier, they require a larger footprint than instream structures, and may also require control structures to regulate flow through the fishway or address tailwater fluctuations affecting the fishway entrance (downstream end).

Fishway design includes an assessment of adjacent stream characteristics, including channel geometry, slope, sediment texture and composition, and major geomorphic units that govern channel plan, pattern and profile. In the case of a fishway that bypasses an instream barrier, the design is tailored to these elements, the elevation required to ascend the barrier, and the known range of flow variation or operations. For fishways constructed in the place of a removed barrier, the design may be a hybrid approach that meets the same criteria, although in a smaller instream footprint.

Nature-like fishways are constructed 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 with between 6 to 12 inches of water surface elevation drop between adjacent structures. Large woody material is used to create channel structural elements in some settings, when available and where approved by oversight agencies. Removed materials are trucked away and disposed or recycled off-site, unless excavated native streambed material can be used in fishway construction. Large woody material or removed trees, if present, are used for fishway construction trucked offsite for disposal, or trucked offsite for stockpiling for future projects. Disturbed 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

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 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. The subject stream contains a number of migrating aquatic organisms ranging in size from small to large with a range of propulsion abilities--weak to strong swimmers and animals that crawl along the bottom. In either case--barrier removal or bypassing an existing barrier--local sentiment to preserve existing or natural conditions and the desire to provide passage for a range of aquatic organisms indicate the use of a nature-like fishway. Adequate space for a bypass channel is available, and adjacent landowners approve.

After Situation:

A nature-like fishway 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.

Scenario Feature Measure: Acres of constructed fishway (bankfull width X total length/43,650)

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $109,690.50 **Scenario Cost/Unit:** $109,690.50

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	$48.07	100	$4,807.00
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	80	$4,990.40
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	100	$575.00
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	$212.37	80	$16,989.60
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$296.42	3	$889.26
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$107.86	100	$10,786.00
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$142.30	2	$284.60
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	12000	$28,200.00
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	$108.13	240	$25,951.20
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	$33.06	60	$1,983.60
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	$19.06	60	$1,143.60
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	$26.75	280	$7,490.00
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	$27.30	80	$2,184.00
Materials						
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$23.79	50	$1,189.50
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	4	$1,139.20
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	2	$1,087.54

Practice: 396 - Aquatic Organism Passage

Scenario: #5 - CMP Culvert

Scenario Description:

A corrugated metal (galvanized steel or aluminum) pipe culvert (CMP) 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 used for AOP are sized according to geomorphic analyses, not just an estimate of runoff and streamflow at the site from the contributing watershed. In addition, CMPs used for AOP are filled with a mixture of rock and gravel sized to emulate site stream conditions and geomorphic units in the channel. The simulated streambed material is continuous throughout the culvert barrel, and blended with the intact streambed at the culvert inlet and outlet. The first estimate of culvert size--diameter or span--is obtained by analyzing bankfull channel width on a reach of stream not affected by an existing road crossing or other conditions that alter self-formed conditions. In the case of a culvert replacement, bankfull investigations are begun at least 10-20 estimated bankfull channel widths above the existing stream crossing. Culvert diameter or span is then increased according to channel bed composition and texture, bank characteristics, channel alignment at the crossing section, and other parameters that may affect channel dynamics and stability.

Once the CMP diameter or span is determined, culvert length will be determined by roadway geometry and loading requirements, and site stream conditions. 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. Culvert wall thickness and corrugations are determined by road loading requirements. Stream geomorphic characteristics, including the reach longitudinal profile, channel cross-sectional shape, substrate composition and arrangement, and bank shape and composition are determined.

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 with between 6 to 12 inches of water surface elevation drop between adjacent structures. 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 culvert is placed within the roadway on a subexcavated compacted bed, 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. Backfill depths are typically at least 20% of the culvert diameter or rise, but may deviate based on the shape of the culvert used, channel dimensions, substrate size, and the site longitudinal profile. Special equipment such as motorized wheelbarrows may be necessary to backfill smaller CMPs. Once the simulated streambed in the culvert barrel is complete, 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

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: (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, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection

Before Situation:

An existing undersized culvert as contributed to general bed and bank scour downstream of a road crossing, and may have contributed to the deposition of a wedge of sediment upstream of the road crossing. The road may be overtopped by high flows, resulting in outright failure, landowner accessibility problems, access by and to emergency services, and hamper post-flood recovery efforts. An upstream impoundment created by the undersized culvert has contributed to water quality problems including high water temperatures and the deposition and later mobilization of polluted fine sediment. Native aquatic organisms are unable to pass through the road crossing because the culvert outlet is perched above the downstream pool, and high velocities are not negotiable by animals that are able to leap into the culvert barrel.

After Situation:

The undersized culvert is replaced with a CMP sized, placed, and backfilled with material determined by geomorphic analyses performed in a reference reach upstream of the crossing location. Geomorphic and ecological functions are preserved through the crossing site, enhancing AOP, water quality, and culvert longevity. In addition, because the culvert is sized to promote the transport of streamflow and the materials it carries, it requires decreased maintenance activities over time. Landowners are able to access their holdings across a range

of flows, and are able to seek and receive emergency and post-flood recovery services. Resource Concerns are addressed within the context of the site.

Scenario Feature Measure: CMP

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $32,355.39 **Scenario Cost/Unit:** $32,355.39

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	$107.86	40	$4,314.40
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	$212.37	40	$8,494.80
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	900	$2,115.00
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	50	$287.50
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	60	$2,884.20
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$142.30	1	$142.30
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	$27.30	40	$1,092.00
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	$19.06	60	$1,143.60
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	$26.75	140	$3,745.00
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	$33.06	40	$1,322.40
Materials						
Pipe, CMP, 96", 14 Gauge	1835	96" Corrugated Metal Pipe, Galvanized, Uncoated, 14 gage. Material cost only.	Foot	$84.32	40	$3,372.80
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$23.79	75	$1,784.25
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	2	$1,087.54

Practice: 396 - Aquatic Organism Passage

Scenario: #6 - Bottomless Culvert

Scenario Description:

A multi-plate galvanized steel or aluminum culvert (arch or box) used 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. Bottomless culverts used for AOP are sized according to geomorphic analyses, not just an estimate of runoff and streamflow at the site from the contributing watershed. In addition, bottomless culverts used for AOP are filled with a mixture of rock and gravel sized to emulate site stream conditions and geomorphic units in the channel. The simulated streambed material is continuous throughout the culvert barrel, and blended with the intact streambed at the culvert inlet and outlet. The first estimate of culvert span is obtained by analyzing bankfull channel width on a reach of stream not affected by an existing road crossing or other conditions that alter self-formed conditions. In the case of a culvert replacement, bankfull investigations are begun at least 10-20 estimated bankfull channel widths above the existing stream crossing. Culvert span is then increased according to channel bed composition and texture, bank characteristics, channel alignment at the crossing section, and other parameters that may affect channel dynamics and stability.

Once the culvert span is determined, culvert length will be dictated by roadway geometry and loading requirements, and site stream conditions. 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. Culvert wall thickness and footing requirements are determined by road loading requirements and site geotechnical investigations. Generally, the preferred footing is a T-design with a spread footing with stem wall. Connecting the culvert leg to the footing can be done by welding, grouting, bolting. Stream geomorphic characteristics, including the reach longitudinal profile, channel cross-sectional shape, substrate composition and arrangement, and bank shape and composition are determined.

Bottomless arch or box culverts are commonly delivered in sections and bolted together in the field. Smaller arches can be delivered in one piece. They 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 with between 6 to 12 inches of water surface elevation drop between adjacent structures. 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. Footings are placed or poured, and 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. Once the simulated streambed between the footings is complete, the culvert sections are assembled and attached to the footings. Larger rock may be placed along the footing/culvert stemwall to project the connection from damage by transported bedload. 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. Scenario does not include concrete for head or wingwalls.

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

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: (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, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection

Before Situation:

An existing undersized culvert as contributed to general bed and bank scour downstream of a road crossing, and may have contributed to the deposition of a wedge of sediment upstream of the road crossing. The road may be overtopped by high flows, resulting in outright failure, landowner accessibility problems, access by and to emergency services, and hamper post-flood recovery efforts. An upstream impoundment created by the undersized culvert has contributed to water quality problems including high water temperatures and the deposition and later mobilization of polluted fine sediment. Native aquatic organisms are unable to pass through the road crossing because the culvert outlet is perched above the downstream pool, and high velocities are not negotiable by animals that are able to leap into the culvert barrel.

After Situation:

The undersized culvert is replaced with a bottomless arch or box culvert sized, placed, and backfilled with material determined by geomorphic analyses performed in a reference reach upstream of the crossing location. Geomorphic and ecological functions are

preserved through the crossing site, enhancing AOP, water quality, and culvert longevity. In addition, because the culvert is sized to promote the transport of streamflow and the materials it carries, it requires decreased maintenance activities over time. Landowners are able to access their holdings across a range of flows, and are able to seek and receive emergency and post-flood recovery services. Resource Concerns are addressed within the context of the site.

Scenario Feature Measure: Multi-plate arch or box and rock fill

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $46,731.20 **Scenario Cost/Unit:** $46,731.20

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	$107.86	40	$4,314.40
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	50	$287.50
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$142.30	1	$142.30
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	900	$2,115.00
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	60	$2,884.20
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	$212.37	40	$8,494.80
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	$19.06	60	$1,143.60
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	$26.75	140	$3,745.00
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	$33.06	40	$1,322.40
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	$27.30	40	$1,092.00
Materials						
Geocell, 6"	1842	6-inch thick cellular confinement system, three-dimensional, expandable panels made from high-density polyethylene (HDPE), polyester or another polymer material. Includes materials, labor and equipment for the geocell only, does not include backfill.	Square Yard	$25.52	500	$12,760.00
Footing, concrete, precast	1836	Precast spread footing with stemwall, T-shaped, with channel built to accept arched culvert leg. Includes materials only.	Foot	$62.34	80	$4,987.20
Culvert, Multi-Plate arch	1979	Multi-plate arch culvert, typically 7 Gauge corrugated plate. Includes metal arch materials only, does not include footings.	Pound	$1.41	1	$1.41
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$23.79	75	$1,784.25
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

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	$543.77	2	$1,087.54

Practice: 396 - Aquatic Organism Passage

Scenario: #7 - 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 box culverts are generally available in sections of 1-foot increments. Concrete box culverts used for AOP are sized according to geomorphic analyses, not just an estimate of runoff and streamflow at the site from the contributing watershed. In addition, concrete box culverts used for AOP are filled with a mixture of rock and gravel sized to emulate site stream conditions and geomorphic units in the channel. The simulated streambed material is continuous throughout the culvert barrel, and blended with the intact streambed at the culvert inlet and outlet. The first estimate of culvert width is obtained by analyzing bankfull channel width on a reach of stream not affected by an existing road crossing or other conditions that alter self-formed conditions. In the case of a culvert replacement, bankfull investigations are begun at least 10-20 estimated bankfull channel widths above the existing stream crossing. Culvert width is then increased according to channel bed composition and texture, bank characteristics, channel alignment at the crossing section, and other parameters that may affect channel dynamics and stability.

Once the culvert width is determined, culvert length will be determined by roadway geometry and loading requirements, and site stream conditions. 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. Stream geomorphic characteristics, including the reach longitudinal profile, channel cross-sectional shape, substrate composition and arrangement, and bank shape and composition are determined.

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. Construction elements generally include an assortment of rock used to create riffles, cascades, or riffle-pool sequences with between 6 to 12 inches of water surface elevation drop between adjacent structures. 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

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: (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, (584) Channel Bed Stabilization, (580) Streambank and Shoreline Protection

Before Situation:

An existing undersized culvert as contributed to general bed and bank scour downstream of a road crossing, and may have contributed to the deposition of a wedge of sediment upstream of the road crossing. The road may be overtopped by high flows, resulting in outright failure, landowner accessibility problems, access by and to emergency services, and hamper post-flood recovery efforts. An upstream impoundment created by the undersized culvert has contributed to water quality problems including high water temperatures and the deposition and later mobilization of polluted fine sediment. Native aquatic organisms are unable to pass through the road crossing because the culvert outlet is perched above the downstream pool, and high velocities are not negotiable by animals that are able to leap into the culvert barrel.

After Situation:

The undersized culvert is replaced with a concrete box culvert sized, placed, and backfilled with material determined by geomorphic analyses performed in a reference reach upstream of the crossing location. Geomorphic and ecological functions are preserved through the crossing site, enhancing AOP, water quality, and culvert longevity. In addition, because the culvert is sized to promote the transport of streamflow and the materials it carries, it requires decreased maintenance activities over time. Landowners are able to access their holdings across a range of flows, and are able to seek and receive emergency and post-flood recovery services. Resource Concerns are addressed within the context of the site.

Scenario Feature Measure: Concrete box culvert and rock fill

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $56,383.34 **Scenario Cost/Unit:** $56,383.34

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	$2.35	1000	$2,350.00
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$107.86	40	$4,314.40
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	75	$431.25
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	60	$2,884.20
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$142.30	1	$142.30
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	$212.37	40	$8,494.80
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	$27.30	40	$1,092.00
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	$19.06	60	$1,143.60
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	$26.75	140	$3,745.00
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	$33.06	40	$1,322.40
Materials						
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$23.79	75	$1,784.25
Geocell, 6"	1842	6-inch thick cellular confinement system, three-dimensional, expandable panels made from high-density polyethylene (HDPE), polyester or another polymer material. Includes materials, labor and equipment for the geocell only, does not include backfill.	Square Yard	$25.52	500	$12,760.00
Culvert, box, 6' x 6'	1837	Precast concrete box culvert, 6'X6'. Typically in 4' sections. Includes materials only.	Foot	$356.55	40	$14,262.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	2	$1,087.54

Practice: 396 - Aquatic Organism Passage

Scenario: #8 - Bridge

Scenario Description:

A channel-spanning structure that carries a road or trailway across a river or stream. Constructed of timber, i-beams, or concrete, bridges are attached at either end to prefabricated, reinforced and poured-in-place, or piling abutments capped/surrounded with concrete. Longer span bridges may require instream pilings to support the travel surface. Bridge decking can be timber, concrete, asphalt, or some combination thereof.

Bridge design is completed to conform to loading requirements and site conditions. Geotechnical investigations are used to determine the best support structure suited to a given site. 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. Stream diversion is not necessary since the bridge will be constructed above the active channel. 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

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

Before Situation:

An existing stream crossing outfitted with an undersized culvert has a history of maintenance issues and failure. The downstream channel has experienced bed and bank scour, and the crossing may have to the deposition of a wedge of sediment upstream of the road. The road may be overtopped by high flows, resulting in outright failure, landowner accessibility problems, access by and to emergency services, and hamper post-flood recovery efforts. An upstream impoundment created by the undersized culvert has contributed to water quality problems including high water temperatures and the deposition and later mobilization of polluted fine sediment. Native aquatic organisms are unable to pass through the road crossing because the culvert outlet is perched above the downstream pool, and high velocities are not negotiable by animals that are able to leap into the culvert barrel.

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. Landowners are able to access their holdings across a range of flows, and are able to seek and receive emergency and post-flood recovery services. Resource Concerns are addressed within the context of the site.

Scenario Feature Measure: Linear feet of bridge deck

Scenario Unit: Linear Feet

Scenario Typical Size: 30

Scenario Cost: $93,072.24 **Scenario Cost/Unit:** $3,102.41

Cost Details (by category):

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

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 equipment and operator.	Hour	$109.92	40	$4,396.80
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	50	$287.50
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	60	$2,884.20
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	$212.37	40	$8,494.80
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	$401.46	100	$40,146.00
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$107.86	40	$4,314.40
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	40	$2,495.20

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	$27.30	40	$1,092.00
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	$19.06	60	$1,143.60
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	$26.75	180	$4,815.00
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	$33.06	40	$1,322.40
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	$108.13	120	$12,975.60

Materials

Steel, structural steel members	1779	Structural steel, includes materials and fabrication.	Pound	$1.05	5360	$5,628.00
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

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	4	$1,139.20
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	2	$1,087.54

Practice: 396 - Aquatic Organism Passage

Scenario: #9 - Concrete Ladder

Scenario Description:

Formed, reinforced, poured-in-place concrete structures outfitted with baffles (Denil), vertical slots, pools and weirs, submerged orifices, chutes or some combination thereof to provide upstream passage for aquatic organisms over dams and other hydraulic structures. Although fish ladder designs vary according to target species and site conditions, they can generally be described as a three-sided concrete channel with integrated hydraulic features that provide a gradual elevation increase across some distance that allows aquatic organism to swim over a barrier--they convert the total barrier head elevation into passable increments. Concrete ladders are often constructed with resting pools and may have switchbacks. The primary water source for a concrete ladder comes from streamflow diverted into the ladder exit (upstream end) and since it is passed through the ladder to the river below, it is not a consumptive use. These ladders often require flow control and regulating devices (sometimes automated), gates, and may need auxiliary pumps to provide attraction flows at the ladder entrance (downstream end) or augment flow in the ladder. Gages above and below the dam are required to inform ladder operation. Trash racks are used at the upstream end to block debris from entering the ladder. Concrete ladders also require frequent maintenance, and flow through unautomated ladders may need to be adjusted manually when adjacent river conditions or dam operations change.

Concrete ladder designs can be complex and require interactions between engineering and ecological sciences for successful implementation. For example, the ladder entrance is one of the most important elements of the structure, and placement of this entrance in the downstream reach is a function of site characteristics and aquatic organism biology. In addition, some aquatic animals will not swim through a submerged orifice, so use of pool-orifice ladders is not recommended. Partners associated with dam ownership and operation, regulatory agencies, and others are consulted and included in the design and construction process. Ladder designs account for run volume and timing, and the swimming capabilities of target species. Some ladders in highly visible areas are finished with masonry facades to blend the ladder to the site in the interest of aesthetics or to conform with historic appearances.

Concrete ladders are constructed with equipment for excavation, placing material, and delivering and removing material. Lifts or booms are required to place concrete into forms. Because ladders are often attached to existing dams, personnel familiar with the dam structure are involved at all phases of the process to ensure that plans conform with site requirements. Bed and bank excavation are necessary to create the location for concrete ladders, so site isolation and sediment and erosion control measures are used. Disturbed areas are revegetated with a mix of site-adapted species, and access control and signage are provided. Scenario does not include additional measures in the adjacent active channel necessary to control flow, address channel elevation or stability, or encourage fish guidance into the concrete ladder. Scenario does not include structures used as counting stations or to trap and sample upstream migrants.

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 operational, low hazard class fixed crest concrete dam becomes the target of parties interested in providing fish passage. The dam presently blocks the upstream migration of a number of native aquatic organisms, and suitable spawning and rearing habitats for targeted fish species exists in upstream river reaches. Assessment of site conditions, dam operation, and target species swimming abilities indicate that a concrete ladder will provide suitable passage conditions during the migration season and pass the expected run volume without excessive delays.

After Situation:

A concrete pool and chute ladder outfitted with aluminum internal features and 2 turn/resting pool is installed. The ladder is attached to the face and abutment of the dam, and the entrance is located along the streambank where migrating aquatic organisms are likely to encounter it. The ladder passes the estimated run volume with minimal delays, and native aquatic animals are able to reach upstream spawning and rearing areas and successfully produce offspring that become part of the population. The ladder has an operating plan that stipulates actions and responsible parties for every month of the year. The ladder is fenced to control access and signage indicating its function and relevant warnings is provided at numerous locations. Resource Concerns are addressed within the context of the site.

Scenario Feature Measure: Barrier height (feet)

Scenario Unit: Vertical Feet

Scenario Typical Size: 20

Scenario Cost: $280,964.15 **Scenario Cost/Unit:** $14,048.21

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	$107.86	60	$6,471.60
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	$401.46	500	$200,730.00
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$296.42	3	$889.26
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	60	$3,742.80
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	$212.37	80	$16,989.60
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	80	$3,845.60
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 equipment and operator.	Hour	$109.92	60	$6,595.20
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	100	$575.00
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$142.30	6	$853.80
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	$33.06	80	$2,644.80
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	$108.13	240	$25,951.20
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	$19.06	60	$1,143.60
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	$27.30	80	$2,184.00
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	$26.75	220	$5,885.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	4	$1,139.20
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	2	$1,087.54
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	$78.65	3	$235.95

Practice: 396 - Aquatic Organism Passage

Scenario: #10 - Complex Denil

Scenario Description:

Denil fishways are roughened chutes that employ baffles connected to the walls and floor of the chute to provide near continuous energy dissipation throughout the fishway length. Denils are often reinforced, poured-in-place concrete structures outfitted with removable baffles constructed with treated wood that fits into channels incorporated into the ladder walls. These fishways have excellent attraction characteristics when properly sited and provide good passage conditions using relatively low flow amounts. They often do not require auxiliary (pumped) attraction or fishway flow, but are sensitive to tailwater fluctuations. Denil fishways are used mainly for sites where the fishway can be closely monitored, such as off-ladder fish trap designs or temporary fishways used during construction of permanent passage facilities. Because of their baffle geometry and narrow flow paths, Denil fishways are especially susceptible to debris accumulation.

Denil fishways are designed with a sloped channel that has a constant discharge for a given normal depth, chute gradient, and baffle configuration. Energy is dissipated consistently throughout the length of the fishway via channel roughness, and results in an average velocity compatible with the swimming ability of native aquatic organisms. Target species' mobility data are important factors in determing the length of a Denil or steeppass because there are no resting locations within a given length of these fishways. Once an animal starts to ascend a length of Denil, it must pass all the way upstream and exit the fishway, or risk injury when falling back downstream. If the Denil or steeppass fishway is long, intermediate resting pools may be included in the design, located at intervals determined by the swimming ability of the weakest target species.

Denil ladders are constructed with equipment used for excavation, placing material, and delivering and removing material. Lifts or booms may be required to place concrete into forms or lift ladder elements into place. Because ladders are often attached to existing dams, personnel familiar with the dam structure are involved at all phases of the process to ensure that plans conform with site requirements. Bed and bank excavation may be necessary to create the location for fishway components, so site isolation and sediment and erosion control measures are used. Disturbed areas are revegetated with a mix of site-adapted species, and access control and signage are provided. Scenario does not include additional measures in the adjacent active channel necessary to control flow, address channel elevation or stability, or encourage fish guidance into the concrete ladder. Scenario does not include structures used as counting stations or to trap and sample upstream migrants.

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 operational, low hazard class fixed crest concrete dam becomes the target of parties interested in providing fish passage. The dam presently blocks the upstream migration of a number of native aquatic organisms, and suitable spawning and rearing habitats for targeted fish species exists in upstream river reaches. Assessment of site conditions, dam operation, and target species swimming abilities indicate that a concrete ladder will provide suitable passage conditions during the migration season and pass the expected run volume without excessive delays.

After Situation:

A concrete Denil ladder outfitted with treated wood baffles and a turn/resting pool is installed. The ladder is attached to the face and abutment of the dam, and the entrance is located along the streambank where migrating native fish are likely to encounter it. The ladder passes the estimated run volume with minimal delays, and native aquatic animals are able to reach upstream spawning and rearing areas and successfully produce offspring that become part of the population. The ladder has an operating plan that stipulates actions and responsible parties for every month of the year. Resource Concerns are addressed within the context of the site.

Scenario Feature Measure: Barrier Height (ft)

Scenario Unit: Vertical Feet

Scenario Typical Size: 12

Scenario Cost: $880,056.22 **Scenario Cost/Unit:** $73,338.02

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	$142.30	6	$853.80
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	$401.46	500	$200,730.00
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$296.42	1	$296.42
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	60	$3,742.80
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	$212.37	60	$12,742.20
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	60	$2,884.20
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	$109.92	60	$6,595.20
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	$19.06	60	$1,143.60
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	$26.75	180	$4,815.00
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	$108.13	240	$25,951.20
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	$27.30	80	$2,184.00
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	$33.06	80	$2,644.80
Materials						
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.85	200	$170.00
Denil Ladder	1838	Denil Ladder, designed to meet species passage requirements and site characteristics. Cost is per vertical foot of dam at site, and includes concrete, gates, trash racks, baffles, turn/resting pools, and ladder entrance or exit works. Includes materials	Foot	$50,952.38	12	$611,428.56
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	2000	$2,060.00
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

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	$543.77	2	$1,087.54
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	$78.65	2	$157.30

Practice: 396 - Aquatic Organism Passage

Scenario: #11 - Alaskan Steeppass

Scenario Description:

Alaskan Steeppass fishways are roughened chutes that employ baffles connected to the walls and floor of the chute to provide near continuous energy dissipation throughout the fishway length. A Steeppass is commonly constructed of welded aluminum at an offsite fabrication facility that is later transported to the project site and lowered in place with a boom truck or crane. Steeppasses can be composed of a single length of chute, or chutes connected by reinforced, poured-in-place resting/turn pools at complex or higher barrier sites. These fishways have excellent attraction characteristics when properly sited and provide good passage conditions using relatively low flow amounts. They often do not require auxiliary (pumped) attraction or fishway flow, but are sensitive to tailwater fluctuations. Steeppass fishways are used mainly for sites where the fishway can be closely monitored, such as off-ladder fish trap designs or temporary fishways used during construction of permanent passage facilities. Because of their baffle geometry and narrow flow paths, steeppass fishways are especially susceptible to debris accumulation.

Steeppass fishways are designed with a sloped channel that has a constant discharge for a given normal depth, chute gradient, and baffle configuration. Energy is dissipated consistently throughout the length of the fishway via channel roughness, and results in an average velocity compatible with the swimming ability of native aquatic organisms. Target species' mobility data are important factors in determing the length of a Denil or steeppass because there are no resting locations within a given length of these fishways. Once an animal starts to ascend a length of steeppass, it must pass all the way upstream and exit the fishway, or risk injury when falling back downstream. If the steeppass fishway is long, intermediate resting pools may be included in the design, located at intervals determined by the swimming ability of the weakest target species.

Steeppass fishways are constructed with equipment used for excavation, placing material, and delivering and removing material. Lifts or booms may be required to place concrete into forms or lift steeppass sections into place. Because ladders are often attached to existing dams, personnel familiar with the dam structure are involved at all phases of the process to ensure that plans conform with site requirements. Bed and bank excavation may be necessary to create the location for fishway components, so site isolation and sediment and erosion control measures are used. Disturbed areas are revegetated with a mix of site-adapted species, and access control and signage are provided. Scenario does not include additional measures in the adjacent active channel necessary to control flow, address channel elevation or stability, or encourage fish guidance into the concrete ladder. Scenario does not include structures used as counting stations or to trap and sample upstream migrants.

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 operational, low hazard class fixed crest concrete dam becomes the target of parties interested in providing fish passage. The dam presently blocks the upstream migration of a number of native aquatic organisms, and suitable spawning and rearing habitats for targeted fish species exists in upstream river reaches. Assessment of site conditions, dam operation, and target species swimming abilities indicate that a concrete ladder will provide suitable passage conditions during the migration season and pass the expected run volume without excessive delays.

After Situation:

Four sections of Alaskan Steeppass separated by 2 turn/resting pools are installed. The ladder is attached to the face and abutment of the dam, and the entrance is located along the streambank where migrating native fish are likely to encounter it. The ladder passes the estimated run volume with minimal delays, and native aquatic animals are able to reach upstream spawning and rearing areas and successfully produce offspring that become part of the population. The ladder has an operating plan that stipulates actions and responsible parties for every month of the year. Resource Concerns are addressed within the context of the site.

Scenario Feature Measure: Barrier Height (ft)

Scenario Unit: Vertical Feet

Scenario Typical Size: 8

Scenario Cost: $81,785.95 **Scenario Cost/Unit:** $10,223.24

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	$48.07	60	$2,884.20
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$142.30	6	$853.80
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	$401.46	100	$40,146.00
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$296.42	0.5	$148.21
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	$212.37	40	$8,494.80
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 equipment and operator.	Hour	$109.92	20	$2,198.40
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	40	$2,495.20
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	$27.30	40	$1,092.00
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	$26.75	140	$3,745.00
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	$108.13	120	$12,975.60
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	$19.06	60	$1,143.60
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	$33.06	40	$1,322.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	4	$1,139.20
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 included in the component price.	Dollar	$1.03	2000	$2,060.00
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	2	$1,087.54

Practice: 396 - Aquatic Organism Passage

Scenario: #12 - Low Water Crossing

Scenario Description:

Structure installed on low volume or on unimproved roads at watercourse crossings. Primary use is to allow livestock and equipment access to other parcels of land or operational units. Low-water crossings provide safe and stable stream crossings that don't negatively impact water and ecological quality while remaining stable across a wide range of flows. Variations exist, but a common application consists of an improved or hardened ford located above a hydraulic control (e.g., bedrock outcropping, riffle, or step composed of coarse substrates). Properly designed and installed low water crossings provide aquatic organism passage (AOP), promote stream ecological and geomorphic function, remain stable over time, and can pass sediment and woody debris.

Conservation planning and interaction with the landowner is vital to determine if existing crossings can be consolidated into fewer, more reliable locations. Characterizing a site according to its watershed position and geomorphic function will aid design decisions. Optimal AOP conditions are usually realized when the backfill is composed of a mixture that mimics bed material as evaluated from a reference reach adjacent to the crossing—preferably at least 10-20 estimated bankfull channel widths above an existing crossing to avoid effects that alter channel geometry or bedform composition and spacing.

Low water crossings are installed with an assortment of equipment used for excavation, placing material, and delivering and removing material. Low water crossings provide the best mix of function and longevity when they are designed and built to conform to existing channel geometry and slope, constructed to match the shape of the existing channel, and oriented to cross the stream at a 90 degree angle. Crossing width, measured along the downstream axis, should not exceed 2X bankfull width. Low water crossings are commonly constructed by overexcavating the crossing section 6-12 inches below the existing streambed and backfilling the void with well-graded rock back to natural bed elevation. Geotextile lining may be required in some settings. Rock size and gradation is the smallest mix needed to remain stable under prevailing flow conditions—larger rock can endanger livestock and turbulence impairs passage. Sand or soil may be added into the mix to seal the section to ensure that the stream doesn't percolate into the crossing substrate. Smaller material increases bed diversity, chokes voids between bigger stones, and helps preserve passage quality. Smaller rock smaller (< 2 inches) at the finished surface may become lodged in livestock hooves. The road/trail surface of the crossing should be extended to an elevation that exceeds the known high water level on each side of the crossing. The downstream edge of the crossing should not produce a sharp drop in water surface to preserve AOP quality and discourage sediment deposition and debris accumulation. 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. Stream corridor fencing should be considered to control livestock access and preserve water and riparian quality.

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:

A small farming operation has a mixture of pastures, hay meadows, and crops that all require seasonal movement of equipment and livestock between parcels. Four unimproved stream crossings provide unreliable access across the property and require yearly maintenance to clear debris and sediment. Farm equipment has gotten stuck in the past, and uncontrolled livestock access and frequent crossing or loafing in the stream contributes to chronic water quality problems associated with elevated fine sediment, high water temperatures, invasive aquatic vegetation, and fecal coliform bacteria. Livestock avoid three of the crossings when streamflow increases moderately. Two of the crossings are overwide and shallow, and impair AOP. The property and landowner's yearly operations are reviewed by conservation planners and—with the input and agreement of the landowner—it is decided that three of the four crossings can be eliminated and consolidated at one site above a cobble/boulder deposit in the stream.

After Situation:

An improved ford is constructed by excavating the channel just upstream of the boulder/cobble hydraulic control. The cut is lined with geotextile to control seepage and subsurface flow, and backfilled up to the existing bed elevation with a well-graded mix of rock sized to mimic the material in the channel upstream of the crossing. The finished crossing surface is at grade with the up and downstream channel elevation, and no drop exists along the downstream edge. Approaches on either side of the crossing are extended up to the adjacent floodplain surface, and the finished instream portion of the ford matches the existing channel cross section. Approach slopes are shallow enough for expected equipment traffic, including towed combinations, and armored as needed with larger rock to protect against erosion that may occur when the floodplain is inundated. The crossing is fenced and gated to control livestock access and provide greater flexibility

to the landowner's grazing needs. AOP is provided, and the crossing remains stable across a range of flow and sediment and debris transport events. Resource Concerns are addressed within the context of the site.

Scenario Feature Measure: Cubic Yard

Scenario Unit: Cubic Yard

Scenario Typical Size: 60

Scenario Cost: $43,748.30 **Scenario Cost/Unit:** $729.14

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	$5.75	50	$287.50
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$107.86	40	$4,314.40
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$296.42	0.5	$148.21
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	1000	$2,350.00
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	80	$4,990.40
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	$212.37	60	$12,742.20
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	80	$3,845.60
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	$19.06	60	$1,143.60
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	$26.75	260	$6,955.00
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	$33.06	40	$1,322.40
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	$27.30	60	$1,638.00
Materials						
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$23.79	75	$1,784.25
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	4	$1,139.20
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	2	$1,087.54

Practice: 396 - Aquatic Organism Passage

Scenario: #13 - 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/Second

Scenario Typical Size: 5

Scenario Cost: $47,559.12 **Scenario Cost/Unit:** $9,511.82

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	$5.75	20	$115.00
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	$401.46	15	$6,021.90
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$296.42	1	$296.42
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	$212.37	40	$8,494.80
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	40	$1,922.80
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 equipment and operator.	Hour	$109.92	32	$3,517.44
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$107.86	32	$3,451.52
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	$27.30	60	$1,638.00
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	$108.13	120	$12,975.60
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	$33.06	40	$1,322.40
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	$26.75	110	$2,942.50
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	$19.06	60	$1,143.60
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	$543.77	2	$1,087.54

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
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 included in the component price.	Dollar	$1.03	2000	$2,060.00

Practice: 396 - Aquatic Organism Passage

Scenario: #14 - 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/Second

Scenario Typical Size: 75

Scenario Cost: $82,516.92 **Scenario Cost/Unit:** $1,100.23

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	$212.37	40	$8,494.80
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	$401.46	100	$40,146.00
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$296.42	1	$296.42
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	40	$1,922.80
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	50	$287.50
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$107.86	32	$3,451.52
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 equipment and operator.	Hour	$109.92	32	$3,517.44
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	$27.30	60	$1,638.00
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	$19.06	60	$1,143.60
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	$26.75	110	$2,942.50
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$33.06	60	$1,983.60
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	$108.13	120	$12,975.60

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	2	$1,087.54
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 included in the component price.	Dollar	$1.03	2000	$2,060.00

Practice: 399 - Fishpond Management

Scenario: #1 - Invasive Weed Species - Chemical

Scenario Description:

Chemical application to existing fishpond to remove invasive or undesired vegetation. Typically use Diquat dibromide or other appropriate herbicide. Chemical control will be applied by a certified pesticide applicator per state code. Resource concerns addressed include: Degraded Plant Condition - Excessive plant pest pressure; Degraded Plant Condition - Inadequate structure and composition; Inadequate Habitat for Fish and Wildlife - Habitat degradation.

Before Situation:

Existing fishpond is negatively impacted by invasive vegetation. Invasive vegetation is reducing availability of resources for desired fish species.

After Situation:

Chemical application has been completed to manage the invasive vegetation. Resource concerns have been addressed. Participant will follow Operation and Maintenance guidance to ensure control has been achieved through regular monitoring and will address any negative impacts to ensure an invasion does not occur again within the lfiespan of the practice.

Scenario Feature Measure: Acre of pond managed

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $317.60 **Scenario Cost/Unit:** $317.60

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	$41.41	2	$82.82
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	$27.30	4	$109.20
Materials						
Herbicide, Diquat dibromide	1820	Aquatic herbicide and plant growth regulator. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Gallon	$125.58	1	$125.58

Practice: 399 - Fishpond Management

Scenario: #2 - Habitat Structures

Scenario Description:

Fishpond lacks a diversity of habitat to provide adequate habitat for desired fish species. Creation of habitat structures as recommended by conservation planner or other individual with appropriate credentials. Suggested improvements will determine type of structure needed, number of structures, density and location of structures. Habitat structures are typically submerged or emergent. Structures may include log cribs, rock piles, log and rock cribs, pipe and limber cribs, conifer cribs, PVC-tree structures, gravel spawning beds, catfish cages, concrete blocks stacked and filled with sticks or cuttings or plastic barrels filled with sand and sticks. Resource Concerns addressed include: Inadequate Habitat for Fish and Wildlife - Habitat degradation. Practice installation may also address: Water Quality Degradation - Elevated water temperatures.

Before Situation:

Existing fish pond lacks sufficent habitat diversity to provide optimum conditions for desired fish species.

After Situation:

Habitat structures within fishpond are appropriate for desired fish species. Typical installation in 1 ac pond: 12 structures of 24 concrete blocks stacked and wired together, with sticks placed within blocks. Resource concerns have been addressed. Participant will follow Operation and Maintenance guidance to ensure created habitat is maintained and continues to provide the benefits to the resources.

Scenario Feature Measure: Acre of pond managed

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $1,622.88 **Scenario Cost/Unit:** $1,622.88

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	$41.41	6	$248.46
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	27	$514.62
Materials						
Block, concrete	253	Concrete block, hollow, normal weight, 3500 psi. Includes both full and partial sizes. Material only	Each	$1.98	144	$285.12
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	$191.56	3	$574.68

Practice: 399 - Fishpond Management

Scenario: #3 - Aerator, surface

Scenario Description:

Aerator added to existing fishpond to obtain desired oxygen levels. Typically 1 aerator needed per pond. Certain oxygen levels in the fishpond are needed for optimum vegetation, habitat and water quality. Oxygen levels and size of aerator needed are determined by a conservation planner, engineer or per existing supported data. Aerator planning and placement specifications can be found in "AEN-3: Aeration of ponds used in aquaculture". Resource concerns addressed include: Inadequate Habitat for Fish and Wildlife - Habitat degradation; Water Quality Degradation - Elevated water temperature.

Before Situation:

Existing fishpond has insufficent levels of oxygen available for desired fish species in pond. Habitat and water quality degraded, as well as health of the fish population.

After Situation:

Aerator sized appropriately for fishpond has been established and oxygen is at an optimum level. Participant will follow Operation and Maintenance guidance to ensure aerator maintained to continually provide appropriate oxygen levels for fishpond.

Scenario Feature Measure: Acre of pond managed

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $1,557.73 **Scenario Cost/Unit:** $1,557.73

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	$41.41	2	$82.82
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	3	$57.18
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
Post, Steel T, 1.33 lbs, 10'	17	Steel Post, Studded 10' - 1.33 lb. Includes materials and shipping only.	Each	$10.83	2	$21.66
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	$191.56	1	$191.56

Practice: 399 - Fishpond Management

Scenario: #4 - Aerator, subsurface

Scenario Description:

Aerator added to existing fishpond to obtain desired oxygen levels. Typically 1 aerator needed per pond. Certain oxygen levels in the fishpond are needed for optimum vegetation, habitat and water quality. Oxygen levels and size of aerator needed are determined by a conservation planner, engineer or per existing supported data. Aerator planning and placement specifications can be found in "AEN-3: Aeration of ponds used in aquaculture". Resource concerns addressed include: Inadequate Habitat for Fish and Wildlife - Habitat degradation; Water Quality Degradation - Elevated water temperature. Associated Practice: Critical Area Planting - 342

Before Situation:

Existing fishpond has insufficent levels of oxygen available for desired fish species in pond. Habitat and water quality degraded, as well as health of the fish population.

After Situation:

Aerator sized appropriately for fishpond has been established and oxygen is at an optimum level. Participant will follow Operation and Maintenance guidance to ensure aerator maintained to continually provide appropriate oxygen levels for fishpond.

Scenario Feature Measure: Acre of pond managed

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $3,868.14 **Scenario Cost/Unit:** $3,868.14

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	$41.41	2	$82.82
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	$2.35	8	$18.80
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	$19.06	3	$57.18
Materials						
Aerator - subsurface	1821	Aeration system, ponds, subsurface air. Includes shipping.	Each	$2,876.26	1	$2,876.26
Pipe, PVC, 3", SCH 40	977	Materials: - 3" - PVC - SCH 40 - ASTM D1785	Foot	$2.87	50	$143.50
Post, Steel T, 1.33 lbs, 10'	17	Steel Post, Studded 10' - 1.33 lb. Includes materials and shipping only.	Each	$10.83	2	$21.66
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
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	$191.56	2	$383.12

Practice: 399 - Fishpond Management

Scenario: #5 - Planting Native Vegetation

Scenario Description:

Native, aquatic vegetation will be established by plugs and or tubers. Both emergent and submerged vegetation will be established using hand tools or other small equipment as needed. Vegetation will be established to ensure approprite cover for desired fish species. Plants will be established at a rate, location and density as prescribed by the conservation planner or other resource. A typical setting will plant between 2-5 aquatic plants per 10 SF. This scenario may include replacing of non desired plants with appropriate native plants. Resource Concerns addressed include: Degraded Plant Condition - Excessive plant pest pressure; Inadequate Habitat for Fish and Wildlife - Habitat degradation. Practice installation may also address: Water Quality Degradation - Elevated water temperatures.

Before Situation:

Established fish pond which has had insufficient vegetation for desired fish species. Vegetation consists either primarily of non-desired plants or is not of a density to provide adequate cover for fish species. Fishpond is typically 1 acre in size, 1/4 acre of fishpond will receive native vegetation restoration.

After Situation:

Vegetation in fishpond is of a density and composition that is suitable for desired fish species. Vegetation is native plants. Resource concerns have been addressed. Participant will follow Operation and Maintenance guidelines to ensure established plants will thrive. If plant die-off occurs prior to lifespan of practice, participant is required to re-establish vegetation to NRCS Standards and Specifications.

Scenario Feature Measure: Acre of vegetation planted

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $1,371.54 **Scenario Cost/Unit:** $1,371.54

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	$41.41	2	$82.82
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	36	$686.16
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	300	$411.00
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	$191.56	1	$191.56

Practice: 399 - Fishpond Management

Scenario: #6 - Depth Management

Scenario Description:

Management of existing fishpond by excavation or placement of material to create deep open water or littoral shelves. Fishpond currently does not provide optimum habitat for desired species. Excavated material will either be relocated within fish pond, or sited appropriately so as to not cause any negative environmental effects. Changes to depth will be based upon recommendations by conservation planner or other indidvidual with appropriate credentials. Resource Concerns addressed include: Inadequate Habitat for Fish and Wildlife - Habitat degradation. Practice installation may also address: Water Quality Degradation - Elevated water temperatures. Associated Practice (if required): Critical Area Planting - 342

Before Situation:

Existing fish pond lacks sufficent depth, diversity of depth or desired bottom structure to provide optimum habitat for desired fish species.

After Situation:

Depth and bottom structure of fishpond are appropriate for desired fish species. Resource concerns have been addressed. Participant will follow Operation and Maintenance guidance to ensure created habitat is maintained and continues to provide the benefits to the resources.

Scenario Feature Measure: Acre of pond managed

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $237.90 **Scenario Cost/Unit:** $237.90

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$23.79	10	$237.90

Practice: 402 - Dam

Scenario: #1 - pipe principal spillway

Scenario Description:

This scenario is the construction of an earthen embankment to impound water. A corrugated metal pipe (CMP) principal spillway will be constructed. A metal trash guard protects the spillway inlet. A circular CMP riser connects to a CMP barrel that runs through the dam to outlet safely downstream. A sand diaphram is installed in the embankment. This scenario assists in addressing the resource concerns: excessive runoff, flooding or ponding, inefficient water use on irrigated land, reduced capacity of conveyances by sediment deposition.

Before Situation:

Area exists where water could naturally pool or run off to create a pond for livestock, wildlife, fire control, flood control, or irrigation. The site meets satisfactory conditions according to the standard.

After Situation:

The typical dam is constructed by excavation and compaction to create an embankment. The principal spillway is completed by using a CMP riser with a metal trash gaurd and a CMP barrel. A sand diaphragm is installed. Vegetation will be completed under Critical Area Planting (342) standard. . Other associated practices such as; Fence (382), Pipeline (516), Pumping Plant (533), Watering Facility (614), Structure For Water Control (587), and Aquatic Organism Passage (396) will use the corresponding Standard(s) as appropriate.

Scenario Feature Measure: Embankment Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 25,000

Scenario Cost: $176,459.04 **Scenario Cost/Unit:** $7.06

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	$1.38	130	$179.40
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	25000	$109,250.00
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	$401.46	1	$401.46
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	90	$517.50
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	$2.35	25000	$58,750.00
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	$19.06	20	$381.20
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	$33.06	40	$1,322.40
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	$27.30	20	$546.00
Materials						
Pipe, CMP, 18", 16 Gauge	1743	18" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$18.19	130	$2,364.70
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	$2.44	60	$146.40

Materials

Pipe, CMP, 30", 16 Gauge	1742	30" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$29.10	35	$1,018.50
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$27.99	52	$1,455.48
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.40	90	$126.00

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: $5,487.32 **Scenario Cost/Unit:** $43.55

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	$1.69	160	$270.40
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	$19.06	8	$152.48
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	84	$4,494.84
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 410 - Grade Stabilization Structure

Scenario: #2 - Embankment, Pipe <= 6"

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: $11,473.35 **Scenario Cost/Unit:** $5.74

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	$127.04	5	$635.20
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	2000	$8,740.00
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	20	$115.00
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	$26.75	5	$133.75
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	$27.30	20	$546.00
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	$19.06	10	$190.60
Materials						
Pipe, PVC, 6", SCH 40	980	Materials: - 6" - PVC - SCH 40 - ASTM D1785	Foot	$6.79	80	$543.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 410 - Grade Stabilization Structure

Scenario: #3 - Embankment, Pipe 8"-12"

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: $16,447.67 **Scenario Cost/Unit:** $6.58

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	$5.75	29	$166.75
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	$127.04	10	$1,270.40
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	2500	$10,925.00
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	$26.75	10	$267.50
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	$27.30	30	$819.00
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	$19.06	30	$571.80
Materials						
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.40	60	$84.00
Pipe, PVC, 10", SCH 80	1351	Materials: - 10" - PVC - SCH 80 - ASTM D1785	Foot	$17.90	90	$1,611.00
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$27.99	3	$83.97
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

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	$78.65	1	$78.65

Practice: 410 - Grade Stabilization Structure

Scenario: #4 - Embankment, Pipe >12"

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: $20,503.51 **Scenario Cost/Unit:** $8.20

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	$4.37	2500	$10,925.00
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	129	$741.75
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	$127.04	13	$1,651.52
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	$401.46	2	$802.92
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	$127.06	1	$127.06
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	42	$800.52
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	$27.30	38	$1,037.40
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	$26.75	13	$347.75
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

Steel, Plate, ⅛"	1047	Flat Steel Plate, ⅛" thick, materials only.	Square Foot	$4.71	82	$386.22
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	14	$749.14
Pipe, Steel, 16", Std Wt, USED	1357	Materials: - USED - 16" - Steel Std Wt	Foot	$30.04	7	$210.28
Pipe, Steel, 12", Std Wt, USED	1356	Materials: - USED - 12" - Steel Std Wt	Foot	$22.78	90	$2,050.20

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	$78.65	1	$78.65
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 410 - Grade Stabilization Structure

Scenario: #5 - Embankment,Soil Treatment

Scenario Description:

An earthen embankment dam with a principal spillway pipe where on site soils are not acceptable and require extra processing or hauling from off farm, distances greater than one mile. 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: $25,447.67 **Scenario Cost/Unit:** $10.18

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	$4.37	2500	$10,925.00
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	$127.04	10	$1,270.40
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	$0.36	25000	$9,000.00
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	29	$166.75
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	$19.06	30	$571.80
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	$26.75	10	$267.50
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	$27.30	30	$819.00
Materials						
Pipe, PVC, 10", SCH 80	1351	Materials: - 10" - PVC - SCH 80 - ASTM D1785	Foot	$17.90	90	$1,611.00
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.40	60	$84.00
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$27.99	3	$83.97
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	$78.65	1	$78.65
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

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 volume (length times area) in cubic feet plus the barrle volume (length times area) in cubic 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" dia PVC riser with a 40 ft long barrel. (18" diameter x 6 ft length) + (18" diameter x 40ft. length) = 828 Diameter-inch feet. 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 Length x diameter in inches) + (Barrel Length x diameter in inches)

Scenario Unit: Diameter Inch Foot

Scenario Typical Size: 828

Scenario Cost: $4,808.92 **Scenario Cost/Unit:** $5.81

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	$127.04	2	$254.08
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	$401.46	1	$401.46
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	20	$115.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	100	$437.00
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	$19.06	8	$152.48
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	$26.75	2	$53.50
Materials						
Pipe, PVC, 18", SCH 40	1373	Materials: - 18" - PVC - SCH 40 - ASTM D1785	Foot	$29.99	40	$1,199.60
Pipe, PVC, 24", ASTM-2241, SDR 26	1945	Materials: -24" -PVC - ASTM 2241, SDR 26	Foot	$34.24	6	$205.44
Coupling, PVC, Tee, 24x18, SCH 40	1374	Materials: - Tee, 24"x18" - PVC - SCH 40 - ASTM D1785	Each	$1,626.91	1	$1,626.91

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
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	$78.65	1	$78.65

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 (36" diameter x 12 ft length) + (30" diameter x 100 ft. length) = 3432 Diameter-inch feet.. 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 Length x diameter in inches) + (Barrel Length x diameter in inches)

Scenario Unit: Diameter Inch Foot

Scenario Typical Size: 3,432

Scenario Cost: $14,527.02 **Scenario Cost/Unit:** $4.23

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	$5.75	100	$575.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	600	$2,622.00
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	$127.04	4	$508.16
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	$19.06	10	$190.60
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	$26.75	4	$107.00
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	$27.30	11	$300.30
Materials						
Pipe, Steel, 36", Std Wt, USED	1362	Materials: - USED - 36" - Steel Std Wt	Foot	$103.05	12	$1,236.60
Steel, Plate, 3/8"	1375	Flat steel plate, 3/8" thickness. Materials only.	Square Foot	$14.09	9	$126.81
Steel, Plate, ⅛"	1047	Flat Steel Plate, ⅛" thick, materials only.	Square Foot	$4.71	30	$141.30
Pipe, Steel, 30", Std Wt, USED	1361	Materials: - USED - 30" - Steel Std Wt	Foot	$80.71	100	$8,071.00
Mobilization						

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
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	$78.65	1	$78.65

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: $8,110.81 **Scenario Cost/Unit:** $90.12

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	$4.37	75	$327.75
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	$127.04	5	$635.20
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	$2.35	40	$94.00
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	$401.46	9	$3,613.14
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	9	$21.15
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	$19.06	30	$571.80
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	$27.30	10	$273.00
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	$26.75	5	$133.75
Materials						
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$21.10	11	$232.10

Materials

Pipe, CMP, 12", 14 Gauge	1377	12" - Corrugated Steel Pipe. Galvanized, uncoated. 14 Gauge. Materials only.	Foot	$8.62	2	$17.24
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
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	3	$85.08

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

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 3 ft and weir length of 8 ft (24 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: 24

Scenario Cost: $3,490.89 **Scenario Cost/Unit:** $145.45

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	$4.37	40	$174.80
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	$127.04	5	$635.20
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	$2.35	7	$16.45
Tractor, agricultural, 210 HP	1201	Agricultural tractor with horsepower range of 190 to 240. Equipment and power unit costs. Labor not included.	Hour	$112.88	3	$338.64
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	23	$54.05
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	$26.75	5	$133.75
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	10	$190.60
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	$33.06	10	$330.60
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	$149.60	7	$1,047.20

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

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: $5,537.53 **Scenario Cost/Unit:** $5,537.53

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	$2.35	11	$25.85
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	$127.04	12	$1,524.48
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	40	$174.80
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	$2.35	10	$23.50
Tractor, agricultural, 210 HP	1201	Agricultural tractor with horsepower range of 190 to 240. Equipment and power unit costs. Labor not included.	Hour	$112.88	20	$2,257.60
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	4	$28.04
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	$5.85	1	$5.85
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	1	$41.41
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	$33.06	5	$165.30
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	$19.06	20	$381.20
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	1	$18.90

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	$26.75	12	$321.00

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 410 - Grade Stabilization Structure

Scenario: #11 - Rock Dam

Scenario Description:

A structure constructed of rock riprap that is hand laid in place with a series of footer rocks embedded into the gulley floor then a layer of large similarly sized rocks laid on top of footers from bank to bank and at least as far up stream as wide. The function of the One rock dam is not to stop the water and then allow it to plunge over the down stream end during high water events, but to slow the water allowing it to pass through the structure effectively raising the bed of the channel to reestablish flood plain connectivity. These structures are used to restore the natural hydrology of entrenched swales and intermittent streams resulting in increased vegetative production and the natural restoration of the ecological site plant community. Cost estimate is based upon a One rock dam 2ft tall (measured from lowest part of channel floor - Thalweg) X 10ft wide X 8ft long structure (80 square feet). The unit of payment measurement is defined as length from furthest upstream part of structure to furthest down stream part of structure times width being the widest extent of structure when measured from channel bank to channel bank "square feet". Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion, water quality degradation, Plant Condition and health, wildlife habitat degradation and T&E/ State Species of Concern (critical Sage Grouse brood rearing habitat).

Before Situation:

The operator presently has entrenched swales or intermittent streams in rangeland or other land use. The entrenched systems are lowering the water table, reducing vegetative productivity, changing vegetation type, degrading forage and degrading wildlife habitat (critical sage grouse brood rearing habitat). Erosion from the entrenched systems is allowing soil and possibly nutrients to be transported to downstream receiving waters degrading water quality and causing soil loss.

After Situation:

The function of the one rock dam is not to stop the water and then allow it to plunge over the down stream end during high water events, but to slow the water allowing it to pass through the structure effectively raising the bed of the channel to reestablish flood plain connectivity. These structures are used to restore the natural hydrology of entrenched swales and intermittent streams resulting in increased vegetative production and the natural restoration of the ecological site plant community.

Scenario Feature Measure: Feet of structure length times feet of structure width

Scenario Unit: Square Foot

Scenario Typical Size: 80

Scenario Cost: $802.48 **Scenario Cost/Unit:** $10.03

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	$62.38	1	$62.38
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	$0.36	83	$29.88
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	$19.06	4	$76.24
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	1	$18.90
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	$33.06	1	$33.06
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	1	$19.55
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$21.10	8.5	$179.35
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	$191.56	2	$383.12

Practice: 410 - Grade Stabilization Structure

Scenario: #12 - Rock Drop Structures - remote locations

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 3 ft and weir length of 8 ft (24 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. This scenario is strictly for use in remote locations that are at least 50 miles or more from the source of equipment or materials.

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: 24

Scenario Cost: $4,108.89 **Scenario Cost/Unit:** $171.20

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	$2.35	23	$54.05
Tractor, agricultural, 210 HP	1201	Agricultural tractor with horsepower range of 190 to 240. Equipment and power unit costs. Labor not included.	Hour	$112.88	3	$338.64
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	$127.04	5	$635.20
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	$2.35	7	$16.45
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	40	$174.80
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	$19.06	10	$190.60
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	$26.75	5	$133.75
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$33.06	10	$330.60
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	$149.60	7	$1,047.20

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	600	$618.00
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 412 - Grassed Waterway

Scenario: #1 - Waterway

Scenario Description:

Typical practice is 1200 ' long, 12' bottom, 8:1 side slopes, 1.5' depth, half excavation. A grass 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. This practice addresses Concentrated Flow Erosion (Classic Gully & Ephemeral Erosion) and Excessive Sediment in surface waters. Waterway area measured from top of bank to top of bank. Seeding area is 20% greater than waterway area to account for disturbed areas. Costs include excavation and associated work to construct the overall shape and grade of the waterway.

Before Situation:

The field has a small gulley which is cutting deeper into the field as time goes on so it needs to be stopped or controlled. 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 poor cropping techniques. Grassed waterway is also commonly installed to convey runoff from concentrated flows, terrarces, diversions, or water control structures or similar practices to a suitable, stable outlet.

After Situation:

Installed grassed waterway is 1200 ' long, 12' bottom, 8:1 side slopes, 1.5' depth. The practice is installed using a dozer. 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).

Scenario Feature Measure: Acre of Waterway

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $1,746.10 **Scenario Cost/Unit:** $1,746.10

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	$1.69	800	$1,352.00
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	$33.06	1	$33.06
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	4	$76.24
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 412 - Grassed Waterway

Scenario: #2 - Waterway - with Fabric Check Structures

Scenario Description:

Typical practice is 1200 ' long, 12' bottom, 8:1 side slopes, 1.5' depth, half excavation. A grass 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). This practice addresses Concentrated Flow Erosion (Classic Gully & Ephemeral Erosion) and Excessive Sediment in surface waters. Waterway area measured from top of bank to top of bank. Seeding area is 20% greater than waterway area to account for disturbed areas. Costs include excavation and associated work to construct the overall shape and grade of the waterway.

Before Situation:

The field has a small gulley which is cutting deeper into the field as time goes on so it needs to be stopped or controlled. 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 poor cropping techniques. Grassed waterway is also commonly installed to convey runoff from concentrated flows, terrarces, diversions, or water control structures or similar practices to a suitable, stable outlet.

After Situation:

Installed grassed waterway is 1200 ' long, 12' bottom, 8:1 side slopes, 1.5' depth. Fabric checks are installed every 100 feet along the length of the waterway. The practice is installed using a dozer. Fabric or stone checks are installed with small backhoe and labor. 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 accoring 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).

Scenario Feature Measure: Acre of Waterway

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $2,618.31 **Scenario Cost/Unit:** $2,618.31

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	$1.69	800	$1,352.00
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	$2.35	33	$77.55
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	33	$189.75
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	$33.06	2	$66.12
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	$19.06	12	$228.72
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	$1.13	132	$149.16
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
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	$191.56	1	$191.56

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	$78.65	1	$78.65

Practice: 422 - Hedgerow Planting

Scenario: #1 - Pollinator Habitat

Scenario Description:

In addition to the traditional hedgerow purposes where pollinator habitat is an additional wildlife habitat concern this scenario addresses the resource concern of inadequate fish and wildlife habitat. It provides both physical habitat by providing areas that are not disturbed by annual tillage and provides pollen and nector throughout the growing season by establishing a diverse mixture of flowering plants. Typically a mixture of 5 or more species is planted to improve diversity so that pollen and nector are avaiable as long as possible. Typical installation is in or at the edge of cropland or pasture. Typical installation involves tillage to prepare the site for planting. Flowering trees and shrubs adapted for local climatic and edaphic conditions are typically planted at eight foot intervals (this will vary with species selection and density goals). A native grass adapted to the local climatic and edaphic conditions will be drilled into the site at a rate that will achieve a minimum of 20 seeds per square foot. A locally adapted mixture of at 3 pollen and nectar producing plants will be drilled into the site. The species list in the component section of this scenario are strictly for deriving a cost. Species adapted to local climatic and edaphic conditions will be listed in the specification for the site. There is tremendous overlap between this practice and conservation practice 380 Windbreak/Shelterbelt establishment. The main difference is that conservation practice 380 is exclusively woody plants where practice 422 provides for the use of herbaceous materials. If a fence is needed to facilitate establishment use practice 382, Fence.

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: $2,273.02 **Scenario Cost/Unit:** $2.84

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	$22.51	0.25	$5.63
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$17.50	0.25	$4.38
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	100	$1,906.00
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	100	$52.00
Animal repellent, chemical	1907	Chemical animal repellent to protect trees from animal damage. Includes materials and shipping only.	Gallon	$33.30	0.25	$8.33
Tree, conifer, seedling, bare root, 2-0	2047	Bare root conifer trees, 2-0 (2 years old). Includes materials and shipping only.	Each	$0.38	100	$38.00
Three Species Mix, Cool Season, Introduced Perennial Grass	2315	Cool season, introduced grass mix. Includes material and shipping only.	Acre	$46.58	0.25	$11.65
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	100	$60.00
Three Species Mix, Native Forb	2333	Native forb mix. Includes material and shipping only.	Acre	$586.90	0.25	$146.73
One Species, Cool Season, Native Perennial Grass	2312	Native, cool season perennial grass. Includes material and shipping only.	Acre	$161.29	0.25	$40.32

Practice: 422 - Hedgerow Planting

Scenario: #2 - Contour

Scenario Description:

Typically installation of this scenario is within an annually cropped field. The hedge row is planted on the contour to provide a physical and visual aid to contour farming. This scenario is used to facilitate additional measures that address the resource concerns of; sheet and rill soil erosion and Water Quality Degradation, excess sediment in surface waters. Trees, shrubs, and grasses adapted for local climatic and edaphic conditions are typically planted at eight foot intervals (this will vary with species selection and density goals). Species selected should be at least three feet tall at maturity. There is tremendous overlap between this practice and conservation practice 380 Windbreak/Shelterbelt establishment. The main difference is that conservation practice 380 is exclusively woody plants where practice 422 provides for the use of herbaceous materials. If a fence is needed to facilitate establishment use practice 382, Fence.

Before Situation:

Contour farming practices are made difficult or less effective due to a lack of visual clues as to the location of the contours. Soil is lost to sheet and rill erosion. Sediments are deposited into surface waters.

After Situation:

Hedgerow planted on the contour presents a physical and visual guide for tillage and planting operations on the contour. Soil erosion from sheet and rill sources is reduced and the resultant deposition of sediment to surface waters is in turn reduced.

Scenario Feature Measure: Length of Hedgerow

Scenario Unit: Feet

Scenario Typical Size: 800

Scenario Cost: $2,103.30 **Scenario Cost/Unit:** $2.63

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	$17.50	0.25	$4.38
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	0.25	$5.63
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	100	$1,906.00
Materials						
Animal repellent, chemical	1907	Chemical animal repellent to protect trees from animal damage. Includes materials and shipping only.	Gallon	$33.30	0.25	$8.33
Three Species Mix, Cool Season, Introduced Perennial Grass	2315	Cool season, introduced grass mix. Includes material and shipping only.	Acre	$46.58	0.25	$11.65
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
Tree, hardwood, seedling or transplant, bare root, 16-36"	1510	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.75	100	$75.00
One Species, Cool Season, Native Perennial Grass	2312	Native, cool season perennial grass. Includes material and shipping only.	Acre	$161.29	0.25	$40.32

Practice: 422 - Hedgerow Planting

Scenario: #3 - Contour, exotic grass

Scenario Description:

Typically installation of this scenario is within an annually cropped field. The hedge row is planted on the contour to provide a physical and visual aid to contour farming. This scenario is used to facilitate additional measures that address the resource concerns of; sheet and rill soil erosion and Water Quality Degradation, excess sediment in surface waters. Trees, shrubs, and exotic grasses adapted for local climatic and edaphic conditions are selected. Typically woody species are planted at eight foot intervals (this will vary with species selection and density goals). Species selected should be at least three feet tall at maturity. There is tremendous overlap between this practice and conservation practice 380 Windbreak/Shelterbelt establishment. The main difference is that conservation practice 380 is exclusively woody plants where practice 422 provides for the use of herbaceous materials. If a fence is needed to facilitate establishment use practice 382, Fence.

Before Situation:

Contour farming practices are made difficult or less effective due to a lack of visual clues as to the location of the contours. Soil is lost to sheet and rill erosion. Sediments are deposited into surface waters.

After Situation:

Hedgerow planted on the contour presents a physical and visual guide for tillage and planting operations on the contour. Soil erosion from sheet and rill sources is reduced and the resultant deposition of sediment to surface waters is in turn reduced.

Scenario Feature Measure: Length of Hedgerow

Scenario Unit: Feet

Scenario Typical Size: 800

Scenario Cost: $2,087.46 **Scenario Cost/Unit:** $2.61

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	$17.50	0.25	$4.38
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	0.25	$5.63
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	100	$1,906.00
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	6	$113.40
Materials						
One Species, Cool Season, Native Perennial Grass	2312	Native, cool season perennial grass. Includes material and shipping only.	Acre	$161.29	0.25	$40.32
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.25	$17.73

Practice: 422 - Hedgerow Planting

Scenario: #4 - Wildlife, Warm Season Grass

Scenario Description:

Typically installed in or at the edge of cropland or pasture this scenario is used to address the Inadequate Habitat for Fish and Wildlife resource concern. Specifically, the establishment of dense vegetation in a linear design can be used to provide for several habitat elements depending on the needs identified in the habitat assessment. This scenario can provide: habitat conectivity, food, and cover for wildlife depending on design and plant species selection. The 422 standard for wildlife criteria calls for a minimum of two species of native plants.Typical installation involves tillage to prepare the site for planting. 2 Trees and/or shrubs adapted for local climatic and edaphic conditions are typically plant at eight foot intervals (this will vary with species selection and density goals). A mix of 2 native warm season grasses adapted to the local climatic and edaphic conditions will be drilled into the site at a rate that will achieve a minimum of 20 seeds per square foot. The species list in the component section of this scenario are strictly for deriving a cost. Plant species adapted to the local climatic and edaphic conditions that address the resource concern will be stated in the specification for the site. There is tremendous overlap between this practice and conservation practice 380 Windbreak/Shelterbelt establishment. The main difference is that conservation practice 380 is exclusively woody plants where practice 422 provides for the use of herbaceous materials. If a fence is needed to facilitate establishment use practice 382, Fence.

Before Situation:

Habitat patches lack connectivity. Cover is inadequate to allow wildlife to exploit cropland food resources. Berries and mast are limited.

After Situation:

Inadequate habitat for fish and wildlife is addressed for needs identified in the resource assessment. Habitat patches are connected by dense hedgerow vegetation. Food resources in crop fields are made availble by their proximity to hedgerow cover. Planting may include fruit and mast bearing species, improving food supply, depending on needs being addressed.

Scenario Feature Measure: Length of Hedgerow

Scenario Unit: Feet

Scenario Typical Size: 800

Scenario Cost: $2,092.70 **Scenario Cost/Unit:** $2.62

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	$17.50	0.25	$4.38
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	0.25	$5.63
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	100	$1,906.00
Materials						
Two Species Mix, Warm Season, Native Perennial Grass	2325	Native, warm season perennial grass. Includes material and shipping only.	Acre	$94.57	0.25	$23.64
Animal repellent, chemical	1907	Chemical animal repellent to protect trees from animal damage. Includes materials and shipping only.	Gallon	$33.30	0.25	$8.33
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
Tree, hardwood, seedling or transplant, bare root, 16-36"	1510	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.75	100	$75.00
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.25	$17.73

Practice: 422 - Hedgerow Planting

Scenario: #5 - Wildlife machine plant

Scenario Description:

This scenario is for machine planting of woody species.Typically installed in or at the edge of cropland or pasture this scenario is used to address the Inadequate Habitat for Fish and Wildlife resource concern. Specifically, the establishment of dense vegetation in a linear design can be used to provide for several habitat elements depending on the needs identified in the habitat assessment. This scenario can provide: habitat conectivity, food, and cover for wildlife depending on design and plant species selection. The 422 standard for wildlife criteria calls for a minimum of two species of native plants.Typical installation involves tillage to prepare the site for planting. 2 Trees and/or shrubs adapted for local climatic and edaphic conditions are typically plant at eight foot intervals (this will vary with species selection and density goals). A mix of 2 native grasses adapted to the local climatic and edaphic conditions will be drilled into the site at a rate that will achieve a minimum of 20 seeds per square foot. The species list in the component section of this scenario are strictly for deriving a cost. Plant species adapted to the local climatic and edaphic conditions that address the resource concern will be stated in the specification for the site. There is tremendous overlap between this practice and conservation practice 380 Windbreak/Shelterbelt establishment. The main difference is that conservation practice 380 is exclusively woody plants where practice 422 provides for the use of herbaceous materials. If a fence is needed to facilitate establishment use practice 382, Fence.

Before Situation:

Habitat patches lack connectivity. Cover is inadequate to allow wildlife to exploit cropland food resources. Berries and mast are limited.

After Situation:

Inadequate habitat for fish and wildlife is addressed for needs identified in the resource assessment. Habitat patches are connected by dense hedgerow vegetation. Food resources in crop fields are made availble by their proximity to hedgerow cover. Planting may include fruit and mast bearing species, improving food supply, depending on needs being addressed.

Scenario Feature Measure: Length of Hedgerow

Scenario Unit: Feet

Scenario Typical Size: 800

Scenario Cost: $75.00 **Scenario Cost/Unit:** $0.09

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Tree, hardwood, seedling or transplant, bare root, 16-36"	1510	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.75	100	$75.00

Practice: 422 - Hedgerow Planting

Scenario: #6 - Wildlife Cool Season

Scenario Description:

Typically installed in or at the edge of cropland or pasture this scenario is used to address the Inadequate Habitat for Fish and Wildlife resource concern. Specifically, the establishment of dense vegetation in a linear design can be used to provide for several habitat elements depending on the needs identified in the habitat assessment. This scenario can provide: habitat conectivity, food, and cover for wildlife depending on design and plant species selection. The 422 standard for wildlife criteria calls for a minimum of two species of native plants.Typical installation involves tillage to prepare the site for planting. 2 Trees and/or shrubs adapted for local climatic and edaphic conditions are typically plant at eight foot intervals (this will vary with species selection and density goals). A native cool season grass adapted to the local climatic and edaphic conditions will be drilled into the site at a rate that will achieve a minimum of 20 seeds per square foot. The species list in the component section of this scenario are strictly for deriving a cost. Plant species adapted to the local climatic and edaphic conditions that address the resource concern will be stated in the specification for the site. There is tremendous overlap between this practice and conservation practice 380 Windbreak/Shelterbelt establishment. The main difference is that conservation practice 380 is exclusively woody plants where practice 422 provides for the use of herbaceous materials. If a fence is needed to facilitate establishment use practice 382, Fence.

Before Situation:

Habitat patches lack connectivity. Cover is inadequate to allow wildlife to exploit cropland food resources. Berries and mast are limited.

After Situation:

Inadequate habitat for fish and wildlife is addressed for needs identified in the resource assessment. Habitat patches are connected by dense hedgerow vegetation. Food resources in crop fields are made availble by their proximity to hedgerow cover. Planting may include fruit and mast bearing species, improving food supply, depending on needs being addressed.

Scenario Feature Measure: Length of Hedgerow

Scenario Unit: Feet

Scenario Typical Size: 800

Scenario Cost: $2,086.30 **Scenario Cost/Unit:** $2.61

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	$17.50	0.25	$4.38
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	0.25	$5.63
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	100	$1,906.00
Materials						
One Species, Cool Season, Native Perennial Grass	2312	Native, cool season perennial grass. Includes material and shipping only.	Acre	$161.29	0.25	$40.32
Animal repellent, chemical	1907	Chemical animal repellent to protect trees from animal damage. Includes materials and shipping only.	Gallon	$33.30	0.25	$8.33
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
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
Three Species Mix, Cool Season, Introduced Perennial Grass	2315	Cool season, introduced grass mix. Includes material and shipping only.	Acre	$46.58	0.25	$11.65

Practice: 428 - Irrigation Ditch Lining

Scenario: #1 - Concrete Lining, 1 ft bottom

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, 2.5 feet depth including freeboard, and 1:1 side slope) and lining with concrete slip forms (total width = 8.07 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: 1,184

Scenario Cost: $17,055.89 **Scenario Cost/Unit:** $14.41

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	$127.06	82.2	$10,444.33
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	$2.35	510	$1,198.50
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	978	$4,273.86
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	4	$1,139.20

Practice: 428 - Irrigation Ditch Lining

Scenario: #2 - Concrete lined ditch-thick, 1.5 ft bottom

Scenario Description:

Construct quarter mile (1320') of concrete (3.0 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: 1.5 ft bottom, 2.5 ft depth including freeboard, and 1:1 side slope) and lining with concrete slip forms (total width = 8.57 ft). 1 foot bottom ditch is needed deliver expected water flows on realitively flat grades.
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: 1,257

Scenario Cost: $20,905.58 **Scenario Cost/Unit:** $16.63

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	$2.35	576	$1,353.60
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	1100	$4,807.00
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	$127.06	105	$13,341.30
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	$33.06	8	$264.48
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	4	$1,139.20

Practice: 428 - Irrigation Ditch Lining

Scenario: #3 - Concrete Lining, 2 ft bottom

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: 2 ft bottom, 2.5 ft depth including freeboard, and 1:1 side slope) and lining with concrete slip forms (total width = 9.07 ft). Two foot bottom ditch is needed for higher water flows (10+ cfs) on realitively flat grades.
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: 1,330

Scenario Cost: $19,806.97 **Scenario Cost/Unit:** $14.89

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	$2.35	643	$1,511.05
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	1222	$5,340.14
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	$127.06	93	$11,816.58
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	4	$1,139.20

Practice: 428 - Irrigation Ditch Lining

Scenario: #4 - Concrete Lining, > 2 ft bottom

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 a 12 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: 3 ft bottom, 2.5 ft depth including freeboard, and 1:1 side slope) and lining with concrete slip forms (total width = 10.07 ft). Three foot bottom ditch is needed for higher water flows (20+ cfs) on realitively flat grades.
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: 1,477

Scenario Cost: $22,378.85 **Scenario Cost/Unit:** $15.15

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	$4.37	1466	$6,406.42
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	$127.06	103	$13,087.18
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	$2.35	743	$1,746.05
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	4	$1,139.20

Practice: 428 - Irrigation Ditch Lining

Scenario: #5 - Notched Ditch, 1.5 ft bottom

Scenario Description:

Construct quarter mile (1320') of concrete (3.0 inch in thickness) lining in an existing ditch alignment with hand formed notches, located at the top of the ditch on field side, to convey water from the source of supply to a field or fields in a farm distribution system. Notches are typically spaced to match field crop row spacing and are wedge shaped with typical dimensions of 2" bottom width, 6'' top width and 6" deep. 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: 1.5 ft bottom, 2.5 ft depth including freeboard, and 1:1 side slope) and lining with concrete slip forms (total width = 8.57 ft). 1.5 foot bottom ditch is needed deliver expected water flows on realitively flat grades.

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: 1,257

Scenario Cost: $29,941.36 **Scenario Cost/Unit:** $23.82

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	$2.35	576	$1,353.60
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	1100	$4,807.00
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	$127.06	115	$14,611.90
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	$19.06	397	$7,566.82
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	$33.06	14	$462.84
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	4	$1,139.20

Practice: 428 - Irrigation Ditch Lining

Scenario: #6 - 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: $10,391.04 **Scenario Cost/Unit:** $8.86

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	$62.38	16	$998.08
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	$33.06	48	$1,586.88
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	$19.06	48	$914.88
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	16	$302.40
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	$284.80	2	$569.60

Practice: 428 - Irrigation Ditch Lining

Scenario: #7 - Transitions

Scenario Description:

Construct short transition of concrete lining in an existing ditch alignment to convey water from one section of a ditch to another. Typical scenario includes hand placing concrete in the transition section where equipment cannot reach.

Before Situation:

need to connect one end of a ditch with a specific cross section to another ditch with the same or different cross section that may include placing a transition in a curve which requires hand placement.

After Situation:

Transitions prevents seepage and erosion at ditch joints, reduces energy use and improves water quality and irrigation efficiency.

Scenario Feature Measure: Surface area of lining

Scenario Unit: Square Foot

Scenario Typical Size: 120

Scenario Cost: $411.78 **Scenario Cost/Unit:** $3.43

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	$127.06	1	$127.06
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	8	$152.48
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	$33.06	4	$132.24

Practice: 428 - Irrigation Ditch Lining

Scenario: #8 - Semi Rigid HDPE Prefab Liner

Scenario Description:

Construct 1000 feet 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: 889

Scenario Cost: $38,963.13 **Scenario Cost/Unit:** $43.83

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	$2.35	111	$260.85
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	50	$953.00
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	$33.06	8	$264.48
Materials						
Ditch liner, HDPE, semi-rigid, 24" depth	2374	Semi-rigid, corrugated HDPE ditch liner, 24" depth. Materials only.	Foot	$37.20	1000	$37,200.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 430 - Irrigation Pipeline

Scenario: #1 - PVC (Iron Pipe Size) ≤ 8 inch

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 2-inch to 24-inch; and typical scenario size is 6-inch. Construct 1/4 mile (1,320 feet) of 6-inch, Class 125 (SDR-32.5), 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-inch, Class 125 (SDR-32.5) PVC pipe weighs 2.596 lb/ft, or a total of 3,427 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.
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.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 3,427

Scenario Cost: $8,616.93 **Scenario Cost/Unit:** $2.51

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	$1.38	1320	$1,821.60
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	$19.06	32	$609.92
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	$1.49	3769	$5,615.81
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 430 - Irrigation Pipeline

Scenario: #2 - PVC (Iron Pipe Size) ≤ 8 inch with boring

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 2-inch to 24-inch; and typical scenario size is 6-inch. Construct 1/4 mile (1,320 feet) of 6-inch, Class 125 (SDR-32.5), PVC pipeline with appurtenances, installed below ground with a minimum of 2 feet of ground cover. Includes 50 feet of boring. The unit is weight of pipe material in pounds. 1,320 feet of 6-inch, Class 125 (SDR-32.5) PVC pipe weighs 2.596 lb/ft, or a total of 3,427 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.
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.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 3,427

Scenario Cost: $11,531.43 **Scenario Cost/Unit:** $3.36

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	$1.38	1320	$1,821.60
Horizontal Boring, > 3" diameter	1132	Includes equipment, labor and setup.	Foot	$58.29	50	$2,914.50
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	$19.06	32	$609.92
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	$1.49	3769	$5,615.81
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 430 - Irrigation Pipeline

Scenario: #3 - PVC (Iron Pipe Size) ≤ 8 inch, alfalfa valve

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 2-inch to 24-inch; and typical scenario size is 6-inch. Construct 1/4 mile (1,320 feet) of 6-inch, Class 125 (SDR-32.5), 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-inch, Class 125 (SDR-32.5) PVC pipe weighs 2.596 lb/ft, or a total of 3,427 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). The cost of the alfalfa valve is included in the cost, this valve is not included in appurtenances. Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements.
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.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 3,427

Scenario Cost: $10,845.45 **Scenario Cost/Unit:** $3.16

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	$1.38	1320	$1,821.60
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	$19.06	32	$609.92
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	$1.49	3769	$5,615.81
Valve, Alfalfa valve with riser, PVC, 12"	2129	Alfalfa valve assembly including, 12" diameter metal alfalfa valve, PVC tee, 36" PVC riser for connection to a pipeline. Materials only.	Each	$557.13	4	$2,228.52
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 430 - Irrigation Pipeline

Scenario: #4 - PVC (Iron Pipe Size) ≥ 10 inch

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 2-inch to 24-inch; and typical scenario size is 12-inch. Construct 1/4 mile (1,320 feet) of 12-inch, Class 125 (SDR-32.5), 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 12-inch, Class 125 (SDR-32.5) PVC pipe weighs 9.505 lb/ft, or a total of 12,547 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.
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.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 12,547

Scenario Cost: $26,179.57 **Scenario Cost/Unit:** $2.09

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	$3.13	1320	$4,131.60
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	$19.06	48	$914.88
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	$1.49	13801	$20,563.49
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 430 - Irrigation Pipeline

Scenario: #5 - PVC (Iron Pipe Size) ≥ 10 inch with boring.

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 2-inch to 24-inch; and typical scenario size is 12-inch. Construct 1/4 mile (1,320 feet) of 12-inch, Class 125 (SDR-32.5), PVC pipeline with appurtenances, installed below ground with a minimum of 2 feet of ground cover. Includes 50 feet of boring. The unit is weight of pipe material in pounds. 1,320 feet of 12-inch, Class 125 (SDR-32.5) PVC pipe weighs 9.505 lb/ft, or a total of 12,547 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.
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.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 12,547

Scenario Cost: $29,094.07 **Scenario Cost/Unit:** $2.32

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	$3.13	1320	$4,131.60
Horizontal Boring, > 3" diameter	1132	Includes equipment, labor and setup.	Foot	$58.29	50	$2,914.50
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	$19.06	48	$914.88
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	$1.49	13801	$20,563.49
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 430 - Irrigation Pipeline

Scenario: #6 - PVC (Iron Pipe Size) ≥ 10 inch, alfalfa valve

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 2-inch to 24-inch; and typical scenario size is 12-inch. Construct 1/4 mile (1,320 feet) of 12-inch, Class 125 (SDR-32.5), 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 12-inch, Class 125 (SDR-32.5) PVC pipe weighs 9.505 lb/ft, or a total of 12,547 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). The cost of the alfalfa valve is included in the cost, this valve is not included in appurtenances. Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements.
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.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 12,547

Scenario Cost: $29,361.57 **Scenario Cost/Unit:** $2.34

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	$3.13	1320	$4,131.60
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	$19.06	48	$914.88
Materials						
Valve, Alfalfa valve with riser, PVC, 14"	2130	Alfalfa valve assembly including, 14" diameter metal alfalfa valve, PVC tee, 36" PVC riser for connection to a pipeline. Materials only.	Each	$795.50	4	$3,182.00
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	$1.49	13801	$20,563.49
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 430 - Irrigation Pipeline

Scenario: #7 - PVC (Plastic Irrigation Pipe) < 8 inch

Scenario Description:

Description: Below ground installation of PVC (Plastic Irrigation Pipe) pipeline. PVC (PIP) is manufactured in sizes (nominal diameter) from 4-inch to 27-inch; typical practice sizes range from 4-inch to 24-inch; and typical scenario size is 6-inch. Construct 1/4 mile (1,320 feet) of 6-inch, Class 50 (SDR-81.0), PVC PIP with appurtenances, installed below ground with a minimum of 2 feet of ground cover. The unit is weight of pipe in pounds. 1,320 feet of 6-inch, Class 50 (SDR-81.0) PVC PIP weighs 0.936 lb/ft, or a total of 1,236 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 is intended for pipes with diameters less than 8 inches.
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.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 1,236

Scenario Cost: $5,026.03 **Scenario Cost/Unit:** $4.07

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	$1.38	1320	$1,821.60
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	$19.06	32	$609.92
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	$1.49	1359	$2,024.91
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 430 - Irrigation Pipeline

Scenario: #8 - PVC (Plastic Irrigation Pipe) ≤ 8 inch with boring

Scenario Description:

Description: Below ground installation of PVC (Plastic Irrigation Pipe) pipeline. PVC (PIP) is manufactured in sizes (nominal diameter) from 4-inch to 27-inch; typical practice sizes range from 4-inch to 24-inch; and typical scenario size is 6-inch. Construct 1/4 mile (1,320 feet) of 6-inch, Class 50 (SDR-81.0), PVC PIP with appurtenances, installed below ground with a minimum of 2 feet of ground cover. Includes 50 feet of boring. The unit is weight of pipe in pounds. 1,320 feet of 6-inch, Class 50 (SDR-81.0) PVC PIP weighs 0.936 lb/ft, or a total of 1,236 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.
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.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 1,236

Scenario Cost: $8,245.49 **Scenario Cost/Unit:** $6.67

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	$1.38	1320	$1,821.60
Horizontal Boring, > 3" diameter	1132	Includes equipment, labor and setup.	Foot	$58.29	50	$2,914.50
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	$19.06	48	$914.88
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	$1.49	1359	$2,024.91
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 430 - Irrigation Pipeline

Scenario: #9 - PVC (Plastic Irrigation Pipe) ≤ 8 inch, alfalfa valve

Scenario Description:

Description: Below ground installation of PVC (Plastic Irrigation Pipe) pipeline. PVC (PIP) is manufactured in sizes (nominal diameter) from 4-inch to 27-inch; typical practice sizes range from 4-inch to 24-inch; and typical scenario size is 6-inch. Construct 1/4 mile (1,320 feet) of 6-inch, Class 50 (SDR-81.0), PVC PIP with appurtenances, installed below ground with a minimum of 2 feet of ground cover. The unit is weight of pipe in pounds. 1,320 feet of 6-inch, Class 50 (SDR-81.0) PVC PIP weighs 0.936 lb/ft, or a total of 1,236 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 the alfalfa valve is included in the cost, this valve is not included in appurtenances. Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements.

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.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 1,236

Scenario Cost: $7,559.51 **Scenario Cost/Unit:** $6.12

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	$1.38	1320	$1,821.60
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	$19.06	48	$914.88
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	$1.49	1359	$2,024.91
Valve, Alfalfa valve with riser, PVC, 12"	2129	Alfalfa valve assembly including, 12" diameter metal alfalfa valve, PVC tee, 36" PVC riser for connection to a pipeline. Materials only.	Each	$557.13	4	$2,228.52
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 430 - Irrigation Pipeline

Scenario: #10 - PVC (Plastic Irrigation Pipe) > 15 inch

Scenario Description:

Description: Below ground installation of PVC (Plastic Irrigation Pipe) pipeline. PVC (PIP) is manufactured in sizes (nominal diameter) from 4-inch to 27-inch; typical practice sizes range from 4-inch to 24-inch; and typical scenario size is 18-inch. Construct 660 feet of 18-inch, Class 80 (SDR-51.0), PVC PIP with appurtenances, installed below ground with a minimum of 2 feet of ground cover. The unit is weight of pipe in pounds. 660 feet of 18-inch, Class 80 (SDR-51.0) PVC PIP weighs 13.67 lb/ft, or a total of 9022 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 is intended for pipes with diameters greater than 15 inches.
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.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 9,022

Scenario Cost: $18,032.08 **Scenario Cost/Unit:** $2.00

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	$3.13	660	$2,065.80
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	$19.06	32	$609.92
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	$1.49	9924	$14,786.76
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 430 - Irrigation Pipeline

Scenario: #11 - PVC (Plastic Irrigation Pipe) ≥ 10 inch with boring

Scenario Description:

Description: Below ground installation of PVC (Plastic Irrigation Pipe) pipeline. PVC (PIP) is manufactured in sizes (nominal diameter) from 4-inch to 27-inch; typical practice sizes range from 4-inch to 24-inch; and typical scenario size is 12-inch. Construct 1/4 mile (1,320 feet) of 12-inch, Class 50 (SDR-81.0), PVC PIP with appurtenances, installed below ground with a minimum of 2 feet of ground cover. Includes 50 feet of boring. The unit is weight of pipe in pounds. 1,320 feet of 12-inch, Class 50 (SDR-81.0) PVC PIP weighs 3.594 lb/ft, or a total of 4,744 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.
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.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 4,744

Scenario Cost: $16,610.36 **Scenario Cost/Unit:** $3.50

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	$3.13	1320	$4,131.60
Horizontal Boring, > 3" diameter	1132	Includes equipment, labor and setup.	Foot	$58.29	50	$2,914.50
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	$19.06	64	$1,219.84
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	$1.49	5218	$7,774.82
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 430 - Irrigation Pipeline

Scenario: #12 - PVC (Plastic Irrigation Pipe) ≥ 10 inch, alfalfa valve

Scenario Description:

Description: Below ground installation of PVC (Plastic Irrigation Pipe) pipeline. PVC (PIP) is manufactured in sizes (nominal diameter) from 4-inch to 27-inch; typical practice sizes range from 4-inch to 24-inch; and typical scenario size is 12-inch. Construct 1/4 mile (1,320 feet) of 12-inch, Class 50 (SDR-81.0), PVC PIP with appurtenances, installed below ground with a minimum of 2 feet of ground cover. The unit is weight of pipe in pounds. 1,320 feet of 12-inch, Class 50 (SDR-81.0) PVC PIP weighs 3.594 lb/ft, or a total of 4,744 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). The cost of the alfalfa valve is included in the cost, this valve is not included in appurtenances. Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements.

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.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 4,744

Scenario Cost: $16,877.86 **Scenario Cost/Unit:** $3.56

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	$3.13	1320	$4,131.60
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	$19.06	64	$1,219.84
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	$1.49	5218	$7,774.82
Valve, Alfalfa valve with riser, PVC, 14"	2130	Alfalfa valve assembly including, 14" diameter metal alfalfa valve, PVC tee, 36" PVC riser for connection to a pipeline. Materials only.	Each	$795.50	4	$3,182.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 430 - Irrigation Pipeline

Scenario: #13 - 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 2-inch to 24-inch; and typical scenario size is 6-inch. Construct 1/4 mile (1,320 feet) of 6-inch, Class 130 (SDR-13.5), 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 8-inch, Class 130 (SDR-13.5), HDPE weighs 4.024 lb/ft, or a total of 5,312 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). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements.
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.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 5,312

Scenario Cost: $16,982.83 **Scenario Cost/Unit:** $3.20

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	$1.38	1320	$1,821.60
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	$19.06	32	$609.92
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.33	5843	$13,614.19
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 430 - Irrigation Pipeline

Scenario: #14 - 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 2-inch to 24-inch; and typical scenario size is 2-inch. Construct 1/4 mile (1,320 feet) of 2-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 0.744 lb/ft, or a total of 982 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). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements.
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.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 982

Scenario Cost: $3,276.59 **Scenario Cost/Unit:** $3.34

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	$19.06	16	$304.96
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.33	1129	$2,630.57
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	$78.65	2	$157.30

Practice: 430 - Irrigation Pipeline

Scenario: #15 - 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. 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). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements.
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.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 4,224

Scenario Cost: $11,896.04 **Scenario Cost/Unit:** $2.82

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	$4.05	660	$2,673.00
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	$19.06	64	$1,219.84
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	$1.60	4646	$7,433.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 430 - Irrigation Pipeline

Scenario: #16 - 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 2-inch to 18-inch; and typical scenario size is 6-inch. Construct 1/4 mile (1,320 feet) of 6-inch, Schedule 10, Galvanized Steel Pipe with appurtenances, installed below ground with a minimum feet of ground cover. The unit is the weight of pipe material in pounds. 1,320 feet of 6-inch, Schedule 10, Galvanized Steel Pipe weighs 9.289 lb/ft, for a total of 12, 261 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). Typical installation applies to soils with no special bedding requirements.
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.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 12,261

Scenario Cost: $25,191.84 **Scenario Cost/Unit:** $2.05

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	$1.38	1320	$1,821.60
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	$19.06	64	$1,219.84
Materials						
Pipe, steel, smooth wall, galvanized, weight priced	1381	Steel manufactured into galvanized smooth wall pipe	Pound	$1.60	13488	$21,580.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 430 - Irrigation Pipeline

Scenario: #17 - 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. 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.
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.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 11,880

Scenario Cost: $14,960.44 **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	$4.05	660	$2,673.00
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	$19.06	80	$1,524.80
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	$0.78	13068	$10,193.04
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 430 - Irrigation Pipeline

Scenario: #18 - 8 inch diameter 80 psi PVC PIP, per foot

Scenario Description:

Below ground installation of PVC plastic irrigation pipeline. Install 1320 feet of 8 inch diameter 80 psi (SDR 51) PVC plastic irrigation pipe (PIP) with appurtenances. Installed below ground with 30 inches minimum cover. Appurtenances include couplings, fittings, air vents, pressure relief valves, thrust blocks dog-legs (risers) and inline valves. Appurtenances do not include flow meters or backflow prevention devices. Typical installation applies to soils with no special bedding requirements. 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 and Subsurface; 533 Pumping Plant.

Before Situation:

Pipeline needed to replace or supplement existing inefficient irrigation conveyance system.

After Situation:

Irrigation pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing conveyance losses, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Linear Foot

Scenario Typical Size: 1,320

Scenario Cost: $8,246.30 **Scenario Cost/Unit:** $6.25

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	$1.38	1320	$1,821.60
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	$127.06	1	$127.06
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	16	$304.96
Materials						
Valve, Alfalfa valve with riser, PVC, 8"	2127	Alfalfa valve assembly including, 8" diameter metal alfalfa valve, PVC tee, 36" PVC riser for connection to a pipeline. Materials only.	Each	$330.26	1	$330.26
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	$1.49	3418	$5,092.82
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 430 - Irrigation Pipeline

Scenario: #19 - 10 inch diameter 80 psi PVC PIP, per foot

Scenario Description:

Below ground installation of PVC plastic irrigation pipeline. Install 1320 feet of 10 inch diameter 80 psi (SDR 51) PVC plastic irrigation pipe (PIP) with appurtenances. Installed below ground with 30 inches minimum cover. Appurtenances include couplings, fittings, air vents, pressure relief valves, thrust blocks dog-legs (risers) and inline valves. Appurtenances do not include flow meters or backflow prevention devices. Typical installation applies to soils with no special bedding requirements. 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 and Subsurface; 533 Pumping Plant.

Before Situation:

Pipeline needed to replace or supplement existing inefficient irrigation conveyance system.

After Situation:

Irrigation pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing conveyance losses, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Linear Foot

Scenario Typical Size: 1,320

Scenario Cost: $13,522.23 **Scenario Cost/Unit:** $10.24

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	$127.06	1	$127.06
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.13	1320	$4,131.60
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	$19.06	16	$304.96
Materials						
Valve, Alfalfa valve with riser, PVC, 10"	2128	Alfalfa valve assembly including, 10" diameter metal alfalfa valve, PVC tee, 36" PVC riser for connection to a pipeline. Materials only.	Each	$442.84	1	$442.84
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	$1.49	5333	$7,946.17
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 430 - Irrigation Pipeline

Scenario: #20 - 12 inch diameter 80 psi PVC PIP, per foot

Scenario Description:

Below ground installation of PVC plastic irrigation pipeline. Install 1320 feet of 12 inch diameter 80 psi (SDR 51) PVC plastic irrigation pipe (PIP) with appurtenances. Installed below ground with 30 inches minimum cover. Appurtenances include couplings, fittings, air vents, pressure relief valves, thrust blocks dog-legs (risers) and inline valves. Appurtenances do not include flow meters or backflow prevention devices. Typical installation applies to soils with no special bedding requirements. 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 and Subsurface; 533 Pumping Plant.

Before Situation:

Pipeline needed to replace or supplement existing inefficient irrigation conveyance system.

After Situation:

Irrigation pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing conveyance losses, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Linear Foot

Scenario Typical Size: 1,320

Scenario Cost: $17,136.53 **Scenario Cost/Unit:** $12.98

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	$127.06	1	$127.06
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.13	1320	$4,131.60
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	$19.06	16	$304.96
Materials						
Valve, Alfalfa valve with riser, PVC, 12"	2129	Alfalfa valve assembly including, 12" diameter metal alfalfa valve, PVC tee, 36" PVC riser for connection to a pipeline. Materials only.	Each	$557.13	1	$557.13
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	$1.49	7682	$11,446.18
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 430 - Irrigation Pipeline

Scenario: #21 - 15 inch diameter 80 psi PVC PIP, per foot

Scenario Description:

Below ground installation of PVC plastic irrigation pipeline. Install 1320 feet of 15 inch diameter 80 psi (SDR 51) PVC plastic irrigation pipe (PIP) with appurtenances. Installed below ground with 30 inches minimum cover. Appurtenances include couplings, fittings, air vents, pressure relief valves, thrust blocks dog-legs (risers) and inline valves. Appurtenances do not include flow meters or backflow prevention devices. Typical installation applies to soils with no special bedding requirements. 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 and Subsurface; 533 Pumping Plant.

Before Situation:

Pipeline needed to replace or supplement existing inefficient irrigation conveyance system.

After Situation:

Irrigation pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing conveyance losses, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Linear Foot

Scenario Typical Size: 1,320

Scenario Cost: $23,963.68 **Scenario Cost/Unit:** $18.15

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	$3.13	1320	$4,131.60
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	$127.06	1	$127.06
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	16	$304.96
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	$1.49	12104	$18,034.96
Valve, Alfalfa valve with riser, PVC, 14"	2130	Alfalfa valve assembly including, 14" diameter metal alfalfa valve, PVC tee, 36" PVC riser for connection to a pipeline. Materials only.	Each	$795.50	1	$795.50
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 430 - Irrigation Pipeline

Scenario: #22 - PVC PIP, Remote Location

Scenario Description:

Description: Below ground installation of PVC (Plastic Irrigation Pipe) pipeline. PVC (PIP) is manufactured in sizes (nominal diameter) from 4-inch to 27-inch; typical practice sizes range from 4-inch to 24-inch; and typical scenario size is 12-inch. Construct 1/4 mile (1,320 feet) of 12-inch, Class 50 (SDR-81.0), PVC PIP with appurtenances, installed below ground with a minimum of 2 feet of ground cover. The unit is weight of pipe in pounds. 1,320 feet of 12-inch, Class 50 (SDR-81.0) PVC PIP weighs 3.594 lb/ft, or a total of 4,744 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). The cost of the alfalfa valve is included in the cost, this valve is not included in appurtenances. Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements. This scenario is strictly for installation of pipelines in remote locations that are at least 50 miles or more from the source of equipment or materials.

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.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 4,744

Scenario Cost: $17,495.86 **Scenario Cost/Unit:** $3.69

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	$3.13	1320	$4,131.60
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	$19.06	64	$1,219.84
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	$1.49	5218	$7,774.82
Valve, Alfalfa valve with riser, PVC, 14"	2130	Alfalfa valve assembly including, 14" diameter metal alfalfa valve, PVC tee, 36" PVC riser for connection to a pipeline. Materials only.	Each	$795.50	4	$3,182.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
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 included in the component price.	Dollar	$1.03	600	$618.00

Practice: 430 - Irrigation Pipeline

Scenario: #23 - Micro Hydroelectric Power Plant

Scenario Description:

Installation of a micro hydroelectric power plant concurrently with the installation of an irrigation pipeline. Energy generated from installation can be used to provide on-farm agricultural electrical power, such as to power a center pivot. Typical size of installation is 10 kilowatts. 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 and Subsurface.

Before Situation:

Pipeline needed to replace or supplement existing inefficient irrigation conveyance system. Sufficient flow rate and head are available to make installation and operation of micro hydroelectric power plant feasible.

After Situation:

Irrigation pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing conveyance losses, reducing soil erosion, and/or reducing energy use. Micro hydroelectric power plant is installed to generate energy to provide on-farm electrical power.

Scenario Feature Measure: Electric Power

Scenario Unit: Kilowatt

Scenario Typical Size: 10

Scenario Cost: $35,620.09 **Scenario Cost/Unit:** $3,562.01

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	$27.30	48	$1,310.40
Materials						
Inverter, Hydroelectric	2592	A grid-tie or grid-interactive inverter which converts the direct current (DC) power from renewable energy source into the alternating current (AC) used in homes and businesses. Includes materials and shipping only.	Kilowat	$552.62	10	$5,526.20
Turbine, Hydroelectric	2589	Impulse turbine generally suitable for high head, low flow applications and uses the velocity of the water to move the runner and discharges to atmospheric pressure. The water stream hits each bucket on the runner. There is no suction on the down side of	Kilowatt	$1,567.87	10	$15,678.70
Pump House, Above Ground	2470	Above ground prefabricated pump house. Includes material and shipping only.	Each	$735.00	1	$735.00
Generator, Hydroelectric	2580	A generator for a hydroelectric turbine is either a permanent magnet alternator, or a “synchronous” or induction AC generatorIncludes materials and shipping only.	Kilowat	$1,146.24	10	$11,462.40
Dump Load, Hydroelectric	2595	Electrical resistance heater that must be sized to handle the full generating capacity of the microhydro turbine. Dump loads can be air or water heaters. Excess energy is shunted to the dump load when necessary. Includes materials and shipping only.	Each	$150.39	1	$150.39
Battery Bank, Hydroelectric	2593	Device used to provide a way to store surplus energy when more is being produced than consumed. When demand increases beyond what is generated, the batteries can be called on to release energy to keep household loads operating. Includes materials and shipping only.	Each	$199.10	1	$199.10

Materials

Controller, Hydroelectric	2594	Transmit excess energy to a secondary (dump) load, such as an air or water heater. Off-grid, batteryless AC-direct microhydro systems need controls too. A load–control governor monitors the voltage or frequency of the system, and keeps the generator correctly loaded, turning dump-load capacity on and off as the load pattern changes, or mechanically deflects water away from the runner. Grid-tied batteryless AC and DC systems also need controls to protect the system if the utility grid fails. Includes materials and shipping.	Each	$557.90	1	$557.90

Practice: 430 - Irrigation Pipeline

Scenario: #24 - Micro Hydro-mechanical Power Plant

Scenario Description:

Installation of a micro hydro-mechanical c power plant concurrently with the installation of an irrigation pipeline. Energy generated from installation can be used to provide on-farm agricultural mechanical power, such as to power the movement of a center pivot. Typical size of installation is 5 horsepower. 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 and Subsurface.

Before Situation:

Pipeline needed to replace or supplement existing inefficient irrigation conveyance system. Sufficient flow rate and head are available to make installation and operation of micro hydro-mechanical power plant feasible.

After Situation:

Irrigation pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing conveyance losses, reducing soil erosion, and/or reducing energy use. Micro hydroelectric power plant is installed to generate energy to provide on-farm electrical power.

Scenario Feature Measure: Mechanical Power

Scenario Unit: Horsepower

Scenario Typical Size: 5

Scenario Cost: $8,073.07 **Scenario Cost/Unit:** $1,614.61

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	$27.30	36	$982.80
Materials						
Generator, Hydroelectric	2580	A generator for a hydroelectric turbine is either a permanent magnet alternator, or a “synchronous” or induction AC generatorIncludes materials and shipping only.	Kilowat	$1,146.24	4	$4,584.96
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 shipping only.	Each	$1,900.46	1	$1,900.46
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 only.	Horsepower	$120.97	5	$604.85

Practice: 436 - Irrigation Reservoir

Scenario: #1 - Embankment Dam with On-Site Borrow

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. It will be built with approximately 4,500 cubic yards of on-site material. It will be 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 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: $24,555.95 **Scenario Cost/Unit:** $5.46

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	$4.37	4500	$19,665.00
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	$19.06	16	$304.96
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	$33.06	8	$264.48
Materials						
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	$7.35	36	$264.60
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
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	$11.34	120	$1,360.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	2	$1,087.54

Practice: 436 - Irrigation Reservoir

Scenario: #2 - Embankment Dam with Off-Site Borrow

Scenario Description:

The reservoir, created by an embankment built across a natural depression, with an 18" diameter principal spillway through the embankment, is controlled by a canal-style gate. It will be built with approximately 4,500 cubic yards of material from off the site. It will be about 19.9 feet high and 200 feet long and hold approximately 1,000,000 gallons (3 Ac-Ft.). The top of berm will be 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: 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:

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 off-site sources.

Scenario Feature Measure: Volume of Compacted Eartfill

Scenario Unit: Cubic Yards

Scenario Typical Size: 4,500

Scenario Cost: $40,493.05 **Scenario Cost/Unit:** $9.00

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	$0.36	4500	$1,620.00
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	$2.35	5850	$13,747.50
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	4500	$19,665.00
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	$19.06	16	$304.96
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	$33.06	8	$264.48
Materials						
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	$7.35	36	$264.60
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
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	$11.34	120	$1,360.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	3	$854.40

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	$543.77	2	$1,087.54

Practice: 436 - Irrigation Reservoir

Scenario: #3 - Embankment Reservoir ≤ 30 Acre-Feet

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. It will have an 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 will be 10 feet wide and the side slopes will no steeper than 2.5 H to 1 V inside and out. It will be built with approximately 28,500 cubic yards of on-site material. It will have a 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: $129,235.03 **Scenario Cost/Unit:** $4.53

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	$4.37	28500	$124,545.00
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	$19.06	16	$304.96
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	$33.06	8	$264.48
Materials						
Screw gate, cast iron, 10" diameter, 10/0 head	1916	10" diameter cast iron screw (canal) gate rated at 10 seating head 0 feet unseating head. Materials only.	Each	$719.45	1	$719.45
Catwalk, metal	1918	Metal pedestrian walk way giving access to the valve on a structure, typically 3' wide with railing. Materials only.	Foot	$58.65	20	$1,173.00
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	$5.71	100	$571.00
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	$543.77	2	$1,087.54
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 436 - Irrigation Reservoir

Scenario: #4 - Embankment Reservoir > 30 Acre-Feet

Scenario Description:

This is a very large embankment reservoir with a 18" diameter drain pipe 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. It will have a top width of 12ft and centerline length of embankment of 5,280 feet. Average fill of 10 feet and the side slopes will be no steeper than 3 H to 1 V inside and out. It will be built with approximately 105,000 cubic yards of on-site material. It will have a maximum water depth of 8 feet with 2 feet of freeboard and no auxiliary spillway. Volume is approximately 320 ac-ft (104,500,000 gallons). Critical Area Planting and Mulching is required.

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 rectangular 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.

Scenario Feature Measure: Volume of Compacted Earthfill

Scenario Unit: Cubic Yards

Scenario Typical Size: 104,200

Scenario Cost: $471,997.85 **Scenario Cost/Unit:** $4.53

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	$4.37	104200	$455,354.00
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	$19.06	32	$609.92
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	$33.06	16	$528.96
Materials						
Catwalk, metal	1918	Metal pedestrian walk way giving access to the valve on a structure, typically 3' wide with railing. Materials only.	Foot	$58.65	50	$2,932.50
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
Pipe, Steel, 18", Std Wt	1366	Materials: - 18" - Steel Std Wt	Foot	$93.25	100	$9,325.00
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	$543.77	3	$1,631.31
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 436 - Irrigation Reservoir

Scenario: #5 - 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. It will have 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. It will be built with approximately 20,000 cubic yards of on-site material. It will have a maximum water depth of 10 feet with 1 feet of freeboard. Volume is approximately 12 ac-ft (3,950,303 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:

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.

Scenario Feature Measure: Volume of Earth Excavated

Scenario Unit: Cubic Yards

Scenario Typical Size: 19,600

Scenario Cost: $47,717.06 **Scenario Cost/Unit:** $2.43

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	$2.35	19600	$46,060.00
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	$19.06	8	$152.48
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	$33.06	4	$132.24
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	$543.77	2	$1,087.54
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 436 - Irrigation Reservoir

Scenario: #6 - 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: $28,341.75 **Scenario Cost/Unit:** $1.42

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Plate compactor	1915	Manually guided vibratroy plate compactor. Equipment only.	Hour	$5.39	16	$86.24
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	10	$480.70
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	$26.75	16	$428.00
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	$33.06	40	$1,322.40
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	$19.06	80	$1,524.80
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	12	$234.60
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$27.99	8	$223.92
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, 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	$78.65	2	$157.30
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 436 - Irrigation Reservoir

Scenario: #7 - 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: $4,265.36 **Scenario Cost/Unit:** $1.42

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Plate compactor	1915	Manually guided vibratroy plate compactor. Equipment only.	Hour	$5.39	4	$21.56
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	6	$288.42
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	32	$609.92
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	$33.06	16	$528.96
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	$26.75	6	$160.50
Materials						
Tank, Poly Enclosed Storage, >1,000	1075	Water storage tanks. Includes materials and shipping only.	Gallon	$0.63	3000	$1,890.00
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	2	$39.10
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	$78.65	2	$157.30
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 436 - Irrigation Reservoir

Scenario: #8 - 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: $10,908.30 **Scenario Cost/Unit:** $1.09

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Plate compactor	1915	Manually guided vibratroy plate compactor. Equipment only.	Hour	$5.39	4	$21.56
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	8	$384.56
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	$33.06	24	$793.44
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	$19.06	40	$762.40
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	$26.75	8	$214.00
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	6	$117.30
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
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
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	$78.65	2	$157.30

Practice: 436 - Irrigation Reservoir

Scenario: #9 - Reservoir < 15 ac-ft

Scenario Description:

Relatively smaller irrigation reservoir constructed such that the capacity is obtained from both excavation and embankment material. Single pipe conduit for outflow consisting of an 18" diameter pipe to control up to 4 cfs. Excavated material is used to construct an embankment surrounding the excavation in which both retain irrigation water. Embankment is compacted with a minimum of two passes of construction equipment and the final 6-8 inches is roller compacted to reduce seepage losses. No auxiliary spillway.

Before Situation:

Irrigated cropland/hayland and some pasture with river, stream or ditch water source. Current system relies on an intermittent or low-flow rate water source. This results in untimely and/or inefficient water application.

After Situation:

A dependable water source or more efficient delivery for an improved irrigation system.

Scenario Feature Measure: Excavated Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 10,000

Scenario Cost: $33,394.02 **Scenario Cost/Unit:** $3.34

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	$4.37	3000	$13,110.00
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	$1.69	10000	$16,900.00
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	$19.06	8	$152.48
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	$33.06	4	$132.24
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	$11.34	60	$680.40
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
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	2	$1,087.54

Practice: 441 - Irrigation System, Microirrigation

Scenario: #1 - SDI (Subsurface Drip Irrigation)

Scenario Description:

A subsurface drip irrigation system (SDI) with a lateral spacing between 37-59 inches. This buried drip irrigation system utilizes a thinwall dripperline or tape with inline emitters at a uniform spacing for the system laterals. The dripperline or tape is normally installed by being plowed in approx 10-14 inches deep with a chisel shank type plow equipped with tape reels. This type of drip irrigation system utilizes a buried supply manifold with automated zone control valves and a buried flush manifold with manual flush valves. This permanent micro-irrigation system includes an automated filter station, flow meter, backflow prevention device, automated control box or timer, the thinwall dipperline or tape for laterals, both a supply and a flushing manifold and numerous types of water control valves. This is an all-inclusive system starting with the filter station including all required system components out to the flush valves. Does not include Pump, Power source, Water source (well or reservoir), Flow meter.The water supply line from the water source to the filter station is an irrigation pipeline (430) and is not included as part of this system

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, 433 - Irrigation Flow Measrement, 587-Structure for Water Control, 610 - Salinity & Sodic Soil Management, 434 - Soil Moisture Measurement, 328-Conservation Crop Rotation, and 590 Nutrient Management.

Before Situation:

Typical before irrigation situation would normally be an existing inefficient surface or sprinkler irrigation system on a cropland or hayland field. The existing irrigation system would experience poor, non-uniform irrigation applications and significant water losses affecting both water quantity and water quality

After Situation:

A typical practice would be the installation of a subsurface drip irrigation system (SDI) on a 60 acre cropland or hayland field. The system lateral (thinwall dripperline or tape) spacing would 40 inches. This highly efficient SDI (buried) irrigation system provides irrigation water directly to the plant root zone eliminating application losses resulting in a very high water application efficiency and properly designed these SDI systems are capable of very uniform water applications.
Typical field size is 60 acres.

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 60

Scenario Cost: $107,384.57 **Scenario Cost/Unit:** $1,789.74

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
Trenching, Pipeline Plowing	1096	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	$1.22	6800	$8,296.00
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
Micro Irrigation, buried drip tape	2521	Tape that is installed underground for sub-surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tape is a minimum of 10 mil thick thick and has emitters built in. Includes labor and installtion.	Foot	$0.09	823284	$74,095.56
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

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	$1.49	4800	$7,152.00
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

Practice: 441 - Irrigation System, Microirrigation

Scenario: #2 - Surface PE with emitters

Scenario Description:

A micro-irrigation system, utilizing surface PE tubing (can be placed on trelis or above ground) with emitters to provide irrigation for an orchard, vinyard, or other specialty crop grown in a grid pattern. The typical system is a permanent system, installed on a 60 acre vineyard on the ground surface or trellis. The vineyard has a plant spacing of 8 feet x 9 feet. Laterals are spaced 9 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), Flow meter.

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, 433 - Irrigation Flow Measrement, 587-Structure for Water Control, 610 - Salinity & Sodic Soil Management, 434 - Soil Moisture Measurement, 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 vineyard. Water applications are reduced and runoff eliminated. Offsite water quality is improved, and on site water use is reduced.

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 60

Scenario Cost: $52,455.41 **Scenario Cost/Unit:** $874.26

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	$1.22	6800	$8,296.00
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, 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
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, 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 tape	2522	Tape is installed above ground for surface drip irrigation on annual crops, includes installation, and connections to the supply and flushing laterals. Tape is a minimum of 10 mil thick and has emitters built in.	Foot	$0.06	319440	$19,166.40
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	$1.49	4800	$7,152.00

Practice: 441 - Irrigation System, Microirrigation

Scenario: #3 - Microjet

Scenario Description:

A micro-irrigation system, utilizing micro-jets to provide irrigation and\or frost protection for an orchard or other specialty crops grown in a grid pattern. The system is installed with all fittings, control valves, pressure reducing/regulating valves, air/vacuum release, sand media/screen/disc filters, pressure gauges, submains (subsurface), lateral lines (subsurface), and micro-jet sprayers to deliver water to the trees. 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), Flow meter.. The typical installation is a permanent, microjet -irrigation system installed on a 60 acre orchard. Typical tree spacing is 20' x 20 feet.

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, 433 - Irrigation Flow Measrement, 587-Structure for Water Control, 610 - Salinity & Sodic Soil Management, 434 - Soil Moisture Measurement, 328-Conservation Crop Rotation, and 590 Nutrient Management.

Before Situation:

An orchard has an inefficient irrigation system causing irrigation water loss that impacts water quality and water quantity.

After Situation:

A micro-spray 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.

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 60

Scenario Cost: $171,287.09 **Scenario Cost/Unit:** $2,854.78

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	$1.22	6800	$8,296.00
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, 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
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, emitters or sprays and tubing	1489	Emitters or sprays that are installed above ground for micro or drip irrigation. Includes installation and connections to the supply and flushing laterals. Tubing for the emitters is included in this item.	Foot	$0.96	143748	$137,998.08
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
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	$1.49	4800	$7,152.00

Practice: 441 - Irrigation System, Microirrigation

Scenario: #4 - Small Farm

Scenario Description:

A micro-irrigation system, utilizing surface PE tubing (can be placed on trelis or above ground) with emitters to provide irrigation on small acreages that have an orchard, vinyard, or a specialty row crop. The typical system is a permanent system, installed on 5 acres or less growing speciality row crops on 38 inch row spacing. Laterals are spaced 38 inches apart. This system scenario utilizes above ground micro or drip irrigation tubing with emitters built in. PVC pipe (mainline, submains, etc) are buried. This system typically includes a filter system, PE tubing laterals, PVC manifolds, and submains, valves, fittings, emitters, flow meter, backflow prevention device, 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) Flow
meter.
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, 433 - Irrigation Flow Measrement, 587 - Structure for Water Control, 610 - Salinity & Sodic Soil Management, 434 - Soil Moisture Measurement, 328-Conservation Crop Rotation, and 590 Nutrient Management.

Before Situation:

A small farm (5 acres or less) 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 a small farm. Water applications are reduced and runoff eliminated. Offsite water quality is improved, and on site water use is reduced.

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 5

Scenario Cost: $5,634.10 **Scenario Cost/Unit:** $1,126.82

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	$1.22	567	$691.74
Materials						
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, 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 tape	2522	Tape is installed above ground for surface drip irrigation on annual crops, includes installation, and connections to the supply and flushing laterals. Tape is a minimum of 10 mil thick and has emitters built in.	Foot	$0.06	50384	$3,023.04
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	$1.49	400	$596.00

Practice: 441 - Irrigation System, Microirrigation

Scenario: #5 - Windbreak Surface PE

Scenario Description:

A micro-irrigation system, utilizing surface PE tubing. The typical system is a permanent system, installed on a 3 row 1000' windbreak on the ground surface (total of 3000' lf). The windbreak has a tree or plant spacing of 8 feet, and a 15 ft lateral spacing. This system utilizes emitters at each tree or plant as the water application device. This system typically includes a filter system, PE tubing, PVC manifolds, 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),Flow meter.

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: 380-Windbreak/Shelterbelt Establishment, 533-Pumping Plant, 449- Irrigation Water Management, 430 - Irrigation Pipeline, 433 - Irrigation Flow Measrement, 587 - Structure for Water Control, 610 - Salinity & Sodic Soil Management, 434 - Soil Moisture Measurement, 328-Conservation Crop Rotation, and 590 Nutrient Management.

Before Situation:

A tree row has an insufficient available water source causing plant health (establishement and persistence) concerns.

After Situation:

A surface placed microirrigation system is utilized to provide highly efficient irrigation to an tree row to address plant health concerns.

Scenario Feature Measure: Acre of Windbreak

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $3,529.47 **Scenario Cost/Unit:** $3,529.47

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	$1.22	100	$122.00
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
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.40	45	$63.00
Pipe, PVC, 4", SCH 40	978	Materials: - 4" - PVC - SCH 40 - ASTM D1785	Foot	$4.12	55	$226.60
Micro Irrigation, emitters or sprays and tubing	1489	Emitters or sprays that are installed above ground for micro or drip irrigation. Includes installation and connections to the supply and flushing laterals. Tubing for the emitters is included in this item.	Foot	$0.96	3000	$2,880.00
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	$191.56	1	$191.56

Practice: 441 - Irrigation System, Microirrigation

Scenario: #6 - Hoop House Surface Microirrigation

Scenario Description:

Surface Microirrigation system for 30' x 96' seasonal high tunnel, 24" rows with emmitters on a 12" spacing.

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, 433 - Irrigation Flow Measrement, 328-Conservation Crop Rotation, 587 - Structure for Water Control, and 590 Nutrient Management.

Before Situation:

An enclosed field has an inefficient garden-hose based sprinkler 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 area. Water applications are reduced and runoff eliminated. Offsite water quality is improved, and on site water use is reduced.

Scenario Feature Measure: Microirrigation area

Scenario Unit: Square Foot

Scenario Typical Size: 2,880

Scenario Cost: $584.17 **Scenario Cost/Unit:** $0.20

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	$19.06	4	$76.24
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, drip irrigation system, small scale	2170	An above ground, small scale, micro-irrigation system. Includes miniature emitters, tubes, or applicators placed along a water delivery line. Includes materials and shipping only.	Square Foot	$0.11	2880	$316.80
Micro Irrigation, screen filter, < 3"	2524	Micro Irrigation, small manual flush screen or disc filter, <3 inch nominal size. Includes materials only.	Each	$144.82	1	$144.82

Practice: 442 - Sprinkler System

Scenario: #1 - Center Pivot System

Scenario Description:

Installation of a low pressure center pivot system.

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 Feet

Scenario Typical Size: 1,300

Scenario Cost: $98,091.11 **Scenario Cost/Unit:** $75.45

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
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	$78.65	2	$157.30
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 442 - Sprinkler System

Scenario: #2 - Center Pivot, poly lined

Scenario Description:

Installation of a low pressure center pivot system. Irrigation water quality is such that normal galvanized steel will deteriorate before meeting the life expectancy of this practice.

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 Feet

Scenario Typical Size: 1,300

Scenario Cost: $110,649.11 **Scenario Cost/Unit:** $85.11

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Poly Lining	2451	Poly lining protects the sprinkler system and increases the efficiency and lifespan.	Foot	$9.66	1300	$12,558.00
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
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
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	$78.65	2	$157.30

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.
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 Feet

Scenario Typical Size: 1,280

Scenario Cost: $122,551.10 **Scenario Cost/Unit:** $95.74

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
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	$78.65	2	$157.30
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 442 - Sprinkler System

Scenario: #4 - Linear Move, poly lined

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. Irrigation water quality is such that normal galvanized steel will deteriorate before meeting the life expectancy of this practice.
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 Feet

Scenario Typical Size: 1,280

Scenario Cost: $134,915.90 **Scenario Cost/Unit:** $105.40

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
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
Poly Lining	2451	Poly lining protects the sprinkler system and increases the efficiency and lifespan.	Foot	$9.66	1280	$12,364.80
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	$78.65	2	$157.30
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 442 - Sprinkler System

Scenario: #5 - 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.

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 Feet

Scenario Typical Size: 1,280

Scenario Cost: $21,185.81 **Scenario Cost/Unit:** $16.55

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
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	$191.56	2	$383.12

Practice: 442 - Sprinkler System

Scenario: #6 - Solid Set System

Scenario Description:

A solid set irrigation system.

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 or less. 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: $46,407.30 **Scenario Cost/Unit:** $4,640.73

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
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	$78.65	2	$157.30

Practice: 442 - Sprinkler System

Scenario: #7 - Traveling Gun System, < 2 inch Hose

Scenario Description:

A portable small gun system used to apply irrigation water on small fields.

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 Utilization (633), Manure Transfer (634)

Before Situation:

An existing traveling gun on a 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 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: $8,312.15 **Scenario Cost/Unit:** $8,312.15

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	1	$8,312.15

Practice: 442 - Sprinkler System

Scenario: #8 - Traveling Gun System, 2 to 3 inch Hose

Scenario Description:

A portable big gun system used to apply waste water from animal feeding operations.

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 Utilization (633), Manure 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: $22,611.09 **Scenario Cost/Unit:** $22,611.09

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

Practice: 442 - Sprinkler System

Scenario: #9 - Traveling Gun System, > 3 inch Hose

Scenario Description:

A portable big gun system used to apply waste water from animal feeding operations.

This traveling big gun unit includes a sprinkler, towable cart, 1200' 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 Utilization (633), Manure 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: $44,737.62 **Scenario Cost/Unit:** $44,737.62

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

Practice: 442 - Sprinkler System

Scenario: #10 - 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.

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: 14

Scenario Cost: $3,502.74 **Scenario Cost/Unit:** $250.20

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	14	$3,345.44
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	$78.65	2	$157.30

Practice: 442 - Sprinkler System

Scenario: #11 - Renovation of Existing 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.

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 Feet

Scenario Typical Size: 1,300

Scenario Cost: $8,131.30 **Scenario Cost/Unit:** $6.25

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	$51.75	8	$414.00
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	8	$151.20
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
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	$78.65	2	$157.30
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 442 - Sprinkler System

Scenario: #12 - Handline

Scenario Description:

This Scenario addresses installation of all handline style irrigation sprinkler systems. A typical quarter mile handline has 1280 lineal feet of 3-4 inch aluminum pipe. Payment rates are based on installed costs. Costs do not include irrigation mainline or risers, pumping plant, or other associated
practices.

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 pasture, alfalfa or specialty crops, such as fresh vegetables.

After Situation:

A handline will be installed to increase irrigation water use efficiency. Water application rates will meet the crops use needs as well as soil intake rates in order to prevent irrigation induced erosion, runoff, and deep percolation. Installation includes the handline. The typical scenario is a 1280 foot long, periodic move handline which covers 20 acre field. Nozzles are spaced along the handline at 40 foot increments and risers are spaced 60 foot increments along the main line. Payment rates are figured per foot of installed hardware length. Improved distribution uniformity and irrigation efficiency will result.

Scenario Feature Measure: Length of handline

Scenario Unit: Linear Feet

Scenario Typical Size: 1,280

Scenario Cost: $5,226.10 **Scenario Cost/Unit:** $4.08

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
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	$78.65	2	$157.30

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: $2,227.29 **Scenario Cost/Unit:** $2,227.29

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	2	$38.12
Materials						
	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: $12,573.06 **Scenario Cost/Unit:** $5.15

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	10	$190.60
Materials						
	1382	Aluminum manufactured into smooth wall pipe	Pound	$4.61	2686	$12,382.46

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 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: 3,320

Scenario Cost: $5,632.08 **Scenario Cost/Unit:** $1.70

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	10	$190.60
Materials						
	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	$1.49	3652	$5,441.48

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: $689.60 **Scenario Cost/Unit:** $2.76

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	10	$190.60
Materials						
	1385	Polyethylene (PE) compound manufactured into collapsible tubing	Pound	$1.30	250	$325.00
	1424	2 1/2" plastic flap gate for poly irrigation tubing. Materials only.	Each	$1.74	100	$174.00

Practice: 449 - Irrigation Water Management

Scenario: #1 - Basic IWM ≤ 30 acres

Scenario Description:

A low Intensity irrigation water management system for producers using a checkbook method (crop grown, soil moisture conditions prior to irrigation, dates of irrigation start and stop, depths of irrigation applied, duration of irrigations, and amount of rainfall). For a typical scenario, soil moisture is determined by the feel method, volumes of irrigation water are based on energy or water district bills, records are kept on paper copies, and calculations are made by hand.

Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; 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, 433-Irrigation Water Measurement, 434-Soil Moisture Measurement, 433- Irrigation Flow Measurement.

Before Situation:

The irrigator decides when to irrigate based on 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 30 acre corn field with a surface irrigation system.

After Situation:

Irrigations are scheduled based on measured crop water requirements. 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: 30

Scenario Cost: $793.44 **Scenario Cost/Unit:** $26.45

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	$33.06	24	$793.44

Practice: 449 - Irrigation Water Management

Scenario: #2 - Basic IWM > 30 acres

Scenario Description:

A low Intensity irrigation water management system for producers using a checkbook method (crop grown, soil moisture conditions prior to irrigation, dates of irrigation start and stop, depths of irrigation applied, duration of irrigations, and amount of rainfall). For a typical scenario, soil moisture is determined by the feel method, volumes of irrigation water are based on energy or water district bills, records are kept on paper copies, and calculations are made by hand.

Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; 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, 433-Irrigation Water Measurement, 434-Soil Moisture Measurement, 433- Irrigation Flow Measurement.

Before Situation:

The irrigator decides when to irrigate based on 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 125 acre corn field with a sprinkler irrigation system.

After Situation:

Irrigations are scheduled based on measured crop water requirements. 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: 125

Scenario Cost: $1,210.40 **Scenario Cost/Unit:** $9.68

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	$19.06	8	$152.48
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	$33.06	32	$1,057.92

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 (crop grown, soil moisture conditions prior to irrigation, dates of irrigation start and stop, depths of irrigation applied, duration of irrigations, and amount of rainfall). For a typical scenario, soil moisture is determined by in-field moisture sensors with manual downloads. Irrigation amounts are recorded from a flow meter near the pump. Records are input manually into an irrigation scheduling computer program.

Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; 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, 433-Irrigation Water Measurement, 434-Soil Moisture Measurement, 433- Irrigation Flow Measurement.

Before Situation:

The farmer decides when to irrigate based on 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 30 acre corn field with a surface irrigation system.

After Situation:

Irrigations are scheduled based on measured crop water requirements. 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: 30

Scenario Cost: $1,057.92 **Scenario Cost/Unit:** $35.26

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	$33.06	32	$1,057.92

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 (crop grown, soil moisture conditions prior to irrigation, dates of irrigation start and stop, depths of irrigation applied, duration of irrigations, and amount of rainfall). For a typical scenario, soil moisture is determined by in field moisture sensors with manual downloads. Irrigation amounts are recorded from a flow meter near the pump. Records are input manually into an irrigation scheduling computer program.

Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; 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, 433-Irrigation Water Measurement, 434-Soil Moisture Measurement, 433- Irrigation Flow Measurement.

Before Situation:

The farmer decides when to irrigate based on 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 125 acre corn field with a sprinkler irrigation system.

After Situation:

Irrigations are scheduled based on measured crop water requirements. 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: 125

Scenario Cost: $1,551.12 **Scenario Cost/Unit:** $12.41

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	$19.06	12	$228.72
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	$33.06	40	$1,322.40

Practice: 449 - Irrigation Water Management

Scenario: #5 - Advanced IWM ≤ 30 acres

Scenario Description:

A high intensity irrigation water management system for producers using a checkbook method with advanced methods of determining irrigation water applied, and estimating crop evapotranspiration, monitoring field soil moisture, or monitoring crop temperature stress. Typical methods include flow measurement, daily record keeping, and use of real-time evapotranspiration estimates (such as those provided dedicated weather stations) and/or soil moisture sensors with automated data logging to monitor field soil moisture content and/or crop temperature. For this scenario, soil moisture is determined by automated soil moisture monitoring stations equiped with telemetry data. Irrigation amounts are recorded from a flow meter near the pump. Telemetry data is automatically sent to a computer with irrigation software. Irrigator also receives real time data via mobile phone applications. Some data such as total water applied may be entered into computer software manually.

Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; 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, 433-Irrigation Water Measurement, 434-Soil Moisture Measurement, 433- Irrigation Flow Measurement.

Before Situation:

The farmer decides when to irrigate based on 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 30 acre corn field with a surface irrigation system.

After Situation:

Irrigations are scheduled based on measured crop water requirements. 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: 30

Scenario Cost: $1,322.40 **Scenario Cost/Unit:** $44.08

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	$33.06	40	$1,322.40

Practice: 449 - Irrigation Water Management

Scenario: #6 - Advanced IWM > 30 acres

Scenario Description:

A high intensity irrigation water management system for producers using a checkbook method with advanced methods of determining irrigation water applied, and estimating crop evapotranspiration, monitoring field soil moisture, or monitoring crop temperature stress. Typical methods include flow measurement, daily record keeping, and use of real-time evapotranspiration estimates (such as those provided dedicated weather stations) and/or soil moisture sensors with automated data logging to monitor field soil moisture content and/or crop temperature. For this scenario, soil moisture is determined by automated soil moisture monitoring stations equiped with telemetry data. Irrigation amounts are recorded from a flow meter near the pump. Telemetry data is automatically sent to a computer with irrigation software. Irrigator also receives real time data via mobile phone applications. Some data such as total water applied may be entered into computer software manually.

Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; 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, 433-Irrigation Water Measurement, 434-Soil Moisture Measurement, 433- Irrigation Flow Measurement.

Before Situation:

The farmer decides when to irrigate based on 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 125 acre corn field with sprinkler irrigation.

After Situation:

Irrigations are scheduled based on measured crop water requirements. 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: 125

Scenario Cost: $1,891.84 **Scenario Cost/Unit:** $15.13

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	$19.06	16	$304.96
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	$33.06	48	$1,586.88

Practice: 449 - Irrigation Water Management

Scenario: #7 - Soil Moist Sensors_1stYr

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; and the labor of using the equipment for the first year. The installation includes the purchase of soil moisture meters and sensors, installation equipment, and labor to install and utilize sensors and readings in making IWM decisions during first year. Typical Scenario involves installation of resistance sensor blocks in a 80 acre field of irrigated cropland. Producer periodically monitors soil moisture sensors during the growing season. Meters used to read sensors may be portable.

This scenario only applies to year one IWM. The appropriate labor only IWM scenario applies in subsequent contract years.

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: 449- Irrigation Water Management, 587-Structure for water Control, 328-Conservation Crop Rotation, and 590-Nutrient Management.

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: $2,110.37 **Scenario Cost/Unit:** $1,055.19

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	$33.06	40	$1,322.40
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	$19.06	12	$228.72
Materials						
Soil Moisture Meter	1455	Soil Moisture Sensor Reader. Equipment only.	Each	$275.57	1	$275.57
Soil Moisture Sensor	1456	Soil moisture resistance sensor W/10' cables. Equipment only.	Each	$35.46	8	$283.68

Practice: 449 - Irrigation Water Management

Scenario: #8 - SoilMoist Sens.w.DataLogrs1stYR

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. Scenario also includes the labor associated with using the equipment for the first year. Typical Scenario involves installation of resistance sensor blocks in a 120 acre field of sprinkler irrigated cropland. Producer periodically monitors soil moisture sensors during the growing season.

This scenario only applies to year one IWM. The appropriate labor only IWM scenario applies in subsequent contract years.

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: 449- Irrigation Water Management, 587-Structure for water Control, 328-Conservation Crop Rotation, and 590-Nutrient Management.

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: $2,975.64 **Scenario Cost/Unit:** $1,487.82

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	$33.06	40	$1,322.40
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	$19.06	12	$228.72
Materials						
Data Logger	1453	Data Logger W/Graphic Output for water management. Materials only.	Each	$570.42	2	$1,140.84
Soil Moisture Sensor	1456	Soil moisture resistance sensor W/10' cables. Equipment only.	Each	$35.46	8	$283.68

Practice: 449 - Irrigation Water Management

Scenario: #9 - Advanced Weather Station and Soil Moisture Sensors 1st Year

Scenario Description:

Description: This scenario includes the equipment, installation, and data interpretation services for intensive irrigation management and water resources monitoring and evaluation. Installation includes an advanced weather station, soil moisture sensors, and data logger and telemetry equipment. Scenario also includes the engineering consultation services labor associated with the analysis of collected data and development of management recommendations. This scenario applies only to the first year. The appropriate labor only scenario applies in subsequent years. This scenario applies only to sites without existing access to equivalent climatic data supplied by the advanced weather station. Locations with adequate weather data should consider the soil moisture sensor with data loggers first year scenario. Management scenario size is assumed as 160 acres, although weather data may be valid over a larger area. Resource Concerns: Insufficient Water- Inefficient use of irrigation water. Associated Practices Include: 449- Irrigation Water Management; 441- Irrigation System, Microirrigation; 442- Irrigation System, Sprinkler; 443- Irrigation System, Surface; and 587, Structure for Water Control.

Before Situation:

Producer ues the feel method to estimate soil moisture for scheduling irrigations.

After Situation:

An advanced weather station, soil moisture sensors, and telemetry equipment are used to continuously collect data. Engineering consultants hired by the producer analyze data and make irrigation recommendations and evaluate water resources data. Service results in improved irrigation water management and optimally scheduled irrigations.

Scenario Feature Measure: Irrigated Area Managed

Scenario Unit: Acre

Scenario Typical Size: 160

Scenario Cost: $11,062.90 **Scenario Cost/Unit:** $69.14

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	$27.30	16	$436.80
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	$33.06	32	$1,057.92
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	$108.13	32	$3,460.16
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	3	$4,863.06
Soil Moisture Sensor	1456	Soil moisture resistance sensor W/10' cables. Equipment only.	Each	$35.46	8	$283.68
Weather Station, precipitation	2550	Advance Weather Station which collects and records recording rainfall, humidity, barometric pressure, wind speed, temperature, and solar radiation from a solar powered self-standing tripod to an advance weather recording console. Used for both 449 advance irrigation water management and for Activity 202 water quality monitoring .	Each	$961.28	1	$961.28

Practice: 449 - Irrigation Water Management

Scenario: #10 - Advanced Weather Station and Soil Moisture Sensors Years 2+

Scenario Description:

Description: This scenario includes the engineering consultation services labor to analyze data and make and implement irrigation management recommendations using the equipment installed under the Advanced Weather Station and Soil Moisture Monitoring Year 1 scenario. Data sources include an advanced weather station, soil moisture sensors with data loggers, flow meters, etc. It is assumed that an engineer or other water resources professional will provide the data analysis services. Assumed management scenario size is 160 acres. Resource Concerns: Insufficient Water- Inefficient use of irrigation water. Associated Practices Include: 449- Irrigation Water Management; 441- Irrigation System, Microirrigation; 442- Irrigation System, Sprinkler; 443- Irrigation System, Surface; and 587, Structure for Water Control.

Before Situation:

An advanced weather station and soil moisture sensors with a telemetry system has been installed in a previous year.

After Situation:

Engineering consultants hired by the producer analye data collected by the previously installed equipment and make irrigation recommendations and evaluate water resources data. Service results in improved irrigation water management and optimally scheduled irrigations.

Scenario Feature Measure: Irrigated Area Managed

Scenario Unit: Acre

Scenario Typical Size: 160

Scenario Cost: $4,518.08 **Scenario Cost/Unit:** $28.24

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	$108.13	32	$3,460.16
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	$33.06	32	$1,057.92

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 (1 to 3 ounce sprinkled at 3-5 ft furrow inlet or metered at 10 ppm directly into the head ditch). 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: $430.32 **Scenario Cost/Unit:** $1.79

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	$19.06	12	$228.72
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: 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: $2,351.16 **Scenario Cost/Unit:** $470.23

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	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	$17.26	6	$103.56
	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	6	$288.42
	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$138.48	6	$830.88
Labor						
	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$26.75	6	$160.50
	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	6	$113.40
Mobilization						
	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	3	$854.40

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 are EXCESS / 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 and 5 feet deep.

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 placed

Scenario Unit: Cubic Yard

Scenario Typical Size: 6,000

Scenario Cost: $14,384.80 **Scenario Cost/Unit:** $2.40

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.35	6000	$14,100.00
Mobilization						
	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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: $2,351.16 **Scenario Cost/Unit:** $470.23

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$138.48	6	$830.88
	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	$17.26	6	$103.56
	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	6	$288.42
Labor						
	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$26.75	6	$160.50
	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	6	$113.40
Mobilization						
	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	3	$854.40

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 are EXCESS / 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 and 5 feet deep.

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 placed

Scenario Unit: Cubic Yard

Scenario Typical Size: 6,000

Scenario Cost: $14,384.80 **Scenario Cost/Unit:** $2.40

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.35	6000	$14,100.00
Mobilization						
	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 464 - Irrigation Land Leveling

Scenario: #1 - Irrigation Land Leveling

Scenario Description:

This scenario will level 80 acres of irrigated crop land to a planned grade to permit uniform and efficient application of irrigation water to the leveled land. Equipment used include dirtpans/carry-all/pan-scraper equipment that are typcially laser or GPS guided. The typical volume of earth moved is 100 to 700 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 reduced irrigation efficiency by localized ponding, excessive deep percolation, and/or excess runoff/runon.

After Situation:

Cropland will be reshaped to provide uniform distribution of irrigation water in promote efficient use of irrigation water and achieve designed irrigation efficiencies.

Scenario Feature Measure: Volume of Earth Moved

Scenario Unit: Cubic Yard

Scenario Typical Size: 52,000

Scenario Cost: $126,550.16 **Scenario Cost/Unit:** $2.43

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.35	52000	$122,200.00
Mobilization						
	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	8	$4,350.16

Practice: 464 - Irrigation Land Leveling

Scenario: #2 - Irrigation Land Leveling Remote

Scenario Description:

This scenario will level 80 acres of irrigated crop land in remote loactions (>50 miles from equipment source) to a planned grade to permit uniform and efficient application of
irrigation water to the leveled land. Equipment used include dirtpans/carry-all/pan-scraper equipment that are typcially laser or GPS guided. The typical volume of earth moved is 400 to 700 cubic yards per acre. Typically, Fields have been rough leveled and have excessive row and side fall. Earth moving, using a guided system, involves higher yardage amounts. Field locations are remote and require transport of equipment at distances of 50 miles or greater. 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 reduced irrigation efficiency by localized ponding, excessive deep percolation, and/or excess runoff/runon. Field locations are remote requiring transport of equipment 50 miles or greater.

After Situation:

Cropland will be reshaped to provide uniform distribution of irrigation water in promote efficient use of irrigation water and achieve designed irrigation efficiencies.

Scenario Feature Measure: Volume of earth moved

Scenario Unit: Cubic Yard

Scenario Typical Size: 52,000

Scenario Cost: $135,250.48 **Scenario Cost/Unit:** $2.60

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.35	52000	$122,200.00
Mobilization						
	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	24	$13,050.48

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. Resource Concerns include Soil Condition, Soil Erosion, and Water Quality/Quantity.

After Situation:

Scraper, backhoe, bulldozer or other heavy equipment used to correct irregulaties and address drainage or workablity issues. Soil condition and erosion concerns are addressed, and water quality is improved in nearby waterways and streams.

Scenario Feature Measure: Acres of land treated

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $4,562.25 **Scenario Cost/Unit:** $114.06

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	1144				2	
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	$17.26	25	$431.50
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$138.48	25	$3,462.00
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	$26.75	25	$668.75

Practice: 472 - Access Control

Scenario: #1 - Trails/Roads Access Control

Scenario Description:

Restricting access to the use of forest/farm roads and trails by the use of a gate and limited fencing. 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: $650.87 **Scenario Cost/Unit:** $650.87

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	$26.12	4	$104.48
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	4	$165.64
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$9.31	2	$18.62
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	$19.06	4	$76.24
Materials						
Concrete mix, bag	1226	Pre-mixed dry concrete mix in 60 pound bag. Materials only.	Each	$3.65	10	$36.50
Gate, Pipe, 12'	1057	6 rail tube gate, 16 gauge. Includes materials and shipping only.	Each	$164.75	1	$164.75
Post, Wood, CCA treated, 6" x 8'	12	Wood Post, End 6" X 8', CCA Treated. Includes materials and shipping only.	Each	$14.96	4	$59.84
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	4	$24.80

Practice: 472 - Access Control

Scenario: #2 - Animal exclusion from sensitive areas

Scenario Description:

Excluding animals from an area in order to address identified resource concerns. This is for facilitating exclusion of animals to protect or enhance natural resource values. Control will be by temporary electric fencing. Any need for permanent fencing will be planned and installed using the Fence practice (382). Clearing of brush and trees is not necessary. Resource concerns include Wildlife Habitat degradation, Undesirable plant productivity and health, and/or Excessive sediment in surface waters.

Before Situation:

Sensitive areas are threatened by the adverse actions of domestic and/or wild animals. The importance of the sensitive areas can include (but are not limited to): wildlife habitat, plant species composition, newly established trees and/or plants, stream bank stability, and/or water quality.

After Situation:

Sensitive areas are protected from the adverse actions of domestic and/or wild animals by excluding them from the area.

Scenario Feature Measure: Length of fence

Scenario Unit: Feet

Scenario Typical Size: 3,600

Scenario Cost: $514.75 **Scenario Cost/Unit:** $0.14

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	$41.41	4	$165.64
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	$19.06	4	$76.24
Materials						
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
Property/Safety Signs	293	Plastic Fence safety or property sign - Printed on both sides 6 pre-drilled holes for hanging or nailing. 7.5" x 4.75". Includes materials and shipping only.	Each	$1.41	35	$49.35
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	$191.56	1	$191.56

Practice: 472 - Access Control

Scenario: #3 - Forest/Farm Access Control

Scenario Description:

Restricting human access to a field/farm/property through use of signage and other markings. Resource concerns include Undesirable plant productivity and health, Excessive sediment in surface waters, Concentrated flow erosion, and Wildlife habitat degradation.

Before Situation:

A 20 acre tract (field, farm. forests, etc.) is being damaged or misused by illegal activities that put the resources/property at risk or needs controlled access due to an active management operation such as pest management or timber harvesting. The perimeter needs marking with paint (at 100 foot intervals) and signs at points of ingress. Surveying is not necessary.

After Situation:

The property is adequately marked and protected, illegal activities are stopped and/or forest resources are secure.

Scenario Feature Measure:

Scenario Unit: Feet

Scenario Typical Size: 3,500

Scenario Cost: $550.88 **Scenario Cost/Unit:** $0.16

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	$41.41	8	$331.28
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	8	$152.48
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
Property/Safety Signs	293	Plastic Fence safety or property sign - Printed on both sides 6 pre-drilled holes for hanging or nailing. 7.5" x 4.75". Includes materials and shipping only.	Each	$1.41	2	$2.82

Practice: 472 - Access Control

Scenario: #4 - Monitoring, maintenance, additional labor

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: $181.41 **Scenario Cost/Unit:** $36.28

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	$41.41	3	$124.23
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	$19.06	3	$57.18

Practice: 484 - Mulching

Scenario: #1 - Organic Material

Scenario Description:

Application of straw mulch or other other state approved natural material to reduce erosion and facilitate the establishment of vegetative cover. Mulch provides full coverage and is typically used with Critical Area Planting.
Resource Concern: Soil Erosion

Before Situation:

Typical scenario ranges is a 1.0 acre disturbed site around a newly constructed structural practice. The potential for soil erosion is high and mulch is needed to stabilize the soil and facilitate the establishment of vegetative cover.

After Situation:

Straw mulch has been applied to areas needing mulch. Erosion and sedimentation is reduced, water and soil quality is protected, and vegetative cover is established.

Scenario Feature Measure: Area Covered by Mulch

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $305.72 **Scenario Cost/Unit:** $305.72

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	$26.12	0.5	$13.06
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	0.5	$20.71
Mulcher, straw blower	1305	Straw bale mulcher/blower to mechanically spread small or large straw bales. Labor not included.	Hour	$50.68	0.5	$25.34
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	$19.06	0.5	$9.53
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 - Erosion Control Blanket

Scenario Description:

Installation of erosion control blanket on critical areas with steep slopes, or disturbed site around a newly constructed structural practice such as a grassed waterway. Blanket is typically made of coconut coir, wood fiber, straw and is typically covered on both sides with polypropylene netting. Used to help control erosion and establish vegetative cover.

Before Situation:

There are areas of concentrated flow or overland flow which require shaping or other earthwork practice installation. 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: $819.68 **Scenario Cost/Unit:** $0.16

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	$19.06	8	$152.48
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: #3 - Synthetic Material

Scenario Description:

Installation of geotextile, biodegradable plastic, polyethylene plastic, or other state approved synthetic mulch to conserve soil moisture, facilitate plant etablishment and provide erosion control. Payment based on actual area covered by mulching material.

Before Situation:

Site conditions very. Typically scenarios include new tree and shrub plantings, irrigated orchards, vineyards, or specialty crops. Water quantity and plant condition are concerns.

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: Linear Feet Covered by Mulch

Scenario Unit: Foot

Scenario Typical Size: 1,000

Scenario Cost: $1,567.45 **Scenario Cost/Unit:** $1.57

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	$2.35	667	$1,567.45

Practice: 484 - Mulching

Scenario: #4 - Tree and Shrub squares

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 to facilitate tree/shrub 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. Water quantity and plant condition are concerns.

After Situation:

Weed barrier fabric squares are installed with 5 sod staples each, around individual trees and shrubs to conserve soil moisture and facilitate tree/shrub establishment.

Scenario Feature Measure: Number of Trees Mulched

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $2.35 **Scenario Cost/Unit:** $2.35

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	$2.35	1	$2.35

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: $2,442.88 **Scenario Cost/Unit:** $1,221.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$138.48	8	$1,107.84
	938	Brush Chipper, 6" capacity, typically 35 HP. Includes chipper and power unit. Labor not included.	Hour	$24.61	8	$196.88
	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	8	$331.28
Labor						
	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	8	$151.20
	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	$27.30	8	$218.40
	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	8	$152.48
Mobilization						
	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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: $4,741.08 **Scenario Cost/Unit:** $2,370.54

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	1868	Brush Chipper, 15" capacity, typically 165 HP. Includes chipper and power unit. Does not include labor.	Hour	$72.90	12	$874.80
	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$207.67	12	$2,492.04
	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	12	$496.92
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	$27.30	12	$327.60
	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$26.75	12	$321.00
	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	12	$228.72

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: $2,833.60 **Scenario Cost/Unit:** $1.07

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	20	$828.20
	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	20	$961.40
Labor						
	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	20	$381.20
	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	20	$378.00
Mobilization						
	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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: $64,929.60 **Scenario Cost/Unit:** $129.86

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	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	$62.38	240	$14,971.20
	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$135.05	240	$32,412.00
Labor						
	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	240	$4,574.40
	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$26.75	240	$6,420.00
	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	$27.30	240	$6,552.00

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 Feet

Scenario Typical Size: 2,000

Scenario Cost: $30,605.44 **Scenario Cost/Unit:** $15.30

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$207.67	64	$13,290.88
	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	$62.38	64	$3,992.32
	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$135.05	64	$8,643.20
Labor						
	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$26.75	64	$1,712.00
	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	$27.30	64	$1,747.20
	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	64	$1,219.84

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 Feet

Scenario Typical Size: 2,000

Scenario Cost: $15,302.72 **Scenario Cost/Unit:** $7.65

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$135.05	32	$4,321.60
	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$207.67	32	$6,645.44
	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	$62.38	32	$1,996.16
Labor						
	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	32	$609.92
	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$26.75	32	$856.00
	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	$27.30	32	$873.60

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" 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: 30

Scenario Cost: $123.76 **Scenario Cost/Unit:** $4.13

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
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	$27.30	1	$27.30
Materials						
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	2	$52.28

Practice: 511 - Forage Harvest Management

Scenario: #2 - Organic Preemptive Harvest

Scenario Description:

Preemptive harvest of forage crops to prevent damage from insects (such as leafhopper on alfalfa) or other pests results in better forage quality and better livestock performance.

Before Situation:

Forage pests are usually controlled with pesticides.

After Situation:

In organic or transitioning to organic systems, 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: 30

Scenario Cost: $123.76 **Scenario Cost/Unit:** $4.13

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
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	$27.30	1	$27.30
Materials						
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	2	$52.28

Practice: 511 - Forage Harvest Management

Scenario: #3 - Perennial Crops - Delayed Mowing

Scenario Description:

In perennial forage crops, the delaying the harvest of the first cutting to promote the reproduction of ground nesting birds. Delaying the harvest of the first cutting will benefit ground nesting birds; research at the University of Vermont showed that breeding success for declining grassland songbirds (e.g. Bobolink) went from 0 on a regularly harvested hay field to 2.8 fledglings per female per year when the the first harvest on a hayfield was delayed until August 1st. Bobolinks, Eastern Meadowlarks, and Savannah Sparrows require a nesting period to fledge young that lasts through the end of July in most parts of the eastern US. The delayed harvest results in a decrease in overall forage quality. Farmers could see as much as a 50% reduction in market value due to declines in protein (~50%) and digestibility (~20%), making the forage crop less palatable and lower in relative feed value. The selected fields should be large enough to promote ground nesting birds. After young have fledged the field will be harvested for dry forages.

Before Situation:

Perennial forage crops are produced and harvested; ground nesting birds are disturbed and/or fledgling birds are killed in the process.

After Situation:

Annual crops are harvested with a delayed mowing; forage quality is compromised, however, the survival of ground nesting birds is promoted.

Scenario Feature Measure: Increased grassland bird populations.

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $158.23 **Scenario Cost/Unit:** $5.27

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	$11.49	3	$34.47
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	$27.30	1	$27.30
Materials						
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	2	$52.28

Practice: 511 - Forage Harvest Management

Scenario: #4 - Doublecropping - Delayed harvest and subsequent planting

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 decrease in overall forage quality. Farmers could see as much as a 50% reduction in market value due to declines in protein (~50%) and digestibility (~20%), making the forage crop less palatable and lower in relative feed value. 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. Subsequently, the harvest of the second crop will cause an approximately 20% yield decline. The selected area should be large enough to buffer adults and nestlings from silage chopping in adjacent areas or fields. After young have fledged the field will be chopped and used as grain or silage. This practice is best planned cooperatively with the farmer and appropriate wildlife agencies far enough in advance to reduce disturbance to ground nesting birds. For example, Tricolored Blackbirds need a 35-day window from the time of nest building to fledge young and the silage needs to remain uncut until then.

Before Situation:

Double cropped annual 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: 30

Scenario Cost: $192.70 **Scenario Cost/Unit:** $6.42

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	$11.49	6	$68.94
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	$27.30	1	$27.30
Materials						
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	2	$52.28

Practice: 512 - Forage and Biomass Planting

Scenario: #1 - Native Perennial 1 species

Scenario Description:

Establish or reseed adapted perennial native grasses to improve or maintain livestock/wildlife nutrition and health, extend the length of the grazing season, and provide soil cover to reduce erosion. Used for either conventional or no-till seeding of native grasses for pasture, hayland, and wildlife openings. This practice may be utilized for organic or regular production. This scenario assumes fertilizer, seed, equipment and labor for seed bed prep, tillage, seeding ,and spreading.

Before Situation:

Poorly managed/degraded pasture land or cropland being converted to pasture and/or hay.

After Situation:

Suitable species are established to improve forage quality and quantity and reduce soil erosion on cropland ,hayland, pasture, and/or biomass production.

Scenario Feature Measure: Acres of Forgage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $6,264.65 **Scenario Cost/Unit:** $208.82

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	$6.47	30	$194.10
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$7.18	30	$215.40
Lime application	953	Lime application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$10.70	30	$321.00
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	30	$675.30
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	$19.06	8	$152.48
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	$0.65	1500	$975.00
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	30	$468.90
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	30	$2,127.90
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	1	$9.77
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.56	1500	$840.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 512 - Forage and Biomass Planting

Scenario: #2 - Native Perennial 1 species Low Input

Scenario Description:

Establish or reseed adapted perennial native grasses to improve or maintain livestock/wildlife nutrition and health, extend the length of the grazing season, and provide soil cover to reduce erosion. Used for either conventional or no-till seeding of native grasses for pasture, hayland, and wildlife openings. This practice may be utilized for organic or regular production. This scenario assumes fertility and pH are not needed. Seed, equipment and labor for seed bed prep, tillage, seeding ,and spreading are included.

Before Situation:

Poorly managed/degraded pasture land or cropland being converted to pasture and/or hay.

After Situation:

Suitable species are established to improve forage quality and quantity and reduce soil erosion on cropland ,hayland, pasture, and/or biomass production.

Scenario Feature Measure: Acres of Forgage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $3,913.25 **Scenario Cost/Unit:** $130.44

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	$22.51	30	$675.30
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	30	$194.10
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	$19.06	8	$152.48
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	30	$468.90
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	30	$2,127.90
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 512 - Forage and Biomass Planting

Scenario: #3 - Native Perennial 2 or more species

Scenario Description:

Establish or reseed with 2 or more adapted perennial native warm season grasses to improve or maintain livestock/wildlife nutrition and health, extend the length of the grazing season, and provide soil cover to reduce erosion. Used for either conventional or no-till seeding of perennial native warm season grasses for pasture, hayland, and wildlife openings. This practice may be utilized for organic or regular production. This scenario assumes fertilizer, seed, equipment and labor for seed bed prep, tillage, seeding ,and spreading.

Before Situation:

Existing stand of perennial grasses or monoculture or no grasses present. Resource concerns may include undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Suitable NWSG species are established to improve forage quality and quantity and reduce soil erosion on cropland, hayland, pasture and/or biomass production.

Scenario Feature Measure: Acres of Forgage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $10,902.95 **Scenario Cost/Unit:** $363.43

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	341				30	
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	$22.51	30	$675.30
Lime application	953	Lime application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$10.70	30	$321.00
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$11.74	30	$352.20
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	30	$194.10
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	$19.06	8	$152.48
Materials						
Three plus Species Mix, Warm Season, Native Perennial	2327	Native, warm season perennial grass. Includes material and shipping only.	Acre	$220.98	30	$6,629.40
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	30	$468.90
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	1	$9.77
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.56	1500	$840.00
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	$0.65	1500	$975.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 512 - Forage and Biomass Planting

Scenario: #4 - Native Perennial 2 or more species with Low Input

Scenario Description:

Establish or reseed with two or more adapted perennial native warm season grasses to improve or maintain livestock/wildlife nutrition and health, extend the length of the grazing season, and provide soil cover to reduce erosion. Used for either conventional or no-till seeding of perennial native warm season grasses for pasture, hayland, and wildlife openings. This practice may be utilized for organic or regular production. This scenario assumes fertility and pH are not needed. Seed, equipment and labor for seed bed prep, tillage, seeding ,and spreading are included.

Before Situation:

Existing stand of perennial grasses or monoculture or no grasses present. Resource concerns may include undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Suitable NWSG species are established to improve forage quality and quantity and reduce soil erosion on cropland, hayland, pasture and/or biomass production.

Scenario Feature Measure: Acres of Forgage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $8,766.95 **Scenario Cost/Unit:** $292.23

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	341				30	
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$11.74	30	$352.20
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	30	$675.30
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	30	$194.10
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	$19.06	8	$152.48
Materials						
Three plus Species Mix, Warm Season, Native Perennial	2327	Native, warm season perennial grass. Includes material and shipping only.	Acre	$220.98	30	$6,629.40
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
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 512 - Forage and Biomass Planting

Scenario: #5 - Introduced Cool Season Grasses with Legumes

Scenario Description:

Establish or reseed adapted perennial introduced cool season grasses and legumes to improve or maintain livestock/wildlife nutrition and health, extend the length of the grazing season, and provide soil cover to reduce erosion. Used for either conventional or no-till seeding of perennial introduced cool season grasses for pasture, hayland, and wildlife openings. This practice may be utilized for organic or regular production. This scenario assumes fertilizer, seed, equipment and labor for seed bed prep, tillage, seeding ,and spreading.

Before Situation:

Poor or nonexistent stand of grass 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 forage quality and quantity and reduce soil erosion on cropland ,hayland, pasture, and/or biomass production.

Scenario Feature Measure: Acres of Forgage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $5,794.25 **Scenario Cost/Unit:** $193.14

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	$7.18	30	$215.40
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	30	$675.30
Chemical, ground application	948	Chemical 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	$11.74	30	$352.20
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	$19.06	8	$152.48
Materials						
Four Species Mix, Cool Season, Introduced Perennial (2 grasses, 2 legumes)	2319	Cool season, introduced grass and legume mix. Includes material and shipping only.	Acre	$21.41	30	$642.30
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	30	$468.90
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	$0.82	1200	$984.00
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	$0.65	1500	$975.00

Materials

Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.56	1500	$840.00

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 512 - Forage and Biomass Planting

Scenario: #6 - Introduced Cool Season Grasses with Legumes with Low Input

Scenario Description:

Establish or reseed adapted perennial introduced cool season grasses and legumes to improve or maintain livestock/wildlife nutrition and health, extend the length of the grazing season, and provide soil cover to reduce erosion. Used for either conventional or no-till seeding of perennial introduced cool season grasses for pasture, hayland, and wildlife openings. This practice may be utilized for organic or regular production. This scenario assumes fertility and pH are not needed. Seed, equipment and labor for seed bed prep, tillage, seeding ,and spreading are included.

Before Situation:

Poor or nonexistent stand of grass 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 forage quality and quantity and reduce soil erosion on cropland ,hayland, pasture, and/or biomass production.

Scenario Feature Measure: Acres of Forgage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $2,779.85 **Scenario Cost/Unit:** $92.66

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	$11.74	30	$352.20
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	30	$675.30
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	30	$194.10
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	$19.06	8	$152.48
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	30	$468.90
Four Species Mix, Cool Season, Introduced Perennial (2 grasses, 2 legumes)	2319	Cool season, introduced grass and legume mix. Includes material and shipping only.	Acre	$21.41	30	$642.30
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	1	$9.77
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 512 - Forage and Biomass Planting

Scenario: #7 - Introduced Warm Season Grasses

Scenario Description:

Establish or reseed adapted introduced warm season grasses to improve or maintain livestock/wildlife nutrition and health, extend the length of the grazing season, and provide soil cover to reduce erosion. Used for either conventional or no-till seeding of perennial introduced warm season grasses for pasture, hayland, and wildlife openings. This practice may be utilized for organic or regular production. This scenario assumes fertilizer, seed, equipment and labor for seed bed prep, tillage, seeding ,and spreading.

Before Situation:

Existing stand of perennial grasses or monoculture or no grasses present. 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 forage quality and quantity and reduce soil erosionon cropland ,hayland, pasture, and/or biomass production.

Scenario Feature Measure: Acres of Forgage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $7,074.65 **Scenario Cost/Unit:** $235.82

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	$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	$22.51	30	$675.30
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$7.18	30	$215.40
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$11.74	30	$352.20
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	$19.06	8	$152.48
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	$0.82	1200	$984.00
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	$0.65	1500	$975.00
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.56	1500	$840.00
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	1	$9.77
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	30	$1,922.70
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	$15.63	30	$468.90
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 512 - Forage and Biomass Planting

Scenario: #8 - Introduced Warm Season Grasses with Low Input

Scenario Description:

Establish or reseed adapted introduced warm season grasses to improve or maintain livestock/wildlife nutrition and health, extend the length of the grazing season, and provide soil cover to reduce erosion. Used for either conventional or no-till seeding of perennial introduced warm season grasses for pasture, hayland, and wildlife openings. This practice may be utilized for organic or regular production. This scenario assumes fertility and pH are not needed. Seed, equipment and labor for seed bed prep, tillage, seeding ,and spreading are included.

Before Situation:

Existing stand of perennial grasses or monoculture or no grasses present. 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 forage quality and quantity and reduce soil erosionon cropland ,hayland, pasture, and/or biomass production.

Scenario Feature Measure: Acres of Forgage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $4,060.25 **Scenario Cost/Unit:** $135.34

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	$22.51	30	$675.30
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$11.74	30	$352.20
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.47	30	$194.10
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	$19.06	8	$152.48
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	30	$468.90
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	30	$1,922.70
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 512 - Forage and Biomass Planting

Scenario: #9 - Grass Establishment-Sprigging

Scenario Description:

Sprigging new grasses with sprigging application for the purpose of providing forage, increasing plant diversity, soil quality and fertility, and plant health. This practice may be utilized for organic or regular production. This scenario assumes fertilizer, sprigs, equipment and labor for seed bed prep, tillage, sprigging ,and spreading.

Before Situation:

Poor or nonexistent stand of grass 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 forage quality and quantity and reduce soil erosion on cropland ,hayland, pasture, and/or biomass production.

Scenario Feature Measure: Acres of Forgage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $9,502.45 **Scenario Cost/Unit:** $316.75

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	$106.09	30	$3,182.70
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$7.18	30	$215.40
Chemical, ground application	948	Chemical 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	$11.74	30	$352.20
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	$19.06	8	$152.48
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	$0.65	1500	$975.00
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	30	$468.90
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.56	1500	$840.00
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	$0.82	1200	$984.00
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	30	$2,127.90

Materials

Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	1	$9.77

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80		$0.00

Practice: 512 - Forage and Biomass Planting

Scenario: #10 - Overseeding Legumes

Scenario Description:

Establishment of legumes for the purpose of increasing plant diversity, soil quality and fertility, and plant health and enhancing the quality of forage. This practice may be utilized for organic or regular production. This scenario assumes fertilizer, seed, equipment and labor for seed bed prep, tillage, seeding ,and spreading.

Before Situation:

Existing stand of perennial grasses or monoculture with no legumes present .

After Situation:

Legumes will be maintained through proper grazing management and improve plant diversity and soil quality.

Scenario Feature Measure: Acres of Forgage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $5,970.35 **Scenario Cost/Unit:** $199.01

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	$22.51	30	$675.30
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$7.18	30	$215.40
Chemical, ground application	948	Chemical 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	$11.74	30	$352.20
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	$19.06	8	$152.48
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	30	$468.90
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.56	1500	$840.00
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	$0.65	1500	$975.00
Five Species Mix, Cool Season, Annual Grasses and Legumes	2320	Cool season, introduced grass and legume mix. Includes material and shipping only.	Acre	$60.08	30	$1,802.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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; 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 weight of pipe material in pounds. 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: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 2,645

Scenario Cost: $13,106.78 **Scenario Cost/Unit:** $4.96

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	$1.38	5280	$7,286.40
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	$19.06	48	$914.88
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	$1.49	2910	$4,335.90
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 516 - Livestock Pipeline

Scenario: #2 - 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; 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 weight of pipe material in pounds. 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: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 2,645

Scenario Cost: $15,607.28 **Scenario Cost/Unit:** $5.90

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	$1.38	5280	$7,286.40
Horizontal Boring, ≤ 3" diameter	1131	Includes equipment, labor and setup.	Foot	$50.01	50	$2,500.50
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	$19.06	48	$914.88
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	$1.49	2910	$4,335.90
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 516 - Livestock Pipeline

Scenario: #3 - 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; 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 weight of pipe material in pounds. 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: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 2,645

Scenario Cost: $16,021.28 **Scenario Cost/Unit:** $6.06

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	$1.38	5280	$7,286.40
Horizontal Boring, > 3" diameter	1132	Includes equipment, labor and setup.	Foot	$58.29	50	$2,914.50
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	$19.06	48	$914.88
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	$1.49	2910	$4,335.90
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 516 - Livestock Pipeline

Scenario: #4 - 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 weight of pipe material in pounds. 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: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 2,508

Scenario Cost: $14,233.35 **Scenario Cost/Unit:** $5.68

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
Trenching, Pipeline Plowing	1096	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	$1.22	5280	$6,441.60
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	$19.06	32	$609.92
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.33	2759	$6,428.47
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 516 - Livestock Pipeline

Scenario: #5 - 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 weight of pipe material in pounds. 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: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 2,508

Scenario Cost: $16,733.85 **Scenario Cost/Unit:** $6.67

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	$1.22	5280	$6,441.60
Horizontal Boring, ≤ 3" diameter	1131	Includes equipment, labor and setup.	Foot	$50.01	50	$2,500.50
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	$19.06	32	$609.92
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.33	2759	$6,428.47
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 516 - Livestock Pipeline

Scenario: #6 - 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 weight of pipe material in pounds. 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: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 2,508

Scenario Cost: $17,147.85 **Scenario Cost/Unit:** $6.84

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	$58.29	50	$2,914.50
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
Trenching, Pipeline Plowing	1096	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	$1.22	5280	$6,441.60
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	$19.06	32	$609.92
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.33	2759	$6,428.47
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 516 - Livestock Pipeline

Scenario: #7 - 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 weight of pipe material in pounds. 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: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 2,508

Scenario Cost: $7,670.70 **Scenario Cost/Unit:** $3.06

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	$19.06	32	$609.92
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.33	2884	$6,719.72
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	$78.65	2	$157.30

Practice: 516 - Livestock Pipeline

Scenario: #8 - 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 weight of pipe material in pounds. 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: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 14,351

Scenario Cost: $35,858.24 **Scenario Cost/Unit:** $2.50

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	$1.38	5280	$7,286.40
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	$19.06	144	$2,744.64
Materials						
Pipe, steel, smooth wall, galvanized, weight priced	1381	Steel manufactured into galvanized smooth wall pipe	Pound	$1.60	15786	$25,257.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 516 - Livestock Pipeline

Scenario: #9 - 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 weight of pipe material in pounds. 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: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 14,351

Scenario Cost: $29,151.04 **Scenario Cost/Unit:** $2.03

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	$19.06	144	$2,744.64
Materials						
Pipe, steel, smooth wall, galvanized, weight priced	1381	Steel manufactured into galvanized smooth wall pipe	Pound	$1.60	16504	$26,406.40

Practice: 516 - Livestock Pipeline

Scenario: #10 - HDPE (Iron Pipe Size & Tubing) - Remote locations

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 weight of pipe material in pounds. 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. Scenario specifically applies to remote locations that are 50 or miles from source of equipment and/or materials.
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: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 2,508

Scenario Cost: $14,851.35 **Scenario Cost/Unit:** $5.92

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	$1.22	5280	$6,441.60
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	$19.06	32	$609.92
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.33	2759	$6,428.47
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
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 included in the component price.	Dollar	$1.03	600	$618.00

Practice: 516 - Livestock Pipeline

Scenario: #11 - 1.25 inch 160 psi PVC-SDR per foot

Scenario Description:

Description: Below ground installation of PVC-SDR pipeline. PVC is manufactured in sizes (nominal diameter) from ½-inch to 36-inch; typical practice sizes range from 1-inch to 4-inch; and this scenario size is 1-1/4-inch 160 psi PVC. Construct one mile (5,280 feet) of 1-1/4-inch 160 psi PVC pipeline with appurtenances, installed below ground with a minimum 1.5 feet of ground cover. The scenario unit is feet. 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 Pipeline Installed

Scenario Unit: Linear Foot

Scenario Typical Size: 5,280

Scenario Cost: $10,675.10 **Scenario Cost/Unit:** $2.02

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	$1.38	5280	$7,286.40
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	$19.06	48	$914.88
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	$1.49	1278	$1,904.22
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 516 - Livestock Pipeline

Scenario: #12 - 1.5 inch HDPE per foot

Scenario 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 linear feet of pipeline installed. Construct 5,280 feet of 1½-inch, Class 200 (SDR-9.0, PE4708) HDPE pipeline. HDPE pipe weighs 0.475 lb/ft. 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 Pipeline Installed

Scenario Unit: Linear Foot

Scenario Typical Size: 5,280

Scenario Cost: $14,233.35 **Scenario Cost/Unit:** $2.70

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	$1.22	5280	$6,441.60
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	$19.06	32	$609.92
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.33	2759	$6,428.47
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

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: $24,595.81 **Scenario Cost/Unit:** $10.16

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	$2.35	2420	$5,687.00
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	$27.30	40	$1,092.00
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	$108.13	32	$3,460.16
Materials						
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Yard	$5.90	2420	$14,278.00
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	$78.65	1	$78.65

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: $31,831.61 **Scenario Cost/Unit:** $13.15

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	$2.35	2420	$5,687.00
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	$108.13	32	$3,460.16
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	$27.30	40	$1,092.00
Materials						
Geonet	1778	Geosynthetic drainage liner, typically HDPE of 300 mil thickness. Includes materials and shipping only.	Square Yard	$2.99	2420	$7,235.80
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Yard	$5.90	2420	$14,278.00
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	$78.65	1	$78.65

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: $28,950.97 **Scenario Cost/Unit:** $11.96

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	$2.35	2420	$5,687.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	807	$3,526.59
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	$108.13	32	$3,460.16
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	$27.30	40	$1,092.00
Materials						
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Yard	$5.90	2420	$14,278.00
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	$78.65	1	$78.65
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77

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: $36,186.77 **Scenario Cost/Unit:** $14.95

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	$4.37	807	$3,526.59
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	2420	$5,687.00
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	$108.13	32	$3,460.16
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	$27.30	40	$1,092.00
Materials						
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Yard	$5.90	2420	$14,278.00
Geonet	1778	Geosynthetic drainage liner, typically HDPE of 300 mil thickness. Includes materials and shipping only.	Square Yard	$2.99	2420	$7,235.80
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	$78.65	1	$78.65
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77

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: $11,163.09 **Scenario Cost/Unit:** $6.92

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	$60.82	6	$364.92
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	1613	$7,048.81
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	$108.13	2	$216.26
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$33.06	8	$264.48
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	8	$151.20
Materials						
Soil Dispersant	1490	Soil Amendment (tetrasodium pyrophosphate (TSPP), sodium tripolyphosphate (STPP), or soda ash or approved equivalent)	Ton	$477.40	6.53	$3,117.42

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. 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 including Soil Cover over Liner

Scenario Unit: Cubic Yard

Scenario Typical Size: 3,226

Scenario Cost: $18,211.90 **Scenario Cost/Unit:** $5.65

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	$4.37	3226	$14,097.62
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$60.82	6	$364.92
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	$108.13	2	$216.26
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$33.06	8	$264.48
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	8	$151.20
Materials						
Soil Dispersant	1490	Soil Amendment (tetrasodium pyrophosphate (TSPP), sodium tripolyphosphate (STPP), or soda ash or approved equivalent)	Ton	$477.40	6.53	$3,117.42

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.

Scenario Feature Measure: Volume of Liner Material

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,613

Scenario Cost: $60,596.91 **Scenario Cost/Unit:** $37.57

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	$60.82	6	$364.92
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	1613	$7,048.81
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	$108.13	3	$324.39
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	7	$132.30
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	$33.06	2	$66.12
Materials						
Bentonite	41	Bentonite, includes materials (50# bag)	Each	$10.02	5227	$52,374.54
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
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 included in the component price.	Dollar	$1.03	1	$1.03

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. 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.

Scenario Feature Measure: Volume of Liner Material (includes 1 foot of soil cover over liner)

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,613

Scenario Cost: $67,650.09 **Scenario Cost/Unit:** $41.94

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	$4.37	3227	$14,101.99
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$60.82	6	$364.92
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	$33.06	2	$66.12
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	$108.13	3	$324.39
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	7	$132.30
Materials						
Bentonite	41	Bentonite, includes materials (50# bag)	Each	$10.02	5227	$52,374.54
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
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 included in the component price.	Dollar	$1.03	1	$1.03

Practice: 528 - Prescribed Grazing

Scenario: #1 - Range Standard

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 short term monitoring.

Scenario Feature Measure:

Scenario Unit: Acre

Scenario Typical Size: 1,000

Scenario Cost: $3,274.36 **Scenario Cost/Unit:** $3.27

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
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	100	$1,906.00
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	$33.06	40	$1,322.40

Practice: 528 - Prescribed Grazing

Scenario: #2 - Range Long Term Monitoring

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, production, 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 proper rest and recovery periods, protection of sensitive areas, proper utilization, and efficient harvest of forage resources. Grazing system success will be evaluated through long term monitoring.

Scenario Feature Measure:

Scenario Unit: Acre

Scenario Typical Size: 1,000

Scenario Cost: $9,524.14 **Scenario Cost/Unit:** $9.52

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	2	$91.92
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$34.13	100	$3,413.00
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	$33.06	60	$1,983.60
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	$19.06	200	$3,812.00
Materials						
Nutritional Balance Analyzer, fecal sample analysis only	1127	NIRS fecal analysis, animal performance report. Includes materials and shipping only.	Each	$37.27	6	$223.62

Practice: 528 - Prescribed Grazing

Scenario: #3 - Habitat Mgt. Standard

Scenario Description:

Development and implementation of a grazing schedule that will enhance habitat components for the identified wildlife species of concern.

Before Situation:

Wildlife cover, shelter, food, water and 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 and 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.

Scenario Feature Measure:

Scenario Unit: Acre

Scenario Typical Size: 500

Scenario Cost: $5,230.96 **Scenario Cost/Unit:** $10.46

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	$34.13	100	$3,413.00
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	$45.96	1	$45.96
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	$19.06	50	$953.00
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	$27.30	30	$819.00

Practice: 528 - Prescribed Grazing

Scenario: #4 - Habitat Mgt. Long Term Monitoring

Scenario Description:

Development and implementation of a grazing schedule that will enhance habitat components for the identified wildlife species of concern.

Before Situation:

Wildlife cover, shelter, food, water and 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 and 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, adequate rest and recovery periods, protection of sensitive areas, improved water quality and reduced risk of invasive or noxious weed encroachment. In order to achieve this, implementation of a rest/rotation or deferred grazing system will be required. A portion of the acres (20% for Sage Grouse Initiative) will be deferred during periods of critical wildlife use.

Scenario Feature Measure:

Scenario Unit: Acre

Scenario Typical Size: 500

Scenario Cost: $11,756.58 **Scenario Cost/Unit:** $23.51

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						
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	2	$91.92
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$34.13	150	$5,119.50
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	$33.06	80	$2,644.80
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	$19.06	200	$3,812.00

Practice: 528 - Prescribed Grazing

Scenario: #5 - Pasture Standard

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: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.

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.

Scenario Feature Measure:

Scenario Unit: Acre

Scenario Typical Size: 160

Scenario Cost: $2,181.36 **Scenario Cost/Unit:** $13.63

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
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	$33.06	30	$991.80
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	$19.06	60	$1,143.60

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, production, 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.

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. Grazing system success will be evaluated through long term monitoring.

Scenario Feature Measure:

Scenario Unit: Acre

Scenario Typical Size: 160

Scenario Cost: $3,781.50 **Scenario Cost/Unit:** $23.63

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	$34.13	30	$1,023.90
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	2	$91.92
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	$19.06	80	$1,524.80
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	$33.06	30	$991.80
Materials						
Nutritional Balance Analyzer, fecal sample analysis only	1127	NIRS fecal analysis, animal performance report. Includes materials and shipping only.	Each	$37.27	4	$149.08

Practice: 528 - Prescribed Grazing

Scenario: #9 - Targeted Grazing

Scenario Description:

Management of woody non-herbaceous plant species through the use of livestock that are closely herded to concentrate grazing on targeted shrubs. Typical area is moderate rolling to gentle sloping, moderately deep to deep soils that have dense stands of woody non-herbaceous species that exceed the desirable ecological site condition. This scenario is an alternative for organic producers.

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 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, hydrology and plant health and vigor is returning to near normal levels.

Scenario Feature Measure: Acres Treated

Scenario Unit: Head per day

Scenario Typical Size: 1,500

Scenario Cost: $3,732.36 **Scenario Cost/Unit:** $2.49

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	$34.13	8	$273.04
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	2	$82.82
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	$2.99	200	$598.00
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	$19.06	50	$953.00
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	$12.17	150	$1,825.50

Practice: 533 - Pumping Plant

Scenario: #1 - Electric-Powered Pump ≤ 5 Hp

Scenario Description:

A 2.5 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; or for transferring liquid waste in a waste transfer system.
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: 2

Scenario Cost: $1,956.73 **Scenario Cost/Unit:** $978.37

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	$41.41	2	$82.82
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	$127.06	0.25	$31.77
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	$33.06	6	$198.36
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	$19.06	6	$114.36
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 motor will include the motor and controls. Includes material and shipping only.	Horsepower	$399.47	2.5	$998.68
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 include the motor and controls. Includes Includes material and shipping only.	Each	$530.75	1	$530.75

Practice: 533 - Pumping Plant

Scenario: #2 - Electric-Powered Pump ≤ 5 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: $1,805.07 **Scenario Cost/Unit:** $1,805.07

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	$41.41	2	$82.82
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	$127.06	0.25	$31.77
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	$19.06	6	$114.36
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	$33.06	6	$198.36
Materials						
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 include the motor and controls. Includes Includes material and shipping only.	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 motor will include the motor and controls. Includes material and shipping only.	Horsepower	$399.47	1	$399.47
Pressure Tank, 40 gallon	1038	Pressure Tank, 40 gallon. Includes materials and shipping only.	Each	$447.54	1	$447.54

Practice: 533 - Pumping Plant

Scenario: #3 - Electric-Powered Pump 5-10 HP

Scenario Description:

This is a close-coupled, 3-phase, 7.5 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: 8

Scenario Cost: $9,673.52 **Scenario Cost/Unit:** $1,209.19

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	$62.38	8	$499.04
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	56	$2,318.96
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	$127.06	1	$127.06
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	$26.75	8	$214.00
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	$27.30	8	$218.40
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	$19.06	56	$1,067.36
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	$33.06	56	$1,851.36
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 only.	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 shipping only.	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	$284.80	2	$569.60

Practice: 533 - Pumping Plant

Scenario: #4 - Internal Combustion-Powered Pump10 to 50HP

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 30 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: 30

Scenario Cost: $20,881.48 **Scenario Cost/Unit:** $696.05

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	$41.41	4	$165.64
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	8	$499.04
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	$127.06	2	$254.12
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	$33.06	16	$528.96
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	$26.75	8	$214.00
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	$19.06	32	$609.92
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	$27.30	8	$218.40
Materials						
Pump, < 50 HP, Pump & ICE power unit	1027	Materials, labor, controls: < 50 HP Pump & ICE power unit	Horsepower	$594.06	30	$17,821.80
Mobilization						

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 533 - Pumping Plant

Scenario: #5 - Variable Frequency Drive

Scenario Description:

This is an installation 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 40 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: $4,165.50 **Scenario Cost/Unit:** $83.31

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Motor, electric, VSD, 50 HP	1155	Variable speed drive electric motor, 50 Horsepower and all required appurtenances. Materials only.	Horsepower	$83.31	50	$4,165.50

Practice: 533 - Pumping Plant

Scenario: #6 - Internal Combustion-Powered Pump ≤ 50HP

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 30 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: 30

Scenario Cost: $20,754.42 **Scenario Cost/Unit:** $691.81

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	$41.41	4	$165.64
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	8	$499.04
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	$127.06	1	$127.06
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	$27.30	8	$218.40
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	$19.06	32	$609.92
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	$26.75	8	$214.00
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	$33.06	16	$528.96
Materials						
Pump, < 50 HP, Pump & ICE power unit	1027	Materials, labor, controls: < 50 HP Pump & ICE power unit	Horsepower	$594.06	30	$17,821.80
Mobilization						

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 533 - Pumping Plant

Scenario: #7 - Internal Combustion-Powered Pump > 50 to 70 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: 60

Scenario Cost: $31,034.82 **Scenario Cost/Unit:** $517.25

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	$127.06	1	$127.06
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	8	$499.04
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	4	$165.64
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	$26.75	8	$214.00
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	$33.06	16	$528.96
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	$27.30	8	$218.40
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	$19.06	32	$609.92
Materials						
Pump, > 50 to 70 HP, Pump & ICE power unit	1028	Materials, labor, controls: > 50 to 70 HP Pump & ICE power unit	Horsepower	$468.37	60	$28,102.20
Mobilization						

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 533 - Pumping Plant

Scenario: #8 - Internal Combustion-Powered Pump > 70 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: $39,858.94 **Scenario Cost/Unit:** $398.59

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	$62.38	8	$499.04
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	6	$248.46
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	$127.06	2	$254.12
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	$33.06	24	$793.44
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	$26.75	8	$214.00
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	$27.30	8	$218.40
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	$19.06	48	$914.88
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	$284.80	2	$569.60

Practice: 533 - Pumping Plant

Scenario: #9 - Tractor Power Take Off (PTO) Pump

Scenario Description:

This scenario involves a PTO driven pump to either transfer water for an irrigation system from a Pond - 378 (includes backflow prevention as appropriate) to cropland or; to transfer semi-solid/ liquid manure (as part of a waste transfer system) at the farm headquarters from a Waste Storage Facility - 313, to an irrigation system or waste treatment facility. In both cases, a PTO driven pump is selected because the landowner has equipment available to supply power to the pump. Electricity is not readily available and/or a stationary engine is not a practical alternative.

Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water.

Associated Practices include: 430 - Irrigation Pipeline; 442 - Irrigation System, Sprinkler; 449 - Irrigation Water Management; 590 - Nutrient Management; 378 - Pond; 313 - Waste Storage Facility; and 634 - Waste Transfer.

Before Situation:

Irrigation Setting: An existing surface irrigation system employs an inefficient, improperly sized pump that leads to inefficient water delivery resulting in high energy costs; Waste Transfer Setting: various types of semi-solid or liquid waste at the headquarters are uncollected causing surface and ground water issues. A transfer method for waste is needed. 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 Setting: A properly designed PTO-driven pump is installed, to transfer water to an Irrigation Pipeline (430) or Irrigation Canal or Lateral (320). Waste Transfer Setting: Wastes that have been collected through a waste transfer system are now efficiently transferred from a Waste Storage Facility (313) to an appropriate treatment facility or to an irrigation system. The pump typically will move 2,000 gallons per minute and is portable so that it can be used at several locations.

Scenario Feature Measure: Pump Power Requirement

Scenario Unit: Horsepower

Scenario Typical Size: 60

Scenario Cost: $11,017.04 **Scenario Cost/Unit:** $183.62

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	$127.06	2	$254.12
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	16	$662.56
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	$33.06	16	$528.96
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	$19.06	16	$304.96
Materials						
Pump, Ag Water PTO, 1,000 GPM	1923	Materials, labor, controls: Ag Water PTO Pump 1,000 GPM - 8"	Each	$9,266.44	1	$9,266.44

Practice: 533 - Pumping Plant

Scenario: #10 - 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: Feet

Scenario Typical Size: 10

Scenario Cost: $9,940.51 **Scenario Cost/Unit:** $994.05

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	$51.75	8	$414.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	4	$165.64
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	$127.06	2	$254.12
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	$19.06	32	$609.92
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	$33.06	16	$528.96
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	$284.80	2	$569.60

Practice: 533 - Pumping Plant

Scenario: #11 - Photovoltaic-Powered Pump

Scenario Description:

The typical scenario assumes installation of a submersible solar-powered pump 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 250 watts of photovoltaic (PV) panels, capable of operating a 1/4 Hp (0.25 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 1/4 Hp solar-powered submersible pump to deliver about 1.5 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: Pump Power Requirement

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $4,498.55 **Scenario Cost/Unit:** $4,498.55

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	$41.41	16	$662.56
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	$33.06	16	$528.96
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	$19.06	16	$304.96
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 include all materials (electrical, controllers, service drops and etc). This cost will include material, labor and equipment.	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 materials (electrical, controllers, and service drop, etc). This cost will include material, labor and equipment.	Kilowatt	$7,755.90	0.25	$1,938.98

Materials

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 include the motor and controls. Includes Includes material and shipping only.	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 motor will include the motor and controls. Includes material and shipping only.	Horsepower	$399.47	0.25	$99.87

Practice: 533 - Pumping Plant

Scenario: #12 - Photovoltaic-Powered Pump

Scenario Description:

The typical scenario assumes installation of a submersible solar-powered pump 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 approximately 500 watts of photovoltaic (PV) panels, capable of operating a 1/2 Hp (0.5 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 1/4 Hp solar-powered submersible pump to deliver about 1.5 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: Pump Power Requirement

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $6,537.40 **Scenario Cost/Unit:** $6,537.40

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	$41.41	16	$662.56
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	$19.06	16	$304.96
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	$33.06	16	$528.96
Materials						
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 materials (electrical, controllers, and service drop, etc). This cost will include material, labor and equipment.	Kilowatt	$7,755.90	0.5	$3,877.95
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 motor will include the motor and controls. Includes material and shipping only.	Horsepower	$399.47	0.5	$199.74

Materials

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 include the motor and controls. Includes Includes material and shipping only.	Each	$530.75	1	$530.75
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 include all materials (electrical, controllers, service drops and etc). This cost will include material, labor and equipment.	Each	$432.48	1	$432.48

Practice: 533 - Pumping Plant

Scenario: #13 - Photovoltaic-Powered Pump

Scenario Description:

The typical scenario assumes installation of a submersible solar-powered pump 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 approximately 1000 watts of photovoltaic (PV) panels, 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 1/4 Hp solar-powered submersible pump to deliver about 1.5 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: Pump Power Requirement

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $10,515.21 **Scenario Cost/Unit:** $10,515.21

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	$41.41	16	$662.56
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	$19.06	16	$304.96
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	$33.06	16	$528.96
Materials						
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 materials (electrical, controllers, and service drop, etc). This cost will include material, labor and equipment.	Kilowatt	$7,755.90	1	$7,755.90
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 motor will include the motor and controls. Includes material and shipping only.	Horsepower	$399.47	0.75	$299.60

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 include all materials (electrical, controllers, service drops and etc). This cost will include material, labor and equipment.	Each	$432.48	1	$432.48
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 include the motor and controls. Includes Includes material and shipping only.	Each	$530.75	1	$530.75

Practice: 533 - Pumping Plant

Scenario: #14 - Photovoltaic-Powered Pump - Remote Locations

Scenario Description:

The typical scenario assumes installation of a submersible solar-powered pump in a well or a live stream in remote areas at least 50 miles or more from source of equipment and/or materials. 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 250 watts of photovoltaic (PV) panels, capable of operating a 1/4 Hp (0.25 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 1/4 Hp solar-powered submersible pump to deliver about 1.5 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: Pump Power Requirement

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $4,910.55 **Scenario Cost/Unit:** $4,910.55

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	$41.41	16	$662.56
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	$19.06	16	$304.96
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	$33.06	16	$528.96
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 motor will include the motor and controls. Includes material and shipping only.	Horsepower	$399.47	0.25	$99.87
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 materials (electrical, controllers, and service drop, etc). This cost will include material, labor and equipment.	Kilowatt	$7,755.90	0.25	$1,938.98

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 include all materials (electrical, controllers, service drops and etc). This cost will include material, labor and equipment.	Each	$432.48	1	$432.48
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 include the motor and controls. Includes Includes material and shipping only.	Each	$530.75	1	$530.75

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 included in the component price.	Dollar	$1.03	400	$412.00

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: Number of Ram Pumps

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $2,111.21 **Scenario Cost/Unit:** $2,111.21

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	$127.06	0.5	$63.53
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	16	$662.56
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	$33.06	16	$528.96
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	$19.06	16	$304.96
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: $1,172.90 **Scenario Cost/Unit:** $1,172.90

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	$127.06	0.5	$63.53
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	8	$331.28
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	$33.06	8	$264.48
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	8	$152.48
Materials						
Nose Pump	1052	Materials and delivery.	Each	$361.13	1	$361.13

Practice: 533 - Pumping Plant

Scenario: #17 - Rebowling

Scenario Description:

Descripton: This scenario includes the modification and/or replacement of vertical turbine pumps in existing active wells to ensure that pumping plant performance is matched to the designed operating requirements of the appurtenant irrigation system and aquifer condtions. This practice is typically done concurrently with a conversion of an irrigation system and is not intended to substitute for normal maintenance activities. This scenario includes an inventory of existing pump data and performing a pump test if sufficient performance data for the exisitng pump cannot be provided. This scenario includes all materials, equipment, and labor to test and repair the inner column of the pumpm assembly and rebowling. Associated practices include: 441- Irrigation System, Microirrigation; 442- Irrigation System, Sprinkler; 443- Irrigation System, Surface

Before Situation:

120 acres of cropland that is being irrigated with a pump that is no longer matched to the operating conditions of the appurtenant system due to improvements in the irrigation system or changes in flow rate or water surface levels due to aquifer depletion.

After Situation:

120 acres of cropland that is being irrigated with a modified pump that is matched to irrigation system and aquifer conditions

Scenario Feature Measure: Number of Pumps

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $13,979.98 **Scenario Cost/Unit:** $13,979.98

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	$51.75	16	$828.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	16	$662.56
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	$33.06	16	$528.96
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	$19.06	32	$609.92
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
Pump, Bowl replacement, 30 to 100 HP	1984	Includes all material and shop labor to replace/service the entire set of bowls for a vertical turbine pump, install new bowls as necessary, and all appurtenances and materials to connect to the existing well column. Typical of 100 to 300 feet of column depth, 400 to 800 gpm discharge at 30 to 50 psi. Does not include labor and equipment to remove and install the assembled pump from the well.	Horsepower	$93.72	100	$9,372.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 548 - Grazing Land Mechanical Treatment

Scenario: #1 - mechanical less than 5 percent slope

Scenario Description:

using heavy modified plow or combinations of equipment that modifies physical soil layer or plant conditions on rangelands.

Before Situation:

Desired Ecological plant community is limited by a plant or soil layer that physically restricts change over a threshold.

After Situation:

Desired Ecological plant community has changed by overcoming the threshold or the seeded vegetaion establishes and sustains its function and ecological processes for the life of the practice.

Scenario Feature Measure: area of treatment

Scenario Unit: Acre

Scenario Typical Size: 250

Scenario Cost: $15,667.00 **Scenario Cost/Unit:** $62.67

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	2027	Chiseling on existing grazingland including tillage implement, power unit and labor.	Acre	$17.10	250	$4,275.00
Mobilization						
	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	40	$11,392.00

Practice: 548 - Grazing Land Mechanical Treatment

Scenario: #2 - Pastureland Mech Treatment

Scenario Description:

This also applies to organic operations as well. Chisel plowing or subsoiling will be used to break the restrictive layers that will increase water infiltration,break up sod and thatch on introduced forages. Depth of treatment will be 1" deeper than the restictive layer.

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.

Scenario Feature Measure: area of treatmnent

Scenario Unit: Acre

Scenario Typical Size: 50

Scenario Cost: $1,335.30 **Scenario Cost/Unit:** $26.71

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	1235	Deep ripper or subsoiler, (16-36 inches depth) includes tillage implement, power unit and labor.	Acre	$21.01	50	$1,050.50
Mobilization						
	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 548 - Grazing Land Mechanical Treatment

Scenario: #3 - mechanical more than 5 percent slope

Scenario Description:

On the contour, using mechanical equipment or combinations of equipment that modifies physical soil layer or plant conditions on rangeland.

Before Situation:

Desired Ecological plant community is limited by a plant or soil layer that physically restricts change over a threshold.

After Situation:

Desired Ecological plant community has changed by overcoming the threshold or the seeded vegetaion establishes and sustains its function and ecological processes for the life of the practice and geomorphology of the site.

Scenario Feature Measure: area of treatment

Scenario Unit: Acre

Scenario Typical Size: 25

Scenario Cost: $1,403.77 **Scenario Cost/Unit:** $56.15

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	2024	Contour furrowing on existing grazingland including tillage implement, power unit and labor.	Acre	$34.04	25	$851.00
Materials						
	1586	Small vinyl flags attached to wire stakes, typically, 36" in length, for marking tree rows	Each	$0.09	100	$9.00
Mobilization						
	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77

Practice: 550 - Range Planting

Scenario: #1 - Native -Standard prep

Scenario Description:

Establishment of a mixture of PREDOMINANTLY 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. Planting by aerial broadcasting.

Before Situation:

Rangeland with existing stand of perennial or annual grasses OR monoculture OR no grasses present where natural reseeding or vegetation enhancement by grazing management alone is unlikely. Resource concerns may include: undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Establishment of PREDOMINANTLY NATIVE adapted perennial vegetation such as grasses, forbs, legumes, shrubs, and trees to improve forage quality and quantity and reduce soil erosion on rangeland, native or naturalized pasture, grazed forest or other suitable location.

Scenario Feature Measure: Acres of Range Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $13,370.72 **Scenario Cost/Unit:** $167.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, Aerial	958	Broadcast seed via aerial operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$9.59	80	$767.20
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	16	$183.84
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	$19.06	8	$152.48
Materials						
Three Species Mix, Cool Season, Native Perennial Grass	2316	Cool season, native grass mix. Includes material and shipping only.	Acre	$144.58	70	$10,120.60
One Species, Native Forb, Low Cost	2329	Native forb. Includes material and shipping only.	Acre	$186.18	10	$1,861.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 550 - Range Planting

Scenario: #1 - Native -Standard prep

Scenario Description:

Establishment of a mixture of PREDOMINANTLY 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. Planting by preparing a seedbed with a LIGHT TO MODERATE TILLAGE and seeding with a no-till drill, range drill, or broadcasting.

Before Situation:

Rangeland with existing stand of perennial or annual grasses OR monoculture OR no grasses present where natural reseeding or vegetation enhancement by grazing management alone is unlikely. Resource concerns may include: undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Establishment of PREDOMINANTLY NATIVE adapted perennial vegetation such as grasses, forbs, legumes, shrubs, and trees to improve forage quality and quantity and reduce soil erosion on rangeland, native or naturalized pasture, grazed forest or other suitable location.

Scenario Feature Measure: Acres of Range Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $15,343.52 **Scenario Cost/Unit:** $191.79

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	$11.74	80	$939.20
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	80	$1,800.80
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	16	$183.84
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	$19.06	8	$152.48
Materials						
Three Species Mix, Cool Season, Native Perennial Grass	2316	Cool season, native grass mix. Includes material and shipping only.	Acre	$144.58	70	$10,120.60
One Species, Native Forb, Low Cost	2329	Native forb. Includes material and shipping only.	Acre	$186.18	10	$1,861.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 550 - Range Planting

Scenario: #2 - Native -Heavy

Scenario Description:

Establishment of a mixture of PREDOMINANTLY 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. Planting by preparing a seedbed with MODERATE TO HEAVY TILLAGE (ex: ripping & heavy disk) and seeding with a no-till drill, range drill, or broadcasting.

Before Situation:

Rangeland with existing stand of perennial or annual grasses OR monoculture OR no grasses present where natural reseeding or vegetation enhancement by grazing management alone is unlikely. Existing conditions often require complete suppression or eradication of existing vegetation to ensure success of planting. Resource concerns may include: undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Establishment of PREDOMINANTLY NATIVE adapted perennial vegetation such as grasses, forbs, legumes, shrubs, and trees to improve forage quality and quantity and reduce soil erosion on rangeland, native or naturalized pasture, grazed forest or other suitable location.

Scenario Feature Measure: Acres of Range Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $16,743.52 **Scenario Cost/Unit:** $209.29

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	$22.51	80	$1,800.80
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$11.74	80	$939.20
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$17.50	80	$1,400.00
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	16	$183.84
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	$19.06	8	$152.48
Materials						
One Species, Native Forb, Low Cost	2329	Native forb. Includes material and shipping only.	Acre	$186.18	10	$1,861.80
Three Species Mix, Cool Season, Native Perennial Grass	2316	Cool season, native grass mix. Includes material and shipping only.	Acre	$144.58	70	$10,120.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 550 - Range Planting

Scenario: #3 - Native -Wildlife or Pollinator

Scenario Description:

Establishment of a mixture of PREDOMINANTLY NATIVE adapted perennial species on a rangeland unit to improve wildlife habitat, benefit pollinators & beneficial insects, improve forage condition, and/or reduce erosion. Seed mix of PREDOMINANTLY NATIVE SPECIES IS CHOSEN TO SPECIFICALLY BENEFIT WILDLIFE (ex: big game spp, Sage grouse, Lesser Prairie Chicken, others) or POLLINATORS (ex: inclusion of 5-10 forb species) based on range conditions and availability of seed. FOR POLLINATOR HABITAT: Consideration is given to selecting plants that bloom sequentially throughout the growing season where feasible. Planting by preparing a seedbed with MODERATE TO HEAVY TILLAGE (ex: ripping & heavy disk) and seeding with a no-till drill, range drill, or broadcasting.

Before Situation:

Rangeland with existing stand of perennial or annual grasses OR monoculture OR no grasses present where natural reseeding or vegetation enhancement by grazing management alone is unlikely. Existing conditions often require complete removal, suppression, or eradication of existing vegetation to ensure success of planting. Pollinator plantings should Resource concerns may include: inadequate habitat for wildlife (ex: big game spp, Sage grouse, Lesser Prairie Chicken, others) undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Establishment of PREDOMINANTLY NATIVE adapted perennial vegetation such as grasses, forbs, legumes, shrubs, and trees with an emphasis on species beneficial to wildlife or Pollinators on rangeland, native or naturalized pasture, grazed forest or other suitable location. For Pollinator habitat: Plants that bloom sequentially throughout the growing season are established, where feasible.

Scenario Feature Measure: Acres of Range Planting

Scenario Unit: Acre

Scenario Typical Size: 50

Scenario Cost: $12,676.58 **Scenario Cost/Unit:** $253.53

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	$11.74	50	$587.00
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$17.50	50	$875.00
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	50	$1,125.50
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	$19.06	8	$152.48
Materials						
Two Species Mix, Warm Season, Native Perennial Grass	2325	Native, warm season perennial grass. Includes material and shipping only.	Acre	$94.57	40	$3,782.80
Three Species Mix, Native Forb	2333	Native forb mix. Includes material and shipping only.	Acre	$586.90	10	$5,869.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 550 - Range Planting

Scenario: #4 - Non-Native - Standard prep

Scenario Description:

Establishment of a mixture of PREDOMINANTLY 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. Planting by aerial broadcasting.

Before Situation:

Rangeland with existing stand of perennial or annual grasses OR monoculture OR no grasses present where natural reseeding or vegetation enhancement by grazing management alone is unlikely. Resource concerns may include: undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Establishment of PREDOMINANTLY NON-NATIVE adapted perennial vegetation such as grasses, forbs, legumes, shrubs, and trees to improve forage quality and quantity and reduce soil erosion on rangeland, native or naturalized pasture, grazed forest or other suitable location.

Scenario Feature Measure: Acres of Range Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $5,254.32 **Scenario Cost/Unit:** $65.68

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, Aerial	958	Broadcast seed via aerial operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$9.59	80	$767.20
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	16	$183.84
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	$19.06	8	$152.48
Materials						
Three Species Mix, Cool Season, Introduced Perennial Grass	2315	Cool season, introduced grass mix. Includes material and shipping only.	Acre	$46.58	79	$3,679.82
One Species, Native Forb, Low Cost	2329	Native forb. Includes material and shipping only.	Acre	$186.18	1	$186.18
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 550 - Range Planting

Scenario: #4 - Non-Native - Standard prep

Scenario Description:

Establishment of a mixture of PREDOMINANTLY 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. Planting by preparing a seedbed with a LIGHT TO MODERATE tillage and seeding with a no-till drill, range drill, or broadcasting.

Before Situation:

Rangeland with existing stand of perennial or annual grasses OR monoculture OR no grasses present where natural reseeding or vegetation enhancement by grazing management alone is unlikely. Resource concerns may include: undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Establishment of PREDOMINANTLY NON-NATIVE adapted perennial vegetation such as grasses, forbs, legumes, shrubs, and trees to improve forage quality and quantity and reduce soil erosion on rangeland, native or naturalized pasture, grazed forest or other suitable location.

Scenario Feature Measure: Acres of Range Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $7,227.12 **Scenario Cost/Unit:** $90.34

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	$11.74	80	$939.20
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	80	$1,800.80
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	16	$183.84
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	$19.06	8	$152.48
Materials						
Three Species Mix, Cool Season, Introduced Perennial Grass	2315	Cool season, introduced grass mix. Includes material and shipping only.	Acre	$46.58	79	$3,679.82
One Species, Native Forb, Low Cost	2329	Native forb. Includes material and shipping only.	Acre	$186.18	1	$186.18
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 550 - Range Planting

Scenario: #5 - Non-Native - heavy prep

Scenario Description:

Establishment of a mixture of PREDOMINANTLY NON-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. Planting by preparing a seedbed with MODERATE TO HEAVY TILLAGE (ex: ripping & heavy disk) and seeding with a no-till drill, range drill, or broadcasting.

Before Situation:

Rangeland with existing stand of perennial or annual grasses OR monoculture OR no grasses present where natural reseeding or vegetation enhancement by grazing management alone is unlikely. Existing conditions often require complete suppression or eradication of existing vegetation to ensure success of planting. Resource concerns may include: undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Establishment of PREDOMINANTLY NON-NATIVE adapted perennial vegetation such as grasses, forbs, legumes, shrubs, and trees to improve forage quality and quantity and reduce soil erosion on rangeland, native or naturalized pasture, grazed forest or other suitable location.

Scenario Feature Measure: Acres of Range Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $8,627.12 **Scenario Cost/Unit:** $107.84

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	$11.74	80	$939.20
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$17.50	80	$1,400.00
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	80	$1,800.80
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	16	$183.84
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	$19.06	8	$152.48
Materials						
One Species, Native Forb, Low Cost	2329	Native forb. Includes material and shipping only.	Acre	$186.18	1	$186.18
Three Species Mix, Cool Season, Introduced Perennial Grass	2315	Cool season, introduced grass mix. Includes material and shipping only.	Acre	$46.58	79	$3,679.82
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 550 - Range Planting

Scenario: #6 - Pollinator - small acerage

Scenario Description:

Establishment of a mixture of PREDOMINANTLY NATIVE adapted perennial species on a rangeland unit to benefit pollinators, beneficial insects, and may provide food and cover resources for other wildlife species. Seed mix of Predominantly Native species is chosen TO SPECIFICALLY BENEFIT POLLINATORS (ex: inclusion of 5-10 forb species) based on range conditions and availability of seed. Consideration is given to selecting plants that bloom sequentially throughout the growing season where feasible. Planting by preparing a seedbed with MODERATE TO HEAVY TILLAGE (ex: ripping & heavy disk) and seeding with a no-till drill, range drill, or broadcasting.

Before Situation:

Rangeland with existing stand of perennial or annual grasses OR monoculture OR no grasses present where natural reseeding or vegetation enhancement by grazing management alone is unlikely. Existing conditions often require complete removal, suppression, or eradication of existing vegetation to ensure success of planting. Resource concerns may include: inadequate Pollinator habitat, undesireable plant productivity and health, inadequate feed and forage for livestock, soil erosion and soil quality.

After Situation:

Establishment of PREDOMINANTLY NATIVE adapted perennial vegetation such as grasses, forbs, legumes, shrubs, and trees with an emphasis on species beneficial to Pollinators & beneficial insects on rangeland, native or naturalized pasture, grazed forest or other suitable location. Plants that bloom sequentially throughout the growing season are established, where feasible.

Scenario Feature Measure: Acres of Range Planting

Scenario Unit: Acre

Scenario Typical Size: 5

Scenario Cost: $2,429.43 **Scenario Cost/Unit:** $485.89

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	$11.74	5	$58.70
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$17.50	5	$87.50
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	5	$112.55
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	$19.06	3	$57.18
Materials						
Three Species Mix, Cool Season, Native Perennial Grass	2316	Cool season, native grass mix. Includes material and shipping only.	Acre	$144.58	2.5	$361.45
Three Species Mix, Native Forb	2333	Native forb mix. Includes material and shipping only.	Acre	$586.90	2.5	$1,467.25
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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: $424.08 **Scenario Cost/Unit:** $84.82

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	295				0.66	
	297				66	
Acquisition of Technical Knowledge						
	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						
	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	$27.30	15	$409.50

Practice: 557 - Row Arrangement

Scenario: #1 - Establishing Row Direction, Grade, & Length.

Scenario Description:

Includes establishing crop rows in direction, grade and length 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 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 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: $54.60 **Scenario Cost/Unit:** $2.18

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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	$27.30	2	$54.60

Practice: 558 - Roof Runoff Structure

Scenario: #1 - Roof Gutter, Small, 6 inches wide and smaller

Scenario Description:

A small roof runoff structure, consisting of gutter(s) equal to or less than 6" wide, downspout(s) 5 inches wide or less, and appropriate outlet facilities. 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.

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:

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 small gutter, downspout, and outlet system servicing the portion of the building roof that would otherwise drain into a waste management system or create erosion. Roof line of 200 ft serviced with gutter, downspouts, and appurtances.

Scenario Feature Measure: Linear Length of Roof to be Guttered

Scenario Unit: Linear Feet

Scenario Typical Size: 100

Scenario Cost: $1,192.48 **Scenario Cost/Unit:** $11.92

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	$19.06	16	$304.96
Materials						
Pipe, HDPE, 4", PCPT, Single Wall	1270	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 4" diameter - ASTM F405. Material cost only.	Foot	$0.46	40	$18.40
Downspout, Aluminum, Small	1700	Aluminum downspout (3" to 5") in width with hangers. Materials only.	Foot	$3.20	60	$192.00
Gutter, Aluminum, Small	1689	Aluminum gutter (4" to 6") in width with hangers. Materials only.	Foot	$2.94	100	$294.00
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	$191.56	2	$383.12

Practice: 558 - Roof Runoff Structure

Scenario: #2 - Roof Gutter, Medium, 7 to 9 inches wide

Scenario Description:

A roof runoff structure, consisting of gutter(s), downspout(s), and appropriate outlet facilities. 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.

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:

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. Roof line of 200 ft serviced with gutter, downspouts, and appurtances.

Scenario Feature Measure: Linear Length of Roof to be Guttered

Scenario Unit: Linear Feet

Scenario Typical Size: 200

Scenario Cost: $5,778.56 **Scenario Cost/Unit:** $28.89

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	$19.06	24	$457.44
Materials						
Gutter, Aluminum, Medium	1690	Aluminum gutter (7" to 9") in width with hangers. Materials only.	Foot	$9.13	200	$1,826.00
Downspout, Aluminum, Medium	1701	Aluminum downspout (6" to 8") in width with hangers. Materials only.	Foot	$30.89	100	$3,089.00
Pipe, HDPE, 4", PCPT, Single Wall	1270	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 4" diameter - ASTM F405. Material cost only.	Foot	$0.46	50	$23.00
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	$191.56	2	$383.12

Practice: 558 - Roof Runoff Structure

Scenario: #3 - Roof Gutter with Fascia

Scenario Description:

Existing roof does not have adequate fascia material to support the required roof gutter for a roof runoff structure. Practice installation requires a fascia board, gutter(s), downspout(s), and appropriate outlet facilities. 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.

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:

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. Roof line of 200 ft serviced with gutter, four downspouts, and appurtances. New 2" x 8" fascia board needed for proper attachment.

Scenario Feature Measure: Linear Length of Roof to be Guttered

Scenario Unit: Linear Feet

Scenario Typical Size: 200

Scenario Cost: $6,729.95 **Scenario Cost/Unit:** $33.65

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	$19.06	48	$914.88
Materials						
Gutter, Aluminum, Medium	1690	Aluminum gutter (7" to 9") in width with hangers. Materials only.	Foot	$9.13	200	$1,826.00
Dimension Lumber, untreated, rot resistant	1613	Untreated dimension lumber with nominal thickness equal or less than 2" milled from a rot resistant species such as cedar. Includes lumber and fasteners. Does not include labor.	Board Foot	$1.85	267	$493.95
Downspout, Aluminum, Medium	1701	Aluminum downspout (6" to 8") in width with hangers. Materials only.	Foot	$30.89	100	$3,089.00
Pipe, HDPE, 4", PCPT, Single Wall	1270	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 4" diameter - ASTM F405. Material cost only.	Foot	$0.46	50	$23.00
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	$191.56	2	$383.12

Practice: 558 - Roof Runoff Structure

Scenario: #4 - Roof Gutter, 6 inches wide with runoff Storage Tank

Scenario Description:

A roof runoff structure, consisting of gutter(s), downspout(s), and a storage tank. Used to keep roof clean water runoff uncontaminated, provide storage for on-farm use of roof water and a stable outlet for any excess to ground surface in a way that avoids erosion. Facilitates waste management and protects environment by minimizing clean water additions to waste systems and addresses water quality concerns.

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:

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 and downspouts servicing the portion of the building roof that would otherwise drain into a waste management system or create erosion. Roof line of 200 ln.ft. serviced with gutter, downspouts, and appurtances. A 1,500 gallon tank is installed for storage and use of roof runoff.

Scenario Feature Measure: Linear Length of Roof to be Guttered

Scenario Unit: Linear Foot

Scenario Typical Size: 200

Scenario Cost: $2,883.48 **Scenario Cost/Unit:** $14.42

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	$5.75	2	$11.50
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	$19.06	20	$381.20
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	$27.30	1	$27.30
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	2	$56.72
Downspout, Aluminum, Small	1700	Aluminum downspout (3" to 5") in width with hangers. Materials only.	Foot	$3.20	60	$192.00
Gutter, Aluminum, Small	1689	Aluminum gutter (4" to 6") in width with hangers. Materials only.	Foot	$2.94	200	$588.00
Pipe, PVC, 4", SCH 40	978	Materials: - 4" - PVC - SCH 40 - ASTM D1785	Foot	$4.12	110	$453.20
Tank, Poly Enclosed Storage, >1,000	1075	Water storage tanks. Includes materials and shipping only.	Gallon	$0.63	1500	$945.00
Mobilization						
Aggregate, Shipping, Cubic Yard-mile	2360	Mobilization of aggregate material beyond 20 miles of local delivery from quarry to construction site. Cubic Yard-mile (Cubic Yard * miles of haul).	Cubic Yard-Mile	$0.37	100	$37.00
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	$191.56	1	$191.56

Practice: 558 - Roof Runoff Structure

Scenario: #5 - Concrete Curb

Scenario Description:

A roof runoff structure, consisting of a concrete curb or parabolic channel installed on existing impervious surface or the ground with appropriate outlet facilities. Environmental/design considerations, for example – snow loads, or a building without proper structural support needed for gutters dictate the use of an on-ground concrete curb. Used to keep roof clean water runoff uncontaminated and provide a stable outlet to ground surface. Facilitates waste management and protects the environment by minimizing clean water additions to waste systems and addresses water quality concerns.

Associated practices include Waste Storage Facility (313), Composting Facility (317), Heavy Use Area Protection (561), Underground Outlet (620), and Diversion (362).

Before Situation:

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 concrete curb or parabolic channel and outlet system servicing the portion of the building roof that would otherwise drain into a waste management system or create erosion. Concrete curb (6" high - 2' wide) extending the length of a 200' roof with additional length (5') for stable outlet.

Scenario Feature Measure: Linear Length of Roof to be Curbed

Scenario Unit: Linear Feet

Scenario Typical Size: 200

Scenario Cost: $2,473.61 **Scenario Cost/Unit:** $12.37

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	$0.36	60	$21.60
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	$2.35	30	$70.50
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	16	$37.60
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.21	6	$109.26
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	$127.06	10	$1,270.60
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	7	$198.52
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$27.99	7	$195.93
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 558 - Roof Runoff Structure

Scenario: #6 - Trench Drain

Scenario Description:

A roof runoff structure, consisting of a trench filled with rock, with a polyethylene, corrugated, perforated drain tile installed in trench bottom. Used to keep roof clean water runoff uncontaminated and provide a stable outlet to ground surface. Environmental/design considerations, for example – snow loads, or a building without proper structural support needed for gutters dictate the use of a trench drain. Facilitates waste management and protects the environment by minimizing clean water additions to waste systems and addresses water quality concerns.

Associated practices include Waste Storage Facility (313), Composting Facility (317), Heavy Use Area Protection (561), Underground Outlet (620), and Diversion (362).

Before Situation:

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 2' deep by 3' wide by 200 long deep rock filled, tile drained trench and outlet system servicing the portion of the building roof that would otherwise drain into a waste management system or create erosion.

Scenario Feature Measure: Linear Length of Roof to be Drained

Scenario Unit: Linear Feet

Scenario Typical Size: 200

Scenario Cost: $2,471.62 **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	$2.35	44	$103.40
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	222	$521.70
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	$19.06	6	$114.36
Materials						
Pipe, HDPE, 4", PCPT, Single Wall	1270	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 4" diameter - ASTM F405. Material cost only.	Foot	$0.46	220	$101.20
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	44	$1,247.84
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	$191.56	2	$383.12

Practice: 560 - Access Road

Scenario: #1 - New earth road in dry, level terrain.

Scenario Description:

Newly constructed compacted earth road in relatively level terrain and dry areas. 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 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, surface material, vegetation of disturbed areas and all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

An agricultural 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 road will be 14 feet wide at the top, mostly in embankment less than 3 feet in height, (average 2 ft) typical side slopes 2:1. 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 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) depending on the type of structure. Earthfill embankment above the culvert structure would still be covered by this Practice. Diversions constructed as part of access road should be covered by Diversion (362). All seeding or revegetation of disturbed areas is provided according to Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of Roadway

Scenario Unit: Feet

Scenario Typical Size: 1,000

Scenario Cost: $11,209.13 **Scenario Cost/Unit:** $11.21

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	$3.59	1330	$4,774.70
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	1330	$5,812.10
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	$27.30	12	$327.60
Materials						
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.14	$9.93
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 560 - Access Road

Scenario: #2 - New 6 inch gravel road in wet, level terrain

Scenario Description:

Newly Constructed gravel road with min. 6 inch thick compacted gravel surface in relatively level ground in wet areas. 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 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, surface material, vegetation of disturbed areas and all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

An agricultural enterprise which requires, but does not have, a fixed travel way 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 wet and swampy but level terrain lands.

After Situation:

The road will be 14 feet wide with 6 inch gravel surfacing at the top. It is mostly in embankment less than 3 feet in height, (average 2 ft) typical side slopes 2:1. A properly constructed, well defined access road will greatly reduce sheet, rill and wind erosion, eliminate compaction in land use areas where it is harmful, reduce emissions of particulate matter (PM) and PM precursors and also reduce excessive sediment in surface water by reducing uncontrolled sediment transport. Planned grades will include all dips and water bars. If clearing and grubbing 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) or Stream Crossings (578) depending on the type of structure. Earthfill embankment above the culvert structure would still be covered by this Practice. Diversions constructed as part of access road should be covered by Diversion (362). All seeding or revegetation of disturbed areas is provided according to Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of Roadway

Scenario Unit: Feet

Scenario Typical Size: 1,000

Scenario Cost: $21,285.38 **Scenario Cost/Unit:** $21.29

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	$2.35	2000	$4,700.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	1330	$5,812.10
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.59	1330	$4,774.70
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	$27.30	12	$327.60
Materials						
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.14	$9.93
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	275	$5,376.25
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 560 - Access Road

Scenario: #3 - Rehabilitation of existing earth road in dry, level terrain

Scenario Description:

Repair and rehabilitation of compacted earth road in existing alignment in dry, level terrain. 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 improves the plant productivity, vigor and health and substantially reduces 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, surface material, vegetation of disturbed areas and all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

An agricultural 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 damaged portions of the road will be repaired to a full 14 feet width at the top, mostly in embankment less than 3 feet in height, (average 2 ft), typical side slopes 2:1. 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 clearing and grubbing 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) or Stream Crossings (578) depending on the type of structure. Earthfill embankment above the culvert structure would still be covered by this Practice. Diversions constructed as part of access road should be covered by Diversion (362). All seeding or revegetation of disturbed areas is provided according to Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of Roadway

Scenario Unit: Feet

Scenario Typical Size: 1,000

Scenario Cost: $2,771.53 **Scenario Cost/Unit:** $2.77

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	$4.37	270	$1,179.90
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.59	270	$969.30
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	$27.30	12	$327.60
Materials						
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.14	$9.93
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 560 - Access Road

Scenario: #4 - Rehabilitation of existing gravel road in wet, level terrain

Scenario Description:

Repair and rehabilitation of gravel road with min. 6 inch thick compacted gravel surface on existing alignment in wet, level terrain. 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 improves the plant productivity, vigor and health and substantially reduces 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, surface material, vegetation of disturbed areas and all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

An agricultural 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 wet and swampy but level terrain lands.

After Situation:

The damaged portions of the road will be repaired to a full 14 feet width with a 6" gravel surface at the top, mostly in embankment less than 3 feet in height, (average 2 ft), typical side slopes 2:1. 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 clearing and grubbing 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) or Stream Crossings (578) depending on the type of structure. Earthfill embankment above the culvert structure would still be covered by this Practice. Diversions constructed as part of access road should be covered by Diversion (362). All seeding or revegetation of disturbed areas is provided according to Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of Roadway

Scenario Unit: Feet

Scenario Typical Size: 1,000

Scenario Cost: $4,754.94 **Scenario Cost/Unit:** $4.75

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	$2.35	400	$940.00
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.59	266	$954.94
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	266	$1,162.42
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	$27.30	12	$327.60
Materials						
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.14	$9.93
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	55	$1,075.25
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 560 - Access Road

Scenario: #5 - New earth road in dry, sloped terrain

Scenario Description:

Newly constructed compacted earth road in steep sloped terrain but relatively dry areas. 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 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, surface material, vegetation of disturbed areas and all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

An agricultural 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 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. 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 clearing and grubbing 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) or Stream Crossings (578) depending on the type of structure. Earthfill embankment above the culvert structure would still be covered by this Practice. Diversions constructed as part of access road should be covered by Diversion (362). All seeding or revegetation of disturbed areas is provided according to Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of Roadway

Scenario Unit: Feet

Scenario Typical Size: 1,000

Scenario Cost: $7,802.13 **Scenario Cost/Unit:** $7.80

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	$4.37	665	$2,906.05
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.59	665	$2,387.35
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	$2.35	530	$1,245.50
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.93	130	$640.90
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	$27.30	12	$327.60
Materials						
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.14	$9.93
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 560 - Access Road

Scenario: #6 - New 6 inch gravel road in wet, sloped terrain

Scenario Description:

Newly Constructed gravel road with min. 6 inch thick compacted gravel surface in steep sloped ground in wet areas. 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 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, surface material, vegetation of disturbed areas and all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

An agricultural 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 wet and swampy land areas with steep sloped terrain.

After Situation:

The road will be 14 feet wide with 6 inch gravel surfacing at the top. It is 50% in embankment and 50% in excavation less than 3 feet in height, (average 2 ft) typical side slopes 2:1. A properly constructed, well defined access road will greatly reduce sheet, rill and wind erosion, eliminate compaction in land use areas where it is harmful, reduce emissions of particulate matter (PM) and PM precursors and also reduce excessive sediment in surface water by reducing uncontrolled sediment transport. Planned grades will include all dips and water bars. If clearing and grubbing 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) or Stream Crossings (578) depending on the type of structure. Earthfill embankment above the culvert structure would still be covered by this Practice. Diversions constructed as part of access road should be covered by Diversion (362). All seeding or revegetation of disturbed areas is provided according to Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of Roadway

Scenario Unit: Feet

Scenario Typical Size: 1,000

Scenario Cost: $17,878.38 **Scenario Cost/Unit:** $17.88

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	$4.37	665	$2,906.05
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.59	665	$2,387.35
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	2000	$4,700.00
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.93	130	$640.90
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	$2.35	530	$1,245.50
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	$27.30	12	$327.60
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	275	$5,376.25
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.14	$9.93
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 560 - Access Road

Scenario: #7 - Rehabilitation of existing earth road in wet, sloped terrain

Scenario Description:

Repair and rehabilitation of compacted earth road in existing alignment in relatively dry but steep sloped terrain. 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 improves the plant productivity, vigor and health and substantially reduces 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, surface material, vegetation of disturbed areas and all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

An agricultural 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 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. 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 clearing and grubbing 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) or Stream Crossings (578) depending on the type of structure. Earthfill embankment above the culvert structure would still be covered by this Practice. Diversions constructed as part of access road should be covered by Diversion (362). All seeding or revegetation of disturbed areas is provided according to Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of Roadway

Scenario Unit: Feet

Scenario Typical Size: 1,000

Scenario Cost: $2,058.29 **Scenario Cost/Unit:** $2.06

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	$4.37	133	$581.21
Excavation, Rock, Ripping	47	Excavation, rock, mechanical ripping, includes equipment and labor	Cubic yard	$4.93	26	$128.18
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.59	133	$477.47
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	$2.35	106	$249.10
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	$27.30	12	$327.60
Materials						
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.14	$9.93
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 560 - Access Road

Scenario: #8 - Rehabilitation of existing gravel road in wet, sloped terrain

Scenario Description:

Repair and rehabilitation of gravel road with min. 6 inch thick compacted gravel surface on existing alignment in wet, steep sloped terrain. 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 improves the plant productivity, vigor and health and substantially reduces 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, surface material, vegetation of disturbed areas and all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

An agricultural 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 full 14 feet width with a 6" 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. 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 clearing and grubbing 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) or Stream Crossings (578) depending on the type of structure. Earthfill embankment above the culvert structure would still be covered by this Practice. Diversions constructed as part of access road should be covered by Diversion (362). All seeding or revegetation of disturbed areas is provided according to Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of Roadway

Scenario Unit: Feet

Scenario Typical Size: 1,000

Scenario Cost: $4,073.54 **Scenario Cost/Unit:** $4.07

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	$4.93	26	$128.18
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	400	$940.00
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	$2.35	106	$249.10
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	133	$581.21
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.59	133	$477.47
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	$27.30	12	$327.60
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	55	$1,075.25
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.14	$9.93
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 561 - Heavy Use Area Protection

Scenario: #1 - Reinforced Concrete with sand or gravel foundation

Scenario Description:

The stabilization of areas around facilities that are frequently and intensively used by people, animals or vehicles by surfacing with reinforced concrete on a sand or gravel foundation to provide a stable, non-eroding surface. Installation includes all materials, equipment, vegetation of disturbed areas, and labor to install this practice, The stabilized area will address the resource concerns soil erosion and water quality degradation.

Before Situation:

This practice applies to all land uses where frequently and/or intensively used areas require treatment to address soil erosion and water quality
degradation.

After Situation:

The stabilized area is surfaced with approximately 630 square feet of approximately 8 cubic yards of welded wire mesh reinforced concrete with 8 cubic yards of sand or gravel foundation material for surfacing areas around facilities that are frequently and intensively used by people, animals or vehicles and will address soil erosion and water quality degradation. All seeding or revegetation of disturbed areas is provided. 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: $1,592.35 **Scenario Cost/Unit:** $2.53

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	$127.06	8	$1,016.48
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	$2.35	4	$9.40
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	$19.06	3	$57.18
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$27.99	8	$223.92
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.008	$0.57
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 561 - Heavy Use Area Protection

Scenario: #2 - Rock/Gravel on Geotextile

Scenario Description:

The stabilization of areas around facilities that are frequently and intensively used by people, animals or vehicles by surfacing with rock and or gravel on a geotextile fabric foundation to provide a stable, non-eroding surface. Installation includes all materials, equipment, vegetation of disturbed areas and labor to install this practice, The stabilized area will address the resource concerns of soil erosion and water quality degradation.

Before Situation:

This practice applies to all land uses where frequently and/or intensively used areas require treatment to address soil erosion and water quality
degradation.

After Situation:

The stabilized area is surfaced with approximately 630 square feet of rock and or gravel on approximately 70 square yards of geotextile fabric foundation material for surfacing areas around facilities that are frequently and intensively used by people, animals or vehicles and will address soil erosion and water quality degradation. All seeding or revegetation of disturbed areas is provided. 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: $743.33 **Scenario Cost/Unit:** $1.18

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	$2.35	70	$164.50
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	$2.35	4	$9.40
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	$19.06	3	$57.18
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	8	$226.88
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.008	$0.57
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 561 - Heavy Use Area Protection

Scenario: #3 - Rock/Gravel-GeoCell-Geotextile

Scenario Description:

The stabilization of areas around facilities that are frequently and intensively used by people, animals or vehicles by surfacing with rock and or gravel in a cellular containment grid on a geotextile fabric foundation to provide a stable, non-eroding surface. Installation includes all materials, equipment, vegetation of disturbed areas and labor to install this practice. The stabilized area will address the resource concerns of soil erosion and water quality degradation.

Before Situation:

This practice applies to all land uses where frequently and/or intensively used areas require treatment to address soil erosion and water quality
degradation.

After Situation:

The stabilized area is surfaced with approximately 630 square feet of rock and or gravel in approximately 70 square yards of cellular containment grid on approximately 70 square yards of geotextile fabric foundation material for surfacing areas around facilities that are frequently and intensively used by people, animals or vehicles and will address soil erosion and water quality degradation. All seeding or revegetation of disturbed areas is provided. 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: $2,442.23 **Scenario Cost/Unit:** $3.88

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	$2.35	4	$9.40
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	70	$164.50
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	$19.06	3	$57.18
Materials						
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.008	$0.57
GeoCell, 4"	1054	Precast Manhole with base and top delivered. 4' diameter x 4' depth. Materials only.	Square Yard	$24.27	70	$1,698.90
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	8	$226.88
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 561 - Heavy Use Area Protection

Scenario: #4 - Fly Ash on Geotextile

Scenario Description:

The stabilization of areas around facilities that are frequently and intensively used by people, animals or vehicles by surfacing with Fly Ash on a geotextile fabric foundation to provide a stable, non-eroding surface. Installation includes all materials, equipment, vegetation of disturbed areas and labor to install this practice. The stabilized area will address the resource concerns of soil erosion and water quality degradation.

Before Situation:

This practice applies to all land uses where frequently and/or intensively used areas require treatment to address soil erosion and water quality
degradation.

After Situation:

The stabilized area is surfaced with approximately 630 square feet of Fly Ash on approximately 70 square yards of geotextile fabric foundation material for surfacing areas around facilities that are frequently and intensively used by people, animals or vehicles and will address soil erosion and water quality degradation. All seeding or revegetation of disturbed areas is provided. 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 Fly Ash

Scenario Unit: Square Foot

Scenario Typical Size: 630

Scenario Cost: $1,380.36 **Scenario Cost/Unit:** $2.19

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	$2.35	70	$164.50
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	$2.35	4	$9.40
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$138.48	4	$553.92
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	$19.06	3	$57.18
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	$26.75	5	$133.75
Materials						
Fly Ash, BAB	52	Fly Ash, Bottom Ash Blend, includes material and delivery	Cubic yard	$22.03	8	$176.24
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.008	$0.57
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 561 - Heavy Use Area Protection

Scenario: #5 - Bituminous Concrete Pavement

Scenario Description:

The stabilization of areas around facilities that are frequently and intensively used by people, animals or vehicles by surfacing with bituminous concrete pavement on aggregate gravel foundation to provide a stable, non-eroding surface. Installation includes all materials, equipment, vegetation of disturbed areas and labor to install this practice. The stabilized area will address the resource concerns of soil erosion and water quality degradation.

Before Situation:

This practice applies to all land uses where frequently and/or intensively used areas require treatment to address soil erosion and water quality
degradation.

After Situation:

The stabilized area is surfaced with approximately 630 square feet of bituminous concrete pavement on 8 cubic yards of aggregate gravel material for surfacing areas around facilities that are frequently and intensively used by people, animals or vehicles and will address soil erosion and water quality degradation. All seeding or revegetation of disturbed areas is provided. 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 Bituminous Pavement

Scenario Unit: Square Foot

Scenario Typical Size: 630

Scenario Cost: $1,901.83 **Scenario Cost/Unit:** $3.02

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	$2.35	4	$9.40
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	$19.06	3	$57.18
Materials						
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.008	$0.57
Asphalt, pavement	1867	Bituminous Concrete,includes materials, equipment and labor for 4" layer, base not included.	Square Foot	$2.10	630	$1,323.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	8	$226.88
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 570 - Stormwater Runoff Control

Scenario: #1 - Combination, Most common Best Management Practices

Scenario Description:

This scenario involves installation of silt fence, straw wattles, and straw bales 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, straw bales can also help to protect water quality. 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. All erosion control blankets and straw mulches will be covered under 484-Mulching. If earthen basins are warranted for water quality improvement or retention/detention purposes, use Sediment Basin (350). If seeding is warranted for water quality and erosion control purposes, all temporary and permenant vegetation will use Critical Area Planting (342).

Scenario Feature Measure: Area of construction site

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $585.56 **Scenario Cost/Unit:** $585.56

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	$41.41	1.5	$62.12
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	$19.06	10	$190.60
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	$33.06	1.5	$49.59
Materials						
Straw bales	2186	Straw bales buried at defined intervals to halt rill and gulley formation. Materials and shipping only.	Each	$4.61	25	$115.25
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	$0.77	100	$77.00

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: $2,912.44 **Scenario Cost/Unit:** $2.91

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	$138.48	10	$1,384.80
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	$17.26	10	$172.60
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	$26.75	10	$267.50
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	$543.77	2	$1,087.54

Practice: 574 - Spring Development

Scenario: #1 - Spring Development

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. 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 (not included), and to a watering facility (not included) for use

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 and an 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: $3,900.92 **Scenario Cost/Unit:** $3,900.92

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	$62.38	16	$998.08
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	11	$25.85
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	$401.46	2	$802.92
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	$19.06	32	$609.92
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	16	$302.40
Materials						
Pipe, CMP, 48", 14 Gauge	1280	48" Corrugated Metal Pipe, Galvanized, Uncoated, 14 gage. Material cost only.	Foot	$31.44	6	$188.64
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	2	$56.72
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$27.99	2	$55.98
Pipe, HDPE, 4", PCPT, Single Wall	1270	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 4" diameter - ASTM F405. Material cost only.	Foot	$0.46	50	$23.00
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	$185.41	1	$185.41

Materials

Pipe, PVC, 4", SCH 40	978	Materials: - 4" - PVC - SCH 40 - ASTM D1785	Foot	$4.12	20	$82.40

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 574 - Spring Development

Scenario: #2 - Spring Development - Remote Locations

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 in remote areas typically 50 or more miles from source of equipment and/or materials. 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 (not included), and to a watering facility (not included) for use
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 and an 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: $4,518.92 **Scenario Cost/Unit:** $4,518.92

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	$2.35	11	$25.85
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	16	$998.08
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	$401.46	2	$802.92
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	16	$302.40
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	$19.06	32	$609.92
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	2	$56.72
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	$185.41	1	$185.41
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$27.99	2	$55.98
Pipe, CMP, 48", 14 Gauge	1280	48" Corrugated Metal Pipe, Galvanized, Uncoated, 14 gage. Material cost only.	Foot	$31.44	6	$188.64
Pipe, PVC, 4", SCH 40	978	Materials: - 4" - PVC - SCH 40 - ASTM D1785	Foot	$4.12	20	$82.40

Materials

Pipe, HDPE, 4", PCPT, Single Wall	1270	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 4" diameter - ASTM F405. Material cost only.	Foot	$0.46	50	$23.00

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	600	$618.00
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 575 - Trails and Walkways

Scenario: #1 - Earth or Vegetated Trail

Scenario Description:

Layout and construct an earth or vegetated trail to facilitate the movement of animals, people, or off-road vehicles to provide or improve access to forage, water, working/handling facilities, and/or shelter, Improve grazing efficiency and distribution, and/or protect ecologically sensitive, erosive and/or potentially erosive sites, pedestrian or off-road vehicle access to agricultural, construction, or maintenance operations, provide trails for recreational activities or access to recreation sites and address the resource conerns of soil erosion and water quality degradation. Costs include excavation, shaping, grading, earth and or vegetated surfaces and all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

This practice applies on all lands where management of animal or human movement is needed to address soil erosion and water quality resource concerns. This practice applies to a trails or walkways constructed for use by off-road vehicles, such as All-Terrain Vehicles or snowmobiles, which are not designed for use on public roads. It does not apply to roads constructed for movement of equipment or vehicles. Use NRCS Conservation Practice Standard Access Road (Code 560).

After Situation:

The typical trail will be a 12 foot wide 300 foot long, 3600 square foot lane of earth and vegetation. All excavation, grading and shaping necessary to provide a smooth permanent travel surface for livestock or people is included. Included is 45 CY of excavation, vegetation of 1800 square foot for sufacing, 1800 square foot of earthen surfacing and vegetation of 900 square foot of disturbed areas. Consider the adequacy of natural surfacing. If the lane requires planting, the vegetation is provided. Where earth and or vegetation is not practical, adequate surface protection is provided under a different sceanrio. Stream Crossing, Code 578, will be used when the trail or lane crosses streams or shallow water areas. Consider the use of water bars to control and direct water flow in the trail. All culverts will be applied under Structure for Water Control (587). Use Access Road, Code 560 and Diversion (362) as appropriate. Fencing, Code 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: $1,111.54 **Scenario Cost/Unit:** $0.31

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	$41.41	3	$124.23
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	3	$224.58
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	$2.35	22	$51.70
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	$19.06	8	$152.48
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	$27.30	4	$109.20
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	$26.75	6	$160.50
Materials						
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.02	$1.42
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	0.041	$2.63
Mobilization						

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 575 - Trails and Walkways

Scenario: #2 - Reinforced Concrete Walkway

Scenario Description:

Layout and construct an reinforced concrete walkway on a sand foundation to facilitate the movement of animals, people, or off-road vehicles to provide or improve access to forage, water, working/handling facilities, and/or shelter, Improve grazing efficiency and distribution, and/or protect ecologically sensitive, erosive and/or potentially erosive sites, pedestrian or off-road vehicle access to agricultural, construction, or maintenance operations, provide walkways for recreational activities or access to recreation sites and address the resource conerns of soil erosion and water quality degradation. Costs include excavation, shaping, grading, reinforced concrete surfacing, vegetation of disturbed areas, all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

This practice applies on all lands where management of animal or human movement is needed to address soil erosion and water quality resource concerns. This practice applies to a trails or walkways constructed for use by off-road vehicles, such as All-Terrain Vehicles or snowmobiles, which are not designed for use on public roads. It does not apply to roads constructed for movement of equipment or vehicles. Use NRCS Conservation Practice Standard Access Road (Code 560).

After Situation:

The typical walkway will be a 12 foot wide 300 foot long, 3600 square foot of reinforced concrete. All excavation, grading and shaping necessary to provide a smooth permanent travel surface for livestock or people is included. Included is reinforced concrete of 3600 square foot for sufacing, and vegetation of 900 square foot of disturbed areas. The walkway consist of approximately 22 CY of excavation, 45 CY of reinforced concrete with a 45 CY sand foundation. Stream Crossing, Code 578, will be used when the walkway crosses streams or shallow water areas. All culvets will be applied under Structure for Water Control (587). Use Access Road, Code 560 and Diversion (362) as appropriate. Fencing, Code 382, will be used when needed to control animal movement.

Scenario Feature Measure: Area of Walkway

Scenario Unit: Square Foot

Scenario Typical Size: 3,600

Scenario Cost: $7,948.73 **Scenario Cost/Unit:** $2.21

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	$74.86	3	$224.58
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	$127.06	45	$5,717.70
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	3	$124.23
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	$2.35	22	$51.70
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	$19.06	5	$95.30
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	$26.75	3	$80.25
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	$27.30	4	$109.20
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$27.99	45	$1,259.55
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.02	$1.42

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 575 - Trails and Walkways

Scenario: #3 - Rock/Gravel on Geotextile, Walkway

Scenario Description:

Layout and construct a walkway with rock and or gravel on a geotextile fabric foundation surface treatment, to facilitate the movement of animals, people, or off-road vehicles to provide or improve access to forage, water, working/handling facilities, and/or shelter, Improve grazing efficiency and distribution, and/or protect ecologically sensitive, erosive and/or potentially erosive sites, pedestrian or off-road vehicle access to agricultural, construction, or maintenance operations, provide walkways for recreational activities or access to recreation sites and address the resource conerns of soil erosion and water quality degradation. Costs include excavation, shaping, grading, rock and or gravel, geotextile, vegetation of disturbed areas, all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

This practice applies on all lands where management of animal or human movement is needed to address soil erosion and water quality resource concerns. This practice applies to a trails or walkways constructed for use by off-road vehicles, such as All-Terrain Vehicles or snowmobiles, which are not designed for use on public roads. It does not apply to roads constructed for movement of equipment or vehicles. Use NRCS Conservation Practice Standard Access Road (Code 560).

After Situation:

The typical walkway will be a 12 foot wide 300 foot long, 3600 square foot of rock and or gravel on a geotextile fabric foundation surface treatment. All excavation, grading and shaping necessary to provide a smooth permanent travel surface for livestock or people is included. Included is aggregrate gravel of 3600 square foot for sufacing, and vegetation of 900 square foot of disturbed areas. The walkway consist of approximately 22 CY of excavation, 45 CY of aggregrate gravel on a 400 SY of geotextile fabric foundation. Stream Crossing, Code 578, will be used when the walkway crosses streams or shallow water areas. All culvets will be applied under Structure for Water Control (587). Use Access Road, Code 560 and Diversion (362) as appropriate. Fencing, Code 382, will be used when needed to control animal movement.

Scenario Feature Measure: Area of Walkway

Scenario Unit: Square Foot

Scenario Typical Size: 3,600

Scenario Cost: $3,187.68 **Scenario Cost/Unit:** $0.89

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	$41.41	3	$124.23
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	400	$940.00
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	3	$224.58
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	$2.35	22	$51.70
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	$27.30	4	$109.20
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	$19.06	5	$95.30
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	$26.75	3	$80.25
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	45	$1,276.20
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.02	$1.42

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 575 - Trails and Walkways

Scenario: #4 - Rock/Gravel in GeoCell on Geotextile, Walkway

Scenario Description:

Layout and construct a walkway with rock and or gravel in a cellular containment grid on a geotextile fabric foundation surface treatment, to facilitate the movement of animals, people, or off-road vehicles to provide or improve access to forage, water, working/handling facilities, and/or shelter, Improve grazing efficiency and distribution, and/or protect ecologically sensitive, erosive and/or potentially erosive sites, pedestrian or off-road vehicle access to agricultural, construction, or maintenance operations, provide walkways for recreational activities or access to recreation sites and address the resource conerns of soil erosion and water quality degradation. Costs include excavation, shaping, grading, rock and or gravel, containment grid, geotextile, vegetation of disturbed areas, all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

This practice applies on all lands where management of animal or human movement is needed to address soil erosion and water quality resource concerns. This practice applies to a trails or walkways constructed for use by off-road vehicles, such as All-Terrain Vehicles or snowmobiles, which are not designed for use on public roads. It does not apply to roads constructed for movement of equipment or vehicles. Use NRCS Conservation Practice Standard Access Road (Code 560).

After Situation:

The typical walkway will be a 12 foot wide 300 foot long, 3600 square foot of rock and or gravel in a cellular containment grid on a geotextile fabric foundation surface treatment. All excavation, grading and shaping necessary to provide a smooth permanent travel surface for livestock or people is included. Included is aggregrate gravel of 3600 square foot for sufacing, and vegetation of 900 square foot of disturbed areas. The walkway consist of approximately 22 CY of excavation, 45 CY of aggregrate gravel in 400 SY of 4 inch geocell on a 400 SY of geotextile fabric foundation. Stream Crossing, Code 578, will be used when the walkway crosses streams or shallow water areas. All culvets will be applied under Structure for Water Control (587). Use Access Road, Code 560 and Diversion (362) as appropriate. Fencing, Code 382, will be used when needed to control animal
movement.

Scenario Feature Measure: Area of Walkway

Scenario Unit: Square Foot

Scenario Typical Size: 3,600

Scenario Cost: $12,895.68 **Scenario Cost/Unit:** $3.58

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	$41.41	3	$124.23
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	$2.35	22	$51.70
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	400	$940.00
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	3	$224.58
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	$26.75	3	$80.25
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	5	$95.30
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	$27.30	4	$109.20
Materials						
GeoCell, 4"	1054	Precast Manhole with base and top delivered. 4' diameter x 4' depth. Materials only.	Square Yard	$24.27	400	$9,708.00

Materials

Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	45	$1,276.20
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.02	$1.42

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 575 - Trails and Walkways

Scenario: #5 - Fly Ash on Geotextile, Walkway

Scenario Description:

Layout and construct a walkway with Fly Ash on a geotextile fabric foundation surface treatment, to facilitate the movement of animals, people, or off-road vehicles to provide or improve access to forage, water, working/handling facilities, and/or shelter, Improve grazing efficiency and distribution, and/or protect ecologically sensitive, erosive and/or potentially erosive sites, pedestrian or off-road vehicle access to agricultural, construction, or maintenance operations, provide walkways for recreational activities or access to recreation sites and address the resource conerns of soil erosion and water quality degradation. Costs include excavation, shaping, grading, Fly Ash, geotextile, vegetation of disturbed areas, all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

This practice applies on all lands where management of animal or human movement is needed to address soil erosion and water quality resource concerns. This practice applies to a trails or walkways constructed for use by off-road vehicles, such as All-Terrain Vehicles or snowmobiles, which are not designed for use on public roads. It does not apply to roads constructed for movement of equipment or vehicles. Use NRCS Conservation Practice Standard Access Road (Code 560).

After Situation:

The typical walkway will be a 12 foot wide 300 foot long, 3600 square foot of Fly Ash on a geotextile fabric foundation surface treatment. All excavation, grading and shaping necessary to provide a smooth permanent travel surface for livestock or people is included. Included is Fly Ash of 3600 square foot for sufacing, and vegetation of 900 square foot of disturbed areas. The walkway consist of approximately 22 CY of excavation, 45 CY of Fly Ash on a 400 SY of geotextile fabric foundation. Stream Crossing, Code 578, will be used when the walkway crosses streams or shallow water areas. All culvets will be applied under Structure for Water Control (587). Use Access Road, Code 560 and Diversion (362) as appropriate. Fencing, Code 382, will be used when needed to control animal movement.

Scenario Feature Measure: Area of Walkway

Scenario Unit: Square Foot

Scenario Typical Size: 3,600

Scenario Cost: $3,093.69 **Scenario Cost/Unit:** $0.86

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	$41.41	3	$124.23
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$138.48	3	$415.44
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	$2.35	22	$51.70
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	400	$940.00
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	$26.75	3	$80.25
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	5	$95.30
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	$27.30	4	$109.20
Materials						
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.02	$1.42
Fly Ash, BAB	52	Fly Ash, Bottom Ash Blend, includes material and delivery	Cubic yard	$22.03	45	$991.35

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 575 - Trails and Walkways

Scenario: #6 - Bituminous Concrete Pavement, Walkway

Scenario Description:

Layout and construct a bituminous concrete pavement surface treatment on aggregate gravel foundation walkway to facilitate the movement of animals, people, or off-road vehicles to provide or improve access to forage, water, working/handling facilities, and/or shelter, Improve grazing efficiency and distribution, and/or protect ecologically sensitive, erosive and/or potentially erosive sites, pedestrian or off-road vehicle access to agricultural, construction, or maintenance operations, provide walkways for recreational activities or access to recreation sites and address the resource conerns of soil erosion and water quality degradation. Costs include excavation, shaping, grading, bituminous concrete pavement surfacing, vegetation of disturbed areas, all equipment, labor and incidental materials necessary to install the
practice.

Before Situation:

This practice applies on all lands where management of animal or human movement is needed to address soil erosion and water quality resource concerns. This practice applies to a trails or walkways constructed for use by off-road vehicles, such as All-Terrain Vehicles or snowmobiles, which are not designed for use on public roads. It does not apply to roads constructed for movement of equipment or vehicles. Use NRCS Conservation Practice Standard Access Road (Code 560).

After Situation:

The typical walkway will be a 12 foot wide 300 foot long, 3600 square foot of bituminous concrete pavement on aggregate gravel foundation. All excavation, grading and shaping necessary to provide a smooth permanent travel surface for livestock or people is included. Included is bituminous concrete pavement of 3600 square foot for sufacing, and vegetation of 900 square foot of disturbed areas. The walkway consist of approximately 22 CY of excavation, 3600 square feet bituminous concrete pavement, with a 45 CY gravel foundation. Stream Crossing, Code 578, will be used when the walkway crosses streams or shallow water areas. All culvets will be applied under Structure for Water Control (587). Use Access Road, Code 560 and Diversion (362) as appropriate. Fencing, Code 382, will be used when needed to control animal
movement.

Scenario Feature Measure: Area of Walkway

Scenario Unit: Square Foot

Scenario Typical Size: 3,600

Scenario Cost: $9,998.54 **Scenario Cost/Unit:** $2.78

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	$138.48	3	$415.44
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	3	$124.23
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	$2.35	22	$51.70
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	$19.06	5	$95.30
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	$26.75	3	$80.25
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	$27.30	4	$109.20
Materials						
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.02	$1.42
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	45	$1,276.20

Materials

Asphalt, pavement	1867	Bituminous Concrete,includes materials, equipment and labor for 4" layer, base not included.	Square Foot	$2.10	3600	$7,560.00

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 575 - Trails and Walkways

Scenario: #7 - Wood Chips, Walkway

Scenario Description:

Layout and construct a wood chip surface treatment on a earthen foundation walkway to facilitate the movement of animals, people, or off-road vehicles to provide or improve access to forage, water, working/handling facilities, and/or shelter, Improve grazing efficiency and distribution, and/or protect ecologically sensitive, erosive and/or potentially erosive sites, pedestrian or off-road vehicle access to agricultural, construction, or maintenance operations, provide walkways for recreational activities or access to recreation sites and address the resource conerns of soil erosion and water quality degradation. Costs include excavation, shaping, grading, wood chip surfacing, vegetation of disturbed areas, all equipment, labor and incidental materials necessary to install the practice.

Before Situation:

This practice applies on all lands where management of animal or human movement is needed to address soil erosion and water quality resource concerns. This practice applies to a trails or walkways constructed for use by off-road vehicles, such as All-Terrain Vehicles or snowmobiles, which are not designed for use on public roads. It does not apply to roads constructed for movement of equipment or vehicles. Use NRCS Conservation Practice Standard Access Road (Code 560).

After Situation:

The typical walkway will be a 12 foot wide 300 foot long, 3600 square foot of wood chip srface treatment on earthen foundation. All excavation, grading and shaping necessary to provide a smooth permanent travel surface for livestock or people is included. Included is wood chips of 3600 square foot for sufacing, and vegetation of 900 square foot of disturbed areas. The walkway consist of approximately 22 CY of excavation, 3600 square feet of wood chip surfacing. Stream Crossing, Code 578, will be used when the walkway crosses streams or shallow water areas. All culvets will be applied under Structure for Water Control (587). Use Access Road, Code 560 and Diversion (362) as appropriate. Fencing, Code 382, will be used when needed to control animal movement.

Scenario Feature Measure: Area of Walkway

Scenario Unit: Square Foot

Scenario Typical Size: 3,600

Scenario Cost: $1,824.00 **Scenario Cost/Unit:** $0.51

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	$22.35	45	$1,005.75
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	3	$224.58
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	$2.35	22	$51.70
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	3	$124.23
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	3	$56.70
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	$19.06	4	$76.24
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 578 - Stream Crossing

Scenario: #1 - Bridge

Scenario Description:

Install a bridge to allow stream flows to cross under access road or animal trail. Bridge opening determined by sizing for storm event dictated in standard. Scenario includes dewatering, abutments, girders, decking. Work consists of site preparation, dewatering, acquiring and installing abuttments, girders, decking with necessary hardware, backfilling abuttments, and armoring with geotextile and riprap. Riprap and geotextile are used to stabilize and protect abutments as needed. Scenario based on cast in place concrete abutments, steel girders, and timber deck. Travel surface shall be wooden deck surface. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Span is less than 14 feet. Load is H-20. Width is 14 feet including curbs. Abutments are <= 6 feet. 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 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: square footage of bridge deck

Scenario Unit: Square Foot

Scenario Typical Size: 252

Scenario Cost: $12,403.75 **Scenario Cost/Unit:** $49.22

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	$2.01	75	$150.75
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$107.86	8	$862.88
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	$26.75	8	$214.00
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	$27.30	80	$2,184.00
Materials						
Dimension Lumber, untreated	1045	Untreated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners.	Board Foot	$0.75	2000	$1,500.00
Floating Turbidity Curtain, Permeable, 4'	2351	Floating permeable vinyl curtain with chain or cable weight and all necessary anchoring required for installation in flowing streams or rivers. Does not include labor for installation or removal. Includes materials and shipping only.	Foot	$17.37	20	$347.40
Block, pre-cast concrete, modular	1496	Pre-cast concrete blocks, typically 2ft x 2ft x 6ft , includes installation and delivery.	Cubic Yard	$115.14	18	$2,072.52
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	20	$567.20
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	20	$1,070.20
Steel, structural steel members	1779	Structural steel, includes materials and fabrication.	Pound	$1.05	3000	$3,150.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 578 - Stream Crossing

Scenario: #2 - Hard armored low water crossing

Scenario Description:

Stabilize the bottom and slope of a stream channel using rock riprap or cast in place concrete. 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: $1,900.78 **Scenario Cost/Unit:** $4.53

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	$2.01	18	$36.18
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$107.86	2	$215.72
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	$26.75	2	$53.50
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	18	$963.18
Floating Turbidity Curtain, Permeable, 4'	2351	Floating permeable vinyl curtain with chain or cable weight and all necessary anchoring required for installation in flowing streams or rivers. Does not include labor for installation or removal. Includes materials and shipping only.	Foot	$17.37	20	$347.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 578 - Stream Crossing

Scenario: #3 - Culvert installation

Scenario Description:

Install a new culvert. 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. 36 inch Culvert installation with <75 cy of fill needed and < 2 yds rock riprap for headwalls. Pipe is 40 feet long.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. 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: in-diameter ft

Scenario Typical Size: 720

Scenario Cost: $4,825.57 **Scenario Cost/Unit:** $6.70

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	$127.04	10	$1,270.40
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	3	$17.25
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	$26.75	10	$267.50
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	50	$1,418.00
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	2	$107.02
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	$27.83	40	$1,113.20
Floating Turbidity Curtain, Permeable, 4'	2351	Floating permeable vinyl curtain with chain or cable weight and all necessary anchoring required for installation in flowing streams or rivers. Does not include labor for installation or removal. Includes materials and shipping only.	Foot	$17.37	20	$347.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 578 - Stream Crossing

Scenario: #4 - Low water crossing using prefabricated products

Scenario Description:

To install a stable crossing medium on channel bottom and approatches. 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: $3,307.12 **Scenario Cost/Unit:** $7.87

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	$107.86	2	$215.72
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	$2.01	18	$36.18
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	40	$762.40
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	$26.75	2	$53.50
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$27.99	6	$167.94
Floating Turbidity Curtain, Permeable, 4'	2351	Floating permeable vinyl curtain with chain or cable weight and all necessary anchoring required for installation in flowing streams or rivers. Does not include labor for installation or removal. Includes materials and shipping only.	Foot	$17.37	20	$347.40
GeoCell, 4"	1054	Precast Manhole with base and top delivered. 4' diameter x 4' depth. Materials only.	Square Yard	$24.27	50	$1,213.50
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	18	$510.48

Practice: 580 - Streambank and Shoreline Protection

Scenario: #1 - Vegetative

Scenario Description:

Protection of streambanks consisting of conventional plantings of vegetation to stabilize and protect against scour and erosion.
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 erosion control fabric; a 6-foot high bank at 3(H):1(V) slope for 1000 linear feet (0.46 acres) 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: 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; 570-Stormwater Runoff Control.

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.
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 Feet

Scenario Typical Size: 1,000

Scenario Cost: $18,269.32 **Scenario Cost/Unit:** $18.27

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	$127.04	75	$9,528.00
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	$13.31	0.46	$6.12
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	16	$1,197.76
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	$33.06	56	$1,851.36
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	16	$302.40
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	$19.06	224	$4,269.44

Materials

One Species, Cool Season, Annual Grass or Legume	2311	Cool season annual grass or legume. Includes material and shipping only.	Acre	$39.29	0.46	$18.07
Tree, willow	1426	Willow tree for planting, 18" to 36" seedling. Includes materials and shipping only.	Each	$0.67	500	$335.00

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
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	$191.56	1	$191.56

Practice: 580 - Streambank and Shoreline Protection

Scenario: #2 - Bioengineered

Scenario Description:

Protection of streambanks consisting of a bioengineered technique comprised of non-structural measures such as earth revetments and benches with vegetative measures to stabilize and protect the streambank against scour and erosion. Soil bioengineering is a system of living plant materials used as structural components. Adapted types of woody vegetation (shrubs and trees) are initially installed in specified configurations that offer immediate soil protection and reinforcement. In addition, soil bioengineering systems create resistance to sliding or shear displacement in a streambank as they develop roots or fibrous inclusions. Environmental benefits derived from woody vegetation include diverse and productive riparian habitats, shade, organic additions to the stream, cover for fish, and improvements in aesthetic value and water quality. Under certain conditions, soil bioengineering installations work well in conjunction with structures to provide more permanent protection and healthy function, enhance aesthetics, and create a more environmentally acceptable product. Soil bioengineering systems normally use unrooted plant parts in the form of cut branches and rooted plants. For streambanks, living systems include brushmattresses, live stakes, joint plantings, vegetated geogrids, branchpacking, and live fascines.

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: a 6-foot high bank at 3(H):1(V) slope for 1000 linear feet (0.46 acres) 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: 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; 570-Stormwater Runoff Control.

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.

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 Feet

Scenario Typical Size: 1,000

Scenario Cost: $47,671.32 **Scenario Cost/Unit:** $47.67

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	$13.31	0.46	$6.12
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	$212.37	75	$15,927.75
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	16	$1,197.76
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	2500	$10,925.00

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	$2.35	2500	$5,875.00

Labor

Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	16	$302.40
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	$19.06	370	$7,052.20
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	$26.75	75	$2,006.25
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	$33.06	80	$2,644.80

Materials

Tree, willow	1426	Willow tree for planting, 18" to 36" seedling. Includes materials and shipping only.	Each	$0.67	1000	$670.00
One Species, Cool Season, Annual Grass or Legume	2311	Cool season annual grass or legume. Includes material and shipping only.	Acre	$39.29	0.46	$18.07

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	$191.56	1	$191.56
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	3	$854.40

Practice: 580 - Streambank and Shoreline Protection

Scenario: #3 - Structural

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. Additional structural measures may also include tree revetments; log, rootwad and boulder revetments; dormant post plantings; piling revetments with wire or geotextile fencing; piling revetments with slotted fencing; jacks or jack fields; rock riprap; stream jetties; stream barbs; and gabions.

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, geotextile, and rock rip rap; a 6-foot high bank at 3(H):1(V) slope for 1000 linear feet (0.46 acres) is used for estimation purposes. The rock toe will be 3' thick and 5' high. The bank above the riprap will be graded to a stable slope and revegetated.

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; 570-Stormwater Runoff Control.

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.

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 Feet

Scenario Typical Size: 1,000

Scenario Cost: $123,110.13 **Scenario Cost/Unit:** $123.11

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	$4.37	2500	$10,925.00
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	16	$1,197.76
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	$13.31	0.12	$1.60
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	$4.68	2500	$11,700.00
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	$19.06	320	$6,099.20

Labor

Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	16	$302.40
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	$33.06	80	$2,644.80

Materials

Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	1667	$89,201.17
One Species, Cool Season, Annual Grass or Legume	2311	Cool season annual grass or legume. Includes material and shipping only.	Acre	$39.29	0.46	$18.07

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	$191.56	1	$191.56
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77

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: $1,459.80 **Scenario Cost/Unit:** $2.92

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	$2.35	500	$1,175.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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: $1,876.76 **Scenario Cost/Unit:** $3.75

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	$2.35	500	$1,175.00
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	$33.06	8	$264.48
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	8	$152.48
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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: $3,644.80 **Scenario Cost/Unit:** $7.29

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	$4.37	500	$2,185.00
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	$2.35	500	$1,175.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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: $4,061.76 **Scenario Cost/Unit:** $8.12

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	$4.37	500	$2,185.00
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	$2.35	500	$1,175.00
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	$19.06	8	$152.48
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	$33.06	8	$264.48
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 584 - Channel Bed Stabilization

Scenario: #1 - Bio-engineering

Scenario Description:

Stabilize the bottom and slope of a stream channel using bioengineering methods. Bio-engineering methods include live stakes, fascines, plantings, bare root stock, willow waddles, and live stakes. Re-vegetation of exposed surfaces will be completed using 342 - Critical Area Planting. Typical stream has 50 foot bottom width and 6 foot banks. Length of area 100 feet. Planting entire area at a 2x2 grid with live stakes, potted plants, and bare root mix

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.
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 and vegetated. 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

Scenario Feature Measure: Area of planting

Scenario Unit: Square Foot

Scenario Typical Size: 2,500

Scenario Cost: $9,015.40 **Scenario Cost/Unit:** $3.61

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	93				10	
Equipment/Installation						
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.95	200	$190.00
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$26.12	40	$1,044.80
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	$33.06	40	$1,322.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	40	$756.00
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	$19.06	120	$2,287.20
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	800	$960.00
Wattles or facines, 6 to 8 inch diameter	1904	Facines, or wattles: bundles of live tree stems of species that sprout roots, bound together. 6"-8" diameter. Includes materials and shipping only.	Foot	$7.25	200	$1,450.00

Materials

Tree, willow	1426	Willow tree for planting, 18" to 36" seedling. Includes materials and shipping only.	Each	$0.67	1500	$1,005.00

Practice: 584 - Channel Bed Stabilization

Scenario: #2 - Rock structures

Scenario Description:

Stabilize the bottom and slope of a stream channel using rock riprap or engineered products that consist primarily of rock or concrete. This includes but not limited to gabions, rock veins, rock weirs, concrete blocks,etc. Typical stream has 50 foot bottom width and 6 foot banks. Length of area 100 feet. Based on degrading channel that needs to be riprapped its entire wetted perimeter.

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. 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: $32,965.28 **Scenario Cost/Unit:** $57.33

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	$296.42	0.2	$59.28
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	20	$381.20
Materials						
Tree, willow	1426	Willow tree for planting, 18" to 36" seedling. Includes materials and shipping only.	Each	$0.67	200	$134.00
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	600	$32,106.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 584 - Channel Bed Stabilization

Scenario: #3 - Wood structures

Scenario Description:

Stabilize the bottom and slope of a stream channel using engineered structures consisting primarily of wood. 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. Typical stream has 50 foot bottom width and 6 foot banks. Length of area 100 feet. Structures spaced at 50 foot intervals.

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. 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: $6,717.65 **Scenario Cost/Unit:** $2,239.22

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	$2.35	40	$94.00
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	$19.06	40	$762.40
Materials						
Wattles or facines, 9 to 12 inch diameter	1905	Facines, or wattles: bundles of live tree stems of species that sprout roots, bound together. 9"- 12" diameter. Includes materials and shipping only.	Foot	$12.32	150	$1,848.00
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	75	$4,013.25

Practice: 587 - Structure for Water Control

Scenario: #1 - Inlet 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 inlet (Half-Rounds). They are often fabricated from half pipes (i.e. half-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: Flashboard Weir Length (in) x barrel Length (ft)

Scenario Unit: Inch-Foot

Scenario Typical Size: 1,800

Scenario Cost: $6,526.61 **Scenario Cost/Unit:** $3.63

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	$5.75	10	$57.50
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	$62.38	2	$124.76
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	190	$830.30
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	$26.75	2	$53.50
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	$27.30	5	$136.50
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	$19.06	6	$114.36
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	$1.59	32	$50.88
Pipe, Steel, 36", Std Wt, USED	1362	Materials: - USED - 36" - Steel Std Wt	Foot	$103.05	6	$618.30
Steel, Angle, 3" x 3" x 1/4"	1372	Materials: Angle, 3" x 3" x 1/4", Meets ASTM A36	Foot	$3.55	24	$85.20
Steel, Plate, 3/8"	1375	Flat steel plate, 3/8" thickness. Materials only.	Square Foot	$14.09	4	$56.36
Pipe, Steel, 30", Std Wt, USED	1361	Materials: - USED - 30" - Steel Std Wt	Foot	$80.71	50	$4,035.50
Mobilization						

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
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	$78.65	1	$78.65

Practice: 587 - Structure for Water Control

Scenario: #2 - Inline 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: Flashboard Weir Length (in) x Barrel Length (ft)

Scenario Unit: Inch-Foot

Scenario Typical Size: 1,800

Scenario Cost: $6,904.48 **Scenario Cost/Unit:** $3.84

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	$62.38	4	$249.52
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	15	$86.25
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	190	$830.30
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	$19.06	10	$190.60
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	$26.75	4	$107.00
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	$27.30	7	$191.10
Materials						
Steel, Angle, 3" x 3" x 1/4"	1372	Materials: Angle, 3" x 3" x 1/4", Meets ASTM A36	Foot	$3.55	24	$85.20
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	$1.59	4	$6.36
Pipe, Steel, 36", Std Wt, USED	1362	Materials: - USED - 36" - Steel Std Wt	Foot	$103.05	6	$618.30
Steel, Plate, 3/8"	1375	Flat steel plate, 3/8" thickness. Materials only.	Square Foot	$14.09	10	$140.90
Pipe, Steel, 30", Std Wt, USED	1361	Materials: - USED - 30" - Steel Std Wt	Foot	$80.71	50	$4,035.50
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	$78.65	1	$78.65
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 587 - Structure for Water Control

Scenario: #3 - 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: Flashboard Weir Length (in) x Barrel Length (ft)

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $5,335.51 **Scenario Cost/Unit:** $5,335.51

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	$5.75	15	$86.25
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	$62.38	2	$124.76
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	190	$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	$27.30	3	$81.90
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	$19.06	8	$152.48
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	$26.75	2	$53.50
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	120	$1,435.20
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
Pipe, PVC, 16", SCH 80	1353	Materials: - 16" - PVC - SCH 80 - ASTM D1785	Foot	$37.96	50	$1,898.00
Mobilization						

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
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	$78.65	1	$78.65

Practice: 587 - Structure for Water Control

Scenario: #4 - 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: Pipe Diameter (In) x Pipe Length (Ft)

Scenario Unit: Inch-Foot

Scenario Typical Size: 960

Scenario Cost: $2,041.92 **Scenario Cost/Unit:** $2.13

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	$5.75	45	$258.75
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	$2.35	5	$11.75
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	$19.06	10	$190.60
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	5	$141.80
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	2	$107.02
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	$19.06	40	$762.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

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: Pipe Diameter (In) x Pipe Length (Ft)

Scenario Unit: Inch-Foot

Scenario Typical Size: 960

Scenario Cost: $2,319.52 **Scenario Cost/Unit:** $2.42

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	$5.75	45	$258.75
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	$2.35	5	$11.75
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	$19.06	10	$190.60
Materials						
Pipe, CMP, 24", 12 Gauge	1417	24" Corrugated Metal Pipe, Galvanized, Uncoated, 12 gage. Material cost only.	Foot	$26.00	40	$1,040.00
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	2	$107.02
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	5	$141.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 587 - Structure for Water Control

Scenario: #6 - 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 10" 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. 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 10" hand operated slide gate is installed.

Scenario Feature Measure: width

Scenario Unit: Inch

Scenario Typical Size: 10

Scenario Cost: $118.21 **Scenario Cost/Unit:** $11.82

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Slide gate, steel, 1' diameter, low head	1830	1' diameter steel slide gate for low head installations	Each	$118.21	1	$118.21

Practice: 587 - Structure for Water Control

Scenario: #7 - Rock Checks for Water Surface Profile

Scenario Description:

Typical setting is in a stream that has at minimum unstable banks, limited fish habitat, degraded bed, or any combination of the undesirable features.. Typical installation consists of installing a cross vane shaped rock structures with points facing upstream for the purpose of raising the water surface profile, stabilizing the stream bed, or creating fish habitat, and, or installing rock structures along the banks to provide bank stability and/or fish habitat. 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: $6,039.64 **Scenario Cost/Unit:** $69.42

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	$4.68	85	$397.80
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	$19.06	12	$228.72
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	$26.75	12	$321.00
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	85	$4,548.35
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	$543.77	1	$543.77

Practice: 587 - Structure for Water Control

Scenario: #8 - Screw - Flap Gate

Scenario Description:

This senario is the installation of a water tight screw gate to control water involving a variety of water control structures. Cost includes all labor and materials needed to install gate onto a pipe or water control structure.

Before Situation:

Water needs to be controlled in a more desirable manner. The gate will be installed to control water flow for irrigation systems.

After Situation:

The gates will play an integral role in application of more efficient irrigation water delivery and on farm systems.

Scenario Feature Measure: diameter

Scenario Unit: Inch

Scenario Typical Size: 12

Scenario Cost: $787.84 **Scenario Cost/Unit:** $65.65

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	$19.06	3	$57.18
Materials						
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	1	$730.66

Practice: 587 - Structure for Water Control

Scenario: #9 - HDPE Turnout

Scenario Description:

A HDPE pipe 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 HDPE pipe 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: $691.21 **Scenario Cost/Unit:** $691.21

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	$62.38	2	$124.76
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	$19.06	4	$76.24
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	2	$37.80
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, HDPE, 12", PCPT, Single Wall	1274	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 12" diameter - ASTM F667. Material cost only.	Foot	$4.94	10	$49.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 587 - Structure for Water Control

Scenario: #10 - 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: $755.81 **Scenario Cost/Unit:** $755.81

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	$62.38	2	$124.76
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	$19.06	4	$76.24
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	2	$37.80
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	$11.40	10	$114.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 587 - Structure for Water Control

Scenario: #11 - Concrete Turnout Structure

Scenario Description:

A reinforced concrete structure designed to measure, divide, deliver and/or control water level effeciently.

Before Situation:

Current water control structure is either non-existant, ineffecient or not controling water in an effecient or desired manner. A water supply of sufficient quantity and quality is available for the desired use.

After Situation:

Water is controled effeciently for desired use. All footings, floors. and walls have a minimum thickness of six inches.

Scenario Feature Measure: CY Reinforced Concrete

Scenario Unit: Cubic Yard

Scenario Typical Size: 5

Scenario Cost: $4,162.18 **Scenario Cost/Unit:** $832.44

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	$401.46	5	$2,007.30
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	8	$499.04
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	$19.06	64	$1,219.84
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	8	$151.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 587 - Structure for Water Control

Scenario: #12 - 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, field ditch, or irrigation pipeline. This scenario is for a five ft tall, four foot wide, and 10 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 4 foot wide and 5 foot tall turnout structure equipped with slots for slide boards and panels, and a trash screen/rack conducts water through the canal berm into a field. The concrete structure is 10 feet long and has a water measuring device. 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: CY Reinforced Concrete

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $2,728.29 **Scenario Cost/Unit:** $2,728.29

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	$401.46	2.9	$1,164.23
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	3	$187.14
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	32	$609.92
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	4	$75.60
Materials						
Slide gate, steel, 2' diameter, low head	1829	2' diameter steel slide gate for low head installations	Each	$406.60	1	$406.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 587 - Structure for Water Control

Scenario: #13 - Concrete Turnout Structure - high flow

Scenario Description:

A reinforced concrete turnout structure equipped with slide boards or panels diverts irrigation water from a ditch or canal into a field, field ditch, or irrigation pipeline. This scenario is for a five ft tall, 15 feet wide, and 10 foot long turnout structure. High flow is equal or greater than 14 cfs.

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 foot wide and 5 foot tall turnout structure equipped with jack gates, and a concrete block energy dissapator as part of the apron. The concrete structure is 10 feet long and has a water measuring device. 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: CY reinforced concrete

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $5,253.43 **Scenario Cost/Unit:** $5,253.43

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	$401.46	6.8	$2,729.93
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	5	$311.90
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	$19.06	48	$914.88
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	8	$151.20
Materials						
Block, concrete	253	Concrete block, hollow, normal weight, 3500 psi. Includes both full and partial sizes. Material only	Each	$1.98	24	$47.52
Slide gate, steel, 2' diameter, low head	1829	2' diameter steel slide gate for low head installations	Each	$406.60	2	$813.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 587 - Structure for Water Control

Scenario: #14 - 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: $1,946.70 **Scenario Cost/Unit:** $194.67

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
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	$78.65	2	$157.30

Practice: 587 - Structure for Water Control

Scenario: #15 - 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: $3,682.37 **Scenario Cost/Unit:** $368.24

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
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	$78.65	2	$157.30

Practice: 587 - Structure for Water Control

Scenario: #16 - Steel Fabrication

Scenario Description:

Fabricating steel into water controls structures, weir plates, trash racks, measuring flumes etc.

Before Situation:

Current water control structures are either non-existant, ineffecient or not controling water in an effecient or desired manner. A water supply of sufficient quantity and quality is available for the desired use.

After Situation:

Water is measured and controled effeciently for desired use.

Scenario Feature Measure: Weight

Scenario Unit: Pound

Scenario Typical Size: 320

Scenario Cost: $1,152.88 **Scenario Cost/Unit:** $3.60

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	$62.38	4	$249.52
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	$27.30	8	$218.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	4	$75.60
Materials						
Steel, Plate, 3/16"	1048	Flat Steel Plate, 3/16" thick, materials only.	Square Foot	$7.07	32	$226.24
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	$191.56	2	$383.12

Practice: 587 - Structure for Water Control

Scenario: #17 - Cleaning Screens

Scenario Description:

Clean trash. debris and sediment from water to be used for irrigation.

Before Situation:

Dirty water inhibits desired use of water in various irrigation systems.

After Situation:

Water is cleaned and inables design and application of high effeciency irrigation systems.

Scenario Feature Measure: Weight

Scenario Unit: Pound

Scenario Typical Size: 120

Scenario Cost: $1,148.52 **Scenario Cost/Unit:** $9.57

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	$27.30	40	$1,092.00
Materials						
Steel, Plate, ⅛"	1047	Flat Steel Plate, ⅛" thick, materials only.	Square Foot	$4.71	12	$56.52

Practice: 587 - Structure for Water Control

Scenario: #18 - Sheet Piling Structure

Scenario Description:

Construction of a sheet piling structure to divert or control water in streams and other water courses.

Before Situation:

Unable to divert water from a water course into irrigation system.

After Situation:

Able to consistantly divert desired amount of water into irrigation system.

Scenario Feature Measure: Square Foot

Scenario Unit: Square Foot

Scenario Typical Size: 700

Scenario Cost: $29,001.00 **Scenario Cost/Unit:** $41.43

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Sheet piling, steel, 25'	1406	Steel sheet pile, panels or barrier driven 15 to 25 feet and left in place. Includes materials, equipment and labor.	Square Foot	$41.43	700	$29,001.00

Practice: 587 - Structure for Water Control

Scenario: #19 - Surge Valve

Scenario Description:

The use of surge valves with controllers to effeciently apply water to cropland.

Before Situation:

In-efficient or less efficient irrigation system in place before surge system applied./

After Situation:

Irrigation effeciency and uniformity is improved.

Scenario Feature Measure: surge valve

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $2,189.17 **Scenario Cost/Unit:** $2,189.17

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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: 587 - Structure for Water Control

Scenario: #20 - 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: $4,688.56 **Scenario Cost/Unit:** $468.86

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
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	$78.65	2	$157.30

Practice: 587 - Structure for Water Control

Scenario: #21 - Wood irrigation Structures

Scenario Description:

Constructing treated or red wood water controls structures.

Before Situation:

Current water control structures are either non-existant, ineffecient or not controling water in an effecient or desired manner. A water supply of sufficient quantity and quality is available for the desired use.

After Situation:

Water is measured and controled effeciently for desired use.

Scenario Feature Measure: Square Foot

Scenario Unit: Square Foot

Scenario Typical Size: 1,000

Scenario Cost: $4,246.88 **Scenario Cost/Unit:** $4.25

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	$62.38	4	$249.52
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	4	$75.60
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	$19.06	16	$304.96
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	$27.30	16	$436.80
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	$1.59	2000	$3,180.00

Practice: 587 - Structure for Water Control

Scenario: #22 - Large, in-stream, Concrete Irrigation Water Diversion Structure

Scenario Description:

Typical setting is in a stream or irrigation canal. Typical installation consists of installing a rectangular shaped concrete structure for the purpose of raising the water surface profile. Cost estimate is for one structure with a effective width of 75', and total length of 20', effective height of 3', max height of 6', and 12" thick walls and floor; containing 245 cubic yards of Concrete. Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as water quantity, water qu,ality degradation, soil erosion-concentrated flow erosion, and fish and recreation passage.

Before Situation:

The stream presently is annually manipulated with heavy equipment to maintain a water surface elevation allowing diversion of irrigation water. This condition has caused the degredation of the stream bed, excessive erosion and sediment deposition down stream, disruption of fish migration, with only floods well above normal high-water escaping the high banks of the stream. Excessive maintenance costs to maintain water levels occur annually.

After Situation:

Banks are stabilized, and the water surface elevation is easily maintained. Water quality is protected downstream due to erosion protection, fish migration is accomplished, and annual maintenancey costs are reduced. 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: Volume of Reinforced Concrete

Scenario Unit: Cubic Yard

Scenario Typical Size: 245

Scenario Cost: $338,601.06 **Scenario Cost/Unit:** $1,382.05

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	$4.01	500	$2,005.00
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	$401.46	245	$98,357.70
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$296.42	2	$592.84
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	120	$690.00
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$142.30	320	$45,536.00
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	$212.37	40	$8,494.80
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	$2.27	107	$242.89
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	$33.06	720	$23,803.20
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	$27.30	520	$14,196.00

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	$19.06	3600	$68,616.00

Materials

Structural steel tubing, 2" diameter	1120	Structural steel tubing, 2" diameter, 1/8" wall thickness, materials only	Foot	$3.69	150	$553.50
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	38	$742.90
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	243	$13,002.93
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	40	$1,134.40
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	8	$52,758.16
Steel, Plate, 3/16"	1048	Flat Steel Plate, 3/16" thick, materials only.	Square Foot	$7.07	960	$6,787.20

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	$543.77	2	$1,087.54

Practice: 587 - Structure for Water Control

Scenario: #23 - Pressure Regulating Station

Scenario Description:

The installation of an inline pressure reuglator in order to regulate the internal water pressure in an irrigation pipeline including thrust blocks, air vents, isolation valves. Conversion from typical buried to steel pipe to above ground installation is necessary for operation and maintenance. Reinforced concrete pad is required to anchor all installed items.

Before Situation:

Pressure in irrigation pipeine is not regulated and can vary with the flow rate. Excessively high pressures can develop that decrease effective irrigation water management and operation of the pipeline system. Flow distribution is uneven.

After Situation:

Constant pressure at a predefined, safe level can be maintained. Water management, distribution can be maintained at a constant level.

Scenario Feature Measure: Number of installed stations

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $3,626.01 **Scenario Cost/Unit:** $3,626.01

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	1760				1	
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	$2.27	32	$72.64
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	$127.06	0.8	$101.65
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	2	$124.76
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	$27.30	4	$109.20
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	$108.13	4	$432.52
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	$19.06	8	$152.48
Materials						
Steel, Angle, 3" x 3" x 1/4"	1372	Materials: Angle, 3" x 3" x 1/4", Meets ASTM A36	Foot	$3.55	16	$56.80
Structural steel tubing, 2" diameter	1120	Structural steel tubing, 2" diameter, 1/8" wall thickness, materials only	Foot	$3.69	160	$590.40
Pipe, Steel, 10", Std Wt	1364	Materials: - 10" - Steel Std Wt	Foot	$52.54	32	$1,681.28
Steel, Plate, 3/8"	1375	Flat steel plate, 3/8" thickness. Materials only.	Square Foot	$14.09	8	$112.72
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	$191.56	1	$191.56

Practice: 587 - Structure for Water Control

Scenario: #24 - Culvert >= 30 inches HDPE

Scenario Description:

Install a new HDPE culvert greater than or equal to 30 inches in diameter to convey water under roads or other barriers. A typical scenario would be an 36 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.

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: Pipe Diameter (In) x Pipe Length (Ft)

Scenario Unit: Diameter Inch Foot

Scenario Typical Size: 1,440

Scenario Cost: $2,726.32 **Scenario Cost/Unit:** $1.89

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	$5.75	45	$258.75
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	$2.35	5	$11.75
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	$19.06	10	$190.60
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	2	$107.02
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	5	$141.80
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	$36.17	40	$1,446.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 587 - Structure for Water Control

Scenario: #25 - Culvert >= 30 inches CMP

Scenario Description:

Install a new CMP culvert greater than or equal to 30 inches in diameter to convey water under roads or other barriers. A typical scenario would be an 36 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.

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: Pipe Diameter (In) x Pipe Length (Ft)

Scenario Unit: Diameter Inch Foot

Scenario Typical Size: 1,440

Scenario Cost: $2,823.92 **Scenario Cost/Unit:** $1.96

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	$5.75	45	$258.75
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	$2.35	5	$11.75
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	$19.06	10	$190.60
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	2	$107.02
Pipe, CMP, 36", 12 Gauge	1825	36" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$38.61	40	$1,544.40
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	5	$141.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 587 - Structure for Water Control

Scenario: #26 - Alfalfa, orchard valve

Scenario Description:

The use of alfalfa or orchard valves ranging from 6" to 14" diameter to deliever water from an irrigation pipeline to a field. The use of inline valves to distribute water within an irrigation pipeline system more efficiently. The use of a chemigation valve to add chemicals to an irrigation system to meet crop requirement needs.

Before Situation:

Irrigation efficiency and delivery from earthen ditch to field are low.

After Situation:

Irrigation effeciency and distribution are improved.

Scenario Feature Measure: diameter

Scenario Unit: Inch

Scenario Typical Size: 12

Scenario Cost: $419.06 **Scenario Cost/Unit:** $34.92

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	$19.06	1	$19.06
materials						
alfalfa valve, Tee, materials	2129	alfalfa valve assembly, including 12" alfalfa valve, PVC Tee, 36" PVC riser to connect to pipeline. Materials only	Each	$400.00	1	$400.00

Practice: 587 - Structure for Water Control

Scenario: #27 - Inline Valve less than 12 inch

Scenario Description:

The use of inline valves less than 12" diameter to regulate and control water in a high pressure irrigation pipeline to a field. The use of inline valves to distribute water within an irrigation pipeline system more efficiently to meet crop requirement needs.

Before Situation:

Irrigation efficiency and delivery from earthen ditch to field are low.

After Situation:

Irrigation effeciency and distribution are improved.

Scenario Feature Measure: diameter

Scenario Unit: Inch

Scenario Typical Size: 10

Scenario Cost: $296.69 **Scenario Cost/Unit:** $29.67

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	$19.06	1	$19.06
Materials						
Valve, Inline, < 12" dia.	2367	Inline valve less than 12" diameter to control direction and volume of flow within a pipeline system. Materials only.	Each	$277.63	1	$277.63

Practice: 587 - Structure for Water Control

Scenario: #28 - Inline valve >=12 inch

Scenario Description:

Inline Valve greater than or equal to 12"

Before Situation:

The use of inline valves greater than or equal to 12" diameter to regulate and control water in a high pressure irrigation pipeline to a field. The use of inline valves to distribute water within an irrigation pipeline system more efficiently to meet crop requirement needs.

After Situation:

Irrigation efficiency and delivery from earthen ditch to field are low.

Scenario Feature Measure: Irrigation effeciency and distribution are improved.

Scenario Unit: Inch

Scenario Typical Size: 14

Scenario Cost: $2,223.50 **Scenario Cost/Unit:** $158.82

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	$19.06	1	$19.06
Materials						
Valve, Inline, ≥ 12" dia.	2368	Inline valve greater than or equal to 12" diameter to control direction and volume of flow within a pipeline system. Materials only.	Each	$2,204.44	1	$2,204.44

Practice: 587 - Structure for Water Control

Scenario: #29 - chemigation valve <12 inch

Scenario Description:

The use of chemigation valves less than 12" diameter to regulate and control injection of chemicals into irrigation systems.

Before Situation:

Nutrient application low efficiency.

After Situation:

Nutrient application is improved.

Scenario Feature Measure: diameter

Scenario Unit: Inch

Scenario Typical Size: 10

Scenario Cost: $519.99 **Scenario Cost/Unit:** $52.00

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	$19.06	1	$19.06
Materials						
Valve, Chemigation, < 12" dia.	2369	Chemigation valve less than 12" diameter for controlling injection of chemicals into irrigation systems. Materials only.	Each	$500.93	1	$500.93

Practice: 587 - Structure for Water Control

Scenario: #30 - Chemigation valve >=12 inch

Scenario Description:

0

Before Situation:

Irrigation efficiency and delivery from earthen ditch to field are low.

After Situation:

Irrigation effeciency and distribution are improved.

Scenario Feature Measure: diameter

Scenario Unit: Inch

Scenario Typical Size: 12

Scenario Cost: $1,191.73 **Scenario Cost/Unit:** $99.31

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	$19.06	1	$19.06
Materials						
Valve, Chemigation, ≥ 12" dia.	2370	Chemigation valve greater than or equal to 12" diameter for controlling injection of chemicals into irrigation systems. Materials only.	Each	$1,172.67	1	$1,172.67

Practice: 590 - Nutrient Management

Scenario: #1 - Basic NM System

Scenario Description:

This scenario describes the implementation of a basic nutrient management system on > = 40 acres of cropland or hayland 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 LGU recommendations or crop removal rates and an associated nutrient budget, and recordkeeping. Records demonstrating implementation of the 4 R's of the NM criteria will be required.

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 on a regular basis 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:

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. On planning units typically 40 acres or larger, soil testing is completed according to LGU 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 and/or tissue 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, thus reducing the potential for off-site impacts. Records will be provided annually of the current soil test, analysis, amount 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.

Scenario Feature Measure:

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $129.35 **Scenario Cost/Unit:** $3.23

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	$41.41	1	$41.41
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	2	$38.12
Materials						
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	1	$9.77
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	$40.05	1	$40.05

Practice: 590 - Nutrient Management

Scenario: #2 - Basic Organic NM System

Scenario Description:

The planned NM system for organic production 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, manure and/or compost analysis, training attendance, consultant services that provide nutrient recommendations. Records demonstrating implementation of the 4 R's of NM standard will be required. This Scenario is designed to encourage organic producers to effectively utilize organic fertilizers, manure, and/or compost appropriately improving soil quality and minimizing runoff of nutrients from fields to surface waters. The basis for nutrient applications will be recommendations based on soil and manure analyses.

Before Situation:

In this geographic area, an organic fertility program does not meet the 590 nutrient management standard. Soil testing is not completed on a regular basis and applications of organic fertilizers and amendments are not based on a nutrient budget. Nutrients are transported to surface waters through runoff or erosion and to ground waters 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 during critical periods often times resulting in sheet, rill, and ephemeral erosion.

After Situation:

A nutrient management system will be developed to meet the NRCS 590 standard and NOP regulations. A nutrient management budget will be developed annually for each field(s) based on soil test analysis and crop needs. Soil testing is completed according to LGU instructions. Application of nutrients will be completed at the proper rate, timing, and methods, and sources. Applications will be completed in a manner that minimizes nutrient runoff and leaching or build up of excess nutrient concentrations. Application of nutrients via manures, cover crops or approved commercial forms are applied in a manner that minimizes nutrient runoff and leaching. Specialized training is required by attending annual workshops and/or conferences. Records will be provided annually of the current soil test, analysis, amount of application, forms and rates of nutrients for each field.

Scenario Feature Measure:

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $220.26 **Scenario Cost/Unit:** $5.51

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	$41.41	1	$41.41
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	2	$38.12
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	1	$45.49
Test, Compost Analysis	307	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$45.42	1	$45.42
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: 590 - Nutrient Management

Scenario: #3 - Small Farm/Diversified

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 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. The planned NM system for this organic or conventional production system will meet current 590 Nutrient Management criteria. Payment for implementation of this scenario is to defray the costs of soil testing, manure and/or compost analysis, training attendance, and consultant services that provide nutrient management recommendations, associated nutrient budgets, and recordkeeping. Records demonstrating implementation of the 4 R's of NM will be required.

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. Application of nutrients will be completed at the proper rate, timing, and methods, and sources. Applications will be completed in a manner that minimizes nutrient runoff and leaching or build up of excess nutrient concentrations. Application rates of all nutrients are based upon soil test analyses either LGU recommendations, crop removal rates, or industry standard. Specialized training is required by attending annual workshops and/or conferences. Records will be provided annually of the current soil test, analyses, amount of application, forms and rates of nutrients for each crop block.

Scenario Feature Measure:

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $188.62 **Scenario Cost/Unit:** $188.62

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	$19.06	2	$38.12
Materials						
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	2	$19.54
Test, Manure Analysis	306	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$45.49	1	$45.49
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, Compost Analysis	307	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$45.42	1	$45.42

Practice: 590 - Nutrient Management

Scenario: #4 - Basic NM system with manure

Scenario Description:

This scenario describes the implementation of a basic nutrient management system on planning units 40 ac or larger of cropland or hayland where there is manure or compost application in addition to commercial fertilizer applications. 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 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 LGU recommendations or crop removal rates and an associated nutrient budget, and recordkeeping. Risk assessments including PI (phosphorus index) and NI (nitrogen index) will be completed with applications of manure completed based on risk results. Records demonstrating implementation of the 4 R's of the NM plan 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:

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. On a planning unit soil testing is completed according to LGU 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 (PI - phosphorus index). The use of post-harvest soil and/or tissue 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. Records will be provided annually documenting current soil tests, manure tests, analyses, amount 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. The producer will attend one extension crop school or nutrient management workshop or similar activity annually to stay current on crop-specific nutrient management.

Scenario Feature Measure:

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $212.66 **Scenario Cost/Unit:** $5.32

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	$41.41	1	$41.41
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	2	$38.12
Materials						
Test, Manure Analysis	306	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$45.49	1	$45.49
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	1	$26.14
Test, Soil Nitrogen Testing	311	Pre-Side Dress/Deep Soil Testing. Includes materials and shipping only.	Each	$11.68	1	$11.68
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	1	$9.77
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	$40.05	1	$40.05

Practice: 590 - Nutrient Management

Scenario: #5 - 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. An enhanced nutrient management system includes split applications and multiple nutrient concentration tests (other than only 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 at least once every three years for N-P-K, and for N annually. 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:

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $1,307.24 **Scenario Cost/Unit:** $32.68

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	$41.41	2	$82.82
Chlorophyll Reader	1125	Applicator and chlorophyll sensor includes labor. No materials	Acre	$13.00	40	$520.00
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$34.13	2	$68.26
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	$19.06	2	$38.12
Materials						
Test, Soil Nitrogen Testing	311	Pre-Side Dress/Deep Soil Testing. Includes materials and shipping only.	Each	$11.68	1	$11.68
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	1	$9.77
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	$40.05	1	$40.05

Materials

Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	1	$26.14
Nitrogen-Urease inhibitor	260	Nitrogen-Urease inhibitor	Acre	$12.76	40	$510.40

Practice: 590 - Nutrient Management

Scenario: #6 - Precision NM System

Scenario Description:

This scenario describes the implementation of a basic precision nutrient management system on cropland. The planned NM system will meet the current 590 standard. Payment for implementation is to defray the costs of soil testing, analysis, consultant services that provide nutrient recommendations based on LGU recommendations or crop removal rates and an associated nutrient budget, recordkeeping, and monitoring on a precision level. Records demonstrating implementation of the 4 R's of at the NM plan will be required. This scenario goes beyond the basic NM system by using technologies that improve efficiency and effectiveness of nutrient management by utilizing precision techniques and tools. 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, applied nutrients are applied across large acreages 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. Because whole fields are fertilized with the same rate, excess nutrients may be applied in some areas while inadequate amounts of nutrients are applied in other areas. Due to the mono-application rate, 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 management zone. Soil sampling consists of methods that allow for various zones to be established. 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 zone nutrient budget. Nutrient applications are based on LGU recommendations. 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. Records are maintained for all nutrient applications and soil testing. Record keeping will include all soil tests, analysis, zone maps, nutrient prescriptions and budgets, and as-applied applications.

Scenario Feature Measure:

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $905.83 **Scenario Cost/Unit:** $22.65

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	$34.13	2	$68.26
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	1	$41.41
Fertilizer, precision application	952	Fertilizer application performed by light bar/GPS navigation system. Includes equipment, power unit and labor costs.	Acre	$12.10	40	$484.00
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	$19.06	3	$57.18
Materials						
Test, Soil Nitrogen Testing	311	Pre-Side Dress/Deep Soil Testing. Includes materials and shipping only.	Each	$11.68	1	$11.68
Test, Soil Test, Precision, Grid or Zone	300	Includes materials, shipping, labor, and equipment costs.	Each	$13.55	15	$203.25
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: 590 - Nutrient Management

Scenario: #7 - Advanced NM Precision System

Scenario Description:

This scenario describes the implementation of an advanced precision nutrient management system on cropland. The planned NM system will meet the current 590 standard. Payment for implementation is to defray the costs of soil testing, analysis, consultant services, skilled labor and specialized nutrient application that provide nutrient proper recommendations based on LGU recommendations or crop removal rates and an associated nutrient budget, recordkeeping, and monitoring on a precision level that includes split applications, NDVI sensing, and aerial imaging. Records demonstrating implementation of the 4 R's of the NM plan will be required. This scenario goes beyond the basic precision system by using 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:

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $1,144.05 **Scenario Cost/Unit:** $28.60

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	$41.41	3	$124.23
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$34.13	4	$136.52
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	$12.10	40	$484.00
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	$19.06	3	$57.18
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	$27.30	2	$54.60
Materials						

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
Test, Soil Test, Precision, Grid or Zone	300	Includes materials, shipping, labor, and equipment costs.	Each	$13.55	15	$203.25
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	1	$26.14
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: #8 - Adaptive NM

Scenario Description:

The practice scenario is for the implementation of nutrient management on a small plot. Scenario includes implementing replicated strip trials on a field plot to evaluate, identify and implement various nutrient use efficiency improvement methods for timing, rate, method of application, or source of nutrients.

Before Situation:

The practice will be installed on cropland (small grain rotation or typical corn-soybean rotation) to address water quality degradation, air quality degradation and energy concerns. The scenario applies to non-organic and organic operations.

After Situation:

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 6 - Adaptive Nutrient Management. Implementation involves establishing the 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 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 Agronomy Technical Note 6 - Adaptive Nutrient Management. The yields for each plot will be adjusted to the appropriate moisture content.

Scenario Feature Measure:

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $1,456.07 **Scenario Cost/Unit:** $1,456.07

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Satellite imagery, aerial photography, infrared	966	Infrared imagery	Acre	$0.16	1	$0.16
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	$19.06	12	$228.72
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	$108.13	8	$865.04
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
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	2	$19.54
Test, Soil Nitrogen Testing	311	Pre-Side Dress/Deep Soil Testing. Includes materials and shipping only.	Each	$11.68	8	$93.44
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	8	$209.12

Practice: 592 - Feed Management

Scenario: #1 - Cow Dairy, Large

Scenario Description:

Feed ration management on a 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: $2,680.20 **Scenario Cost/Unit:** $3.83

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	$27.30	10	$273.00
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	$19.06	20	$381.20
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	$108.13	12	$1,297.56
Materials						
Test, Manure Analysis	306	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$45.49	4	$181.96
Test, Feed Analysis	1989	Representative sample of feed. Includes materials and shipping only.	Each	$34.05	16	$544.80
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

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: $1,606.54 **Scenario Cost/Unit:** $32.13

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	$27.30	10	$273.00
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	$19.06	12	$228.72
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	$108.13	6	$648.78
Materials						
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
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

Practice: 592 - Feed Management

Scenario: #3 - Livestock

Scenario Description:

This example is feed ration management on a swine finishing operation that does not have access to enough acres to spread all of the nutrients in the manure, at agronomic rates. The resource concerns are water quality, and excessive manure nutrients, particularly nitrogen and phosphorus. The goal of the practice is to reduce these excess nutrients to a point where they can be fully utilized at agronomic rates on the existing land base, thereby reducing or eliminating water quality degredation concerns.

Associated Practices: Nutrient management (590)

Before Situation:

The producer is feeding a single diet with a higher level of protein (16%) and phosphorus (0.65%) than is needed to meet National Research Council (NRC) recommendations for animals of this type and at this stage of production.

After Situation:

This scenario's operation currently houses 2800 finishing hogs with an average weight of 154 pounds (307 pound live finished weight/2), or 430 animal units (2800 hogs * 154 lbs average hog weight / 1000 lbs AU = 430 AU). The farm typically gows out 2.5 turns per year (430 AU * 2.5 = 1075 AU). A baseline analysis of manure and feed 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 animals of this type and at this stage of production. Producer will consider alternative feedstuffs, phase feeding, split-sex feeding and other scenarios to achieve the objective. Proper feed management removes excess nutrients from the manure, making the manure easier for the producer to properly manage within his/her land constraints. The improved manaure management prevents surface and groundwater degredation from excess nitrogen and phosphorus.

Scenario Feature Measure: Number of 1000 pound animal units

Scenario Unit: Animal Unit

Scenario Typical Size: 1,075

Scenario Cost: $2,095.80 **Scenario Cost/Unit:** $1.95

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	$108.13	12	$1,297.56
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	$27.30	12	$327.60
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	$19.06	8	$152.48
Materials						
Test, Manure Analysis	306	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$45.49	4	$181.96
Test, Feed Analysis	1989	Representative sample of feed. Includes materials and shipping only.	Each	$34.05	4	$136.20

Practice: 592 - Feed Management

Scenario: #4 - Meat Bird

Scenario Description:

This example is feed ration management on a meat bird operation that does not have access to enough acres to spread all of the nutrients in the manure, at agronomic rates. The resource concerns are water quality, and excessive manure nutrients, particularly nitrogen and phosphorus. The goal of the practice is to reduce these excess nutrients to a point where they can be fully utilized at agronomic rates on the existing land base, thereby reducing or eliminating water quality degredation concerns.

Associated Practices: Nutrient management (590)

Before Situation:

The producer is feeding animals a single diet with a higher nutrient levels than are needed to meet National Research Council (NRC) recommendations for animals of this type and at this stage of production.

After Situation:

This scenario's operation currently houses 60,000 broilers in three houses of 20,000 birds. Each house has 5 turns per year with an average weight of 2.5 pounds per bird (5 pound live finished weight/2). The operation annually raises a total of 750 animal units (60,000 birds * 5 turns * 2.5 lbs average weight of bird/1000 lbs AU = 750 AU). A baseline analysis of manure and feed 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 animals of this type and at this stage of production. Producer will consider alternative feedstuffs, phase feeding, split-sex feeding and other scenarios to achieve the objective. Proper feed management removes excess nutrients from the manure, making the manure easier for the producer to properly manage within his/her land constraints. The improved manaure management prevents surface and groundwater degredation from excess nitrogen and phosphorus.

Scenario Feature Measure: Number of 1000 pound animal units

Scenario Unit: Animal Unit

Scenario Typical Size: 750

Scenario Cost: $2,619.75 **Scenario Cost/Unit:** $3.49

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	$27.30	15	$409.50
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	$108.13	15	$1,621.95
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	10	$190.60
Materials						
Test, Manure Analysis	306	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$45.49	5	$227.45
Test, Feed Analysis	1989	Representative sample of feed. Includes materials and shipping only.	Each	$34.05	5	$170.25

Practice: 595 - Integrated Pest Management

Scenario: #1 - Basic IPM 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: $703.38 **Scenario Cost/Unit:** $17.58

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	$27.30	2	$54.60
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	$108.13	6	$648.78

Practice: 595 - Integrated Pest Management

Scenario: #2 - Basic IPM 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: $946.94 **Scenario Cost/Unit:** $23.67

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	$108.13	8	$865.04
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	$27.30	3	$81.90

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: $1,406.76 **Scenario Cost/Unit:** $35.17

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	$108.13	12	$1,297.56
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	$27.30	4	$109.20

Practice: 595 - Integrated Pest Management

Scenario: #4 - Basic IPM 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: $974.24 **Scenario Cost/Unit:** $97.42

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	$27.30	4	$109.20
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	$108.13	8	$865.04

Practice: 595 - Integrated Pest Management

Scenario: #5 - Basic IPM 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: $1,245.10 **Scenario Cost/Unit:** $124.51

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	$27.30	6	$163.80
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	$108.13	10	$1,081.30

Practice: 595 - Integrated Pest Management

Scenario: #6 - Advanced IPM 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: $1,894.95 **Scenario Cost/Unit:** $189.50

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	$27.30	10	$273.00
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	$108.13	15	$1,621.95

Practice: 595 - Integrated Pest Management

Scenario: #7 - Basic IPM 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: $1,245.10 **Scenario Cost/Unit:** $124.51

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	$27.30	6	$163.80
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	$108.13	10	$1,081.30

Practice: 595 - Integrated Pest Management

Scenario: #8 - Basic IPM 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: $1,894.95 **Scenario Cost/Unit:** $189.50

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	$108.13	15	$1,621.95
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	$27.30	10	$273.00

Practice: 595 - Integrated Pest Management

Scenario: #9 - Advanced IPM 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: $2,845.10 **Scenario Cost/Unit:** $284.51

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	$27.30	25	$682.50
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	$108.13	20	$2,162.60

Practice: 595 - Integrated Pest Management

Scenario: #10 - IPM S-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: $595.25 **Scenario Cost/Unit:** $595.25

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	$27.30	2	$54.60
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	$108.13	5	$540.65

Practice: 595 - Integrated Pest Management

Scenario: #11 - IPM S-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: $757.98 **Scenario Cost/Unit:** $757.98

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	$27.30	4	$109.20
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	$108.13	6	$648.78

Practice: 595 - Integrated Pest Management

Scenario: #12 - Advanced IPM S-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: $1,136.97 **Scenario Cost/Unit:** $1,136.97

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	$27.30	6	$163.80
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	$108.13	9	$973.17

Practice: 595 - Integrated Pest Management

Scenario: #13 - Risk Prevention IPM All RCs

Scenario Description:

A comprehensive IPM plan based primarily on LGU-approved pest prevention and avoidance techniques is applied to prevent negative impacts on all identified resource concerns. LGU-approved pest monitoring techniques and pest thresholds may also be included, but suppression techniques cannot pose any hazards to identified resource concerns. This type of system is very difficult to achieve, but may be most commonly achieved in Organic Systems that already rely heavily on prevention and avoidance techniques.

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 based primarily on Land Grant University approved pest prevention and avoidance techniques is applied to prevent negative impacts on all identified resource concerns. Land Grant University approved pest monitoring techniques and pest thresholds may also be included, but suppression techniques cannot pose any hazards to identified resource concerns.

Scenario Feature Measure: Acres of management applied

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $1,490.80 **Scenario Cost/Unit:** $149.08

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	$27.30	15	$409.50
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	$108.13	10	$1,081.30

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 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: Feet

Scenario Typical Size: 2,500

Scenario Cost: $6,100.98 **Scenario Cost/Unit:** $2.44

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	$138.48	34	$4,708.32
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	$33.06	6	$198.36
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	$26.75	34	$909.50
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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: Feet

Scenario Typical Size: 2,500

Scenario Cost: $9,967.39 **Scenario Cost/Unit:** $3.99

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	$138.48	57	$7,893.36
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	$33.06	8	$264.48
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	$26.75	57	$1,524.75
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 600 - Terrace

Scenario: #3 - Grass Backed

Scenario Description:

{Only name change from 5 to 1 & 2 to 1 to Grass Back} 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: $3,523.35 **Scenario Cost/Unit:** $1.41

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	$138.48	19	$2,631.12
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	$26.75	19	$508.25
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	$33.06	3	$99.18
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 600 - Terrace

Scenario: #4 - Narrow Base, less than 8% slope

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: $4,349.50 **Scenario Cost/Unit:** $1.74

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	$138.48	24	$3,323.52
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	$26.75	24	$642.00
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	$33.06	3	$99.18
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 600 - Terrace

Scenario: #5 - Narrow Base, greater than 8% slope

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: $4,713.02 **Scenario Cost/Unit:** $1.89

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	$138.48	26	$3,600.48
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	$26.75	26	$695.50
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$33.06	4	$132.24
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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. Resource concerns addressed by this practice are reduce soil erosion by wind, reduce soil particulate emmissions into the air, improve plant productivity by protecting crops from wind and wind-borne soil particles, and improve plant available moisture. Scenario size is 8' x 1320' = 0.25 acre.

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. The annual herbaceous wind barrier will be placed across an entire field perpendicular to applicable prevailing wind direction. Planting width is approximately 8 feet wide. 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 annual barriers and required reestablishment.

Scenario Feature Measure: linear feet of barrier planted

Scenario Unit: Linear Feet

Scenario Typical Size: 1,320

Scenario Cost: $347.82 **Scenario Cost/Unit:** $0.26

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	$41.41	3	$124.23
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	1	$22.51
Foregone Income						
FI, Corn Irrigated	1960	Irrigated Corn is Primary Crop	Acre	$536.31	0.25	$134.08
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	3	$57.18
Materials						
One Species, Cool Season, Annual Grass or Legume	2311	Cool season annual grass or legume. Includes material and shipping only.	Acre	$39.29	0.25	$9.82

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. Resource concerns addressed by this practice are reduce soil erosion by wind, reduce soil particulate emmissions into the air, improve plant productivity by protecting crops from wind and wind-borne soil particles, and improve plant available moisture. Scenario size is planting an area that is 8' wide by 1320 feet long using a grass seed drill to plant the perennial species. Area is 8' x 1320' = 0.25 acres.

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. The perennial herbaceous wind barrier will be placed across an entire field perpendicular to applicable prevailing wind direction. Planting width is approximately 8 feet wide with rows 7 to 8 " apart and 1320 feet long. 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: $355.73 **Scenario Cost/Unit:** $0.27

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	$22.51	1	$22.51
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	3	$124.23
Foregone Income						
FI, Corn Irrigated	1960	Irrigated Corn is Primary Crop	Acre	$536.31	0.25	$134.08
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	3	$57.18
Materials						
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.25	$17.73

Practice: 603 - Herbaceous Wind Barriers

Scenario: #3 - Snow Deposition

Scenario Description:

This scenario describes the implementation of herbaceous barriers that are designed 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. This scenario is typically used in dryland farming situations. Resource concerns addressed by this practice are reduce soil erosion by wind, reduce soil particulate emmissions into the air, improve plant productivity by protecting crops from wind and wind-borne soil particles, and improve plant available moisture. Scenario size is 8' x 1320' = 0.25 acre.

Before Situation:

Typically dryland 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. Plant species can include either perennial or annual species. 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: $257.74 **Scenario Cost/Unit:** $0.20

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	$41.41	3	$124.23
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$22.51	1	$22.51
Foregone Income						
FI, Corn Dryland	1959	Dryland Corn is Primary Crop	Acre	$144.36	0.25	$36.09
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	$19.06	3	$57.18
Materials						
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	0.25	$17.73

Practice: 606 - Subsurface Drain

Scenario: #1 - Corrugated Plastic Pipe (CPP), Single-Wall, ≤ 6 inch

Scenario Description:

Description: Below ground installation of perforated HDPE (Corrugated Plastic Pipe) pipeline, using a drainage plow. 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 feet of pipe. The typical number of mainline connections for 2,000 feet of subsurface drainline is a total of 3 each.

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.

Scenario Feature Measure: Feet of Pipe

Scenario Unit: Foot

Scenario Typical Size: 2,000

Scenario Cost: $8,331.22 **Scenario Cost/Unit:** $4.17

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	$2.58	2000	$5,160.00
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	$31.36	3	$94.08
Pipe, HDPE, 5", PCPT, Single Wall	1271	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 5" diameter - ASTM F405. Material cost only.	Foot	$0.71	2000	$1,420.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	2	$1,087.54

Practice: 606 - Subsurface Drain

Scenario: #2 - Enveloped Corrugated Plastic Pipe (CPP), Single-Wall, ≤ 6 inch

Scenario Description:

Description: Below ground installation of perforated HDPE (Corrugated Plastic Pipe) pipeline with Sand-Gravel envelope, using a drainage trencher. 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 feet of pipe. 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.
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.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Foot

Scenario Typical Size: 2,000

Scenario Cost: $10,129.30 **Scenario Cost/Unit:** $5.06

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	$98.63	8	$789.04
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	$2.07	2000	$4,140.00
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	$26.75	8	$214.00
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	$31.36	3	$94.08
Pipe, HDPE, 5", PCPT, Single Wall	1271	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 5" diameter - ASTM F405. Material cost only.	Foot	$0.71	2000	$1,420.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	64	$1,815.04
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	2	$1,087.54

Practice: 606 - Subsurface Drain

Scenario: #3 - Corrugated Plastic Pipe (CPP), Single-Wall, ≥ 8 inch

Scenario Description:

Description: Below ground installation of HDPE (Corrugated Plastic Pipe) pipeline, using a drainage plow. 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 feet of pipe.
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.

Scenario Feature Measure: Feet of Pipe

Scenario Unit: Foot

Scenario Typical Size: 1,000

Scenario Cost: $7,617.54 **Scenario Cost/Unit:** $7.62

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	$2.58	1000	$2,580.00
Materials						
Pipe, HDPE, 10", PCPT, Single Wall	1273	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 10" diameter - ASTM F667. Material cost only.	Foot	$3.95	1000	$3,950.00
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	$543.77	2	$1,087.54

Practice: 606 - Subsurface Drain

Scenario: #4 - Corrugated Plastic Pipe (CPP), Twin-Wall, ≥ 8 inch

Scenario Description:

Description: Below ground installation of HDPE (Corrugated Plastic Pipe) pipeline, using a drainage plow. 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 3.20 lb/ft, or a total of 3,200 pounds.

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.

Scenario Feature Measure: Feet of Pipe

Scenario Unit: Foot

Scenario Typical Size: 1,000

Scenario Cost: $13,628.56 **Scenario Cost/Unit:** $13.63

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	$4.05	1000	$4,050.00
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	$19.06	16	$304.96
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	$2.72	3200	$8,704.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 606 - Subsurface Drain

Scenario: #5 - Secondary Main Rertrofit

Scenario Description:

An agricultural field has existing patterned tile system installed at 75 foot spacings. The field is 75 acres in size: 2475' x 1320', with a single main line at the low end of the field (2475'). The laterals are installed perpendicular to the topographic contours. The field has 3.5 feet of fall in the 1/4 mile length of the laterals, so a secondary main will be needed to allow drainage water management to be implemented on the higher half of the field.

Before Situation:

The patterned tile drainage system allows free flow of drainage water to a receiving ditch. Drainage water carries nitrogen and phosphorus out of the soil and these nutrients pollute the receiving waters.

After Situation:

A 12 inch diameter secondary mainline is retrofitted to the drainage system, located halfway up the field and relatively parallel to the topographic contours. This new mainline is hooked to each individual lateral and continued to a stable outlet. A Drainage Water practice must be completed along with the mainline; typically Structures for Water Control (587) installed at two foot vertical intervals so that water can be retained in the field. This scenario also applies to systems where the secondary main is used to connect drain lines that formerly each exited separately to the ditch, with a structure that distributes the drainage water into the subsurface soil at a vegetated buffer (772) OR a Denitrifying Bioreactor (747) might be installed at the outlet. In combination or singly, one of these practices must be installed with the secondary main.

Scenario Feature Measure: Feet of Pipe

Scenario Unit: Foot

Scenario Typical Size: 3,135

Scenario Cost: $25,122.49 **Scenario Cost/Unit:** $8.01

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	$2.58	3135	$8,088.30
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	$31.36	32	$1,003.52
Pipe, HDPE, 12", PCPT, Single Wall	1274	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 12" diameter - ASTM F667. Material cost only.	Foot	$4.94	3135	$15,486.90
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	$543.77	1	$543.77

Practice: 607 - Surface Drainage, Field Ditch

Scenario: #1 - Field Drainage Ditch

Scenario Description:

This scenario is the construction of a surface drain, field ditch. 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.

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: Volume of Earth Excavated

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,406

Scenario Cost: $3,687.22 **Scenario Cost/Unit:** $2.62

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	$2.35	1406	$3,304.10
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	$191.56	2	$383.12

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.

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

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: $6,625.86 **Scenario Cost/Unit:** $2.42

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	$2.35	2738	$6,434.30
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	$191.56	1	$191.56

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: $1,366.58 **Scenario Cost/Unit:** $13.67

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	$33.06	40	$1,322.40

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, Water Quality Degradation- Excessive salts in surface and ground waters, and plant productivity.
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 and irrigation water analysis to determine the irrigation leaching requirement needed based on crop consumptive use and salinity levels of the irrigation water to flush accumulated salts and maintain a proper salt balance. 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 and or water 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: $1,569.23 **Scenario Cost/Unit:** $15.69

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	$33.06	40	$1,322.40
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
Test, Soil Test, Precision, Grid or Zone	300	Includes materials, shipping, labor, and equipment costs.	Each	$13.55	12	$162.60

Practice: 610 - Salinity and Sodic Soil Management

Scenario: #3 - Soil Management (Irrigated Gypsum)

Scenario Description:

The producer secures training in Salinity and Sodic Soil Management and develops and carries out a Salinity and Sodic Soil Management Plan that involves the application of gypsum to address a sodicity soil problem. 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, Water Quality Degradation- Excessive salts in surface and ground waters, and plant productivity.
Associated Practices: 328-Conservation Crop Rotation; 449-Irrigation Water Management; and 590-Nutrient Management.

Before Situation:

Preliminary field assessment has indicated a Sodic soil condition has developed in the root zone of a 100 acre irrigated cropland field and that a gypsum application will be needed to increase soil quality, reduce plant health problems, and eliminate yield impacts.

After Situation:

Producer conducts soil and irrigation water analysis to determine the amount of gypsum to apply and irrigation leaching requirement needed based on crop consumptive use and sodium (SAR or ESP) concentrations of the soil. Producer conducts routine soil and water analysis to determine any required 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 and or water 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: $10,849.65 **Scenario Cost/Unit:** $108.50

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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	$35.49	300	$10,647.00
Test, Soil Test, Precision, Grid or Zone	300	Includes materials, shipping, labor, and equipment costs.	Each	$13.55	12	$162.60

Practice: 610 - Salinity and Sodic Soil Management

Scenario: #4 - Small Farm<10acres (Irrigated)

Scenario Description:

This scenario is for small irrigated farms typically 10 acres or less in size. 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, Water Quality Degradation- Excessive salts in surface and ground waters, and plant productivity.
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 Small Farm (10 acre) with irrigated cropland resulting in decreased soil quality, plant health problems, and yield reductions.

After Situation:

Producer conducts soil and irrigation water analysis to determine the irrigation leaching requirement needed based on crop consumptive use and salinity levels of the irrigation water to flush accumulated salts and maintain a proper salt balance. 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 and or water 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: 10

Scenario Cost: $1,433.73 **Scenario Cost/Unit:** $143.37

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
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	$33.06	40	$1,322.40
Materials						
Test, Soil Test, Precision, Grid or Zone	300	Includes materials, shipping, labor, and equipment costs.	Each	$13.55	2	$27.10
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: 612 - Tree/Shrub Establishment

Scenario: #1 - Individual tree - hand planting

Scenario Description:

Larger sized seedlings will be hand planted in the forested area where few or no forest trees or shrubs are growing, the existing stand of trees or shrubs needs underplanting, or the previously planted seedling tree or shrub stocking level is below desirable conditions. Wildlife habitat is 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 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 20 acres, 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: Area Planted

Scenario Unit: Each

Scenario Typical Size: 2,000

Scenario Cost: $20,439.58 **Scenario Cost/Unit:** $10.22

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	$41.41	8	$331.28
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
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	$33.06	5	$165.30
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	$19.06	40	$762.40
Materials						
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	2000	$18,420.00
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 included in the component price.	Dollar	$1.03	400	$412.00

Practice: 612 - Tree/Shrub Establishment

Scenario: #2 - Individual tree - hand planting

Scenario Description:

Medium sized seedlings will be hand planted in the forested area where few or no forest trees or shrubs are growing, the existing stand of trees or shrubs needs underplanting, or the previously planted seedling tree or shrub stocking level is below desirable conditions. Wildlife habitat is 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 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 20 acres, 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: Area Planted

Scenario Unit: Each

Scenario Typical Size: 2,000

Scenario Cost: $11,305.22 **Scenario Cost/Unit:** $5.65

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	$41.41	8	$331.28
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
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	$33.06	4	$132.24
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	$19.06	35	$667.10
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	$4.81	2000	$9,620.00
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 included in the component price.	Dollar	$1.03	200	$206.00

Practice: 612 - Tree/Shrub Establishment

Scenario: #3 - Individual tree - hand planting

Scenario Description:

Small seedlings will be hand planted in the forested area where few or no forest trees or shrubs are growing, the existing stand of trees or shrubs needs underplanting, or the previously planted seedling tree or shrub stocking level is below desirable conditions. Wildlife habitat is 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 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 20 acres, 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: Area Planted

Scenario Unit: Each

Scenario Typical Size: 2,000

Scenario Cost: $2,580.44 **Scenario Cost/Unit:** $1.29

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	26	$302.12
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	8	$331.28
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	$33.06	4	$132.24
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	$19.06	30	$571.80
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	2000	$1,140.00
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 included in the component price.	Dollar	$1.03	100	$103.00

Practice: 612 - Tree/Shrub Establishment

Scenario: #4 - Individual tree - hand planting w/browse protection

Scenario Description:

Tree seedlings will be hand planted in the forested area where few or no forest trees 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 is 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 20 acres 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: 2,000

Scenario Cost: $5,477.68 **Scenario Cost/Unit:** $2.74

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	$41.41	4	$165.64
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	28	$325.36
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	$33.06	16	$528.96
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	$19.06	112	$2,134.72
Materials						
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	4000	$440.00
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	2000	$1,040.00
Tree, conifer, seedling, containerized, 8 cu. in.	1518	Containerized conifer stock, 8 cubic inches (e.g. 1.5" x 6"). Includes materials and shipping only.	Each	$0.37	2000	$740.00
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 included in the component price.	Dollar	$1.03	100	$103.00

Practice: 612 - Tree/Shrub Establishment

Scenario: #5 - Medium Density-hand plant Conifer, protect from widlife

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. Newly planted conifer seedlings are protected from browsing by installing open tree tubes. Resource concerns addressed are degraded plant condition -- undesirable plant productivity and health, and inadequate structure and composition and degraded wildlife habitat. Terrain is moderatey to steeply sloping, too steep to be planted with a mechanical tree planter so the area is hand planted.

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. Half of planted 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: $16,992.52 **Scenario Cost/Unit:** $424.81

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	$41.41	20	$828.20
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	120	$1,394.40
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	$19.06	200	$3,812.00
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	$33.06	32	$1,057.92
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	9000	$4,680.00
Tree, conifer, seedling, bare root, 1-1	1513	Bare root conifer trees, 1-1 (2 years old). Includes materials and shipping only.	Each	$0.45	9000	$4,050.00
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	9000	$1,170.00

Practice: 612 - Tree/Shrub Establishment

Scenario: #6 - Medium Density-hand plant Conifer

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. Resource concerns addressed are degraded plant condition -- undesirable plant productivity and health, and inadequate structure and composition and degraded wildlife habitat. Terrain is moderatey to steeply sloping, too steep to be planted with a mechanical tree planter so the area is hand planted.

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 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: $9,088.76 **Scenario Cost/Unit:** $227.22

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	120	$1,394.40
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	20	$828.20
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	$33.06	16	$528.96
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	$19.06	120	$2,287.20
Materials						
Tree, conifer, seedling, bare root, 1-1	1513	Bare root conifer trees, 1-1 (2 years old). Includes materials and shipping only.	Each	$0.45	9000	$4,050.00

Practice: 612 - Tree/Shrub Establishment

Scenario: #7 - Medium Density-Conifer

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. The resource concerns addressed is degraded plant condition -- undesirable plant productivity and health, and inadequate structure and composition and degraded wildlife habitat. Terrain is moderatey sloping and will be planted with a mechanical tree planter. Smaller size seedlings (1-0) are planted.

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. Half of planted 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: $9,390.07 **Scenario Cost/Unit:** $234.75

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	$41.41	8	$331.28
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	18	$1,347.48
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	20	$378.00
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	$19.06	24	$457.44
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	$33.06	8	$264.48
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 included in the component price.	Dollar	$1.03	1	$1.03
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	$191.56	1	$191.56

Practice: 612 - Tree/Shrub Establishment

Scenario: #8 - High Density 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. Larger containerized seedlings are planted. Resource concerns addressed are degraded plant condition -- undesirable plant productivity and health, and inadequate structure and composition and degraded wildlife habitat. Terrain conditions allow for mechanical tree planting

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: $25,233.28 **Scenario Cost/Unit:** $504.67

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	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	$74.86	34	$2,545.24
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	14	$579.74
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	$33.06	14	$462.84
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	37	$699.30
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	$19.06	40	$762.40
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, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
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 included in the component price.	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	$191.56	1	$191.56

Practice: 612 - Tree/Shrub Establishment

Scenario: #9 - Hardwood Hand Planting-bare root-protected

Scenario Description:

Improving the hardwood forest setting by hand planting hardwood tree seedlings. Seedlings are protected from deer browsing. The number of trees to plant is lower than establishing a new forest. 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 area of treatment is 10 acres. Bare root hardwood seedlings are planted by hand in the best locations for seedling survival. Solid 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: $6,330.56 **Scenario Cost/Unit:** $633.06

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	$41.41	8	$331.28
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	$33.06	8	$264.48
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	56	$1,067.36
Materials						
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	$0.47	1500	$705.00
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
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 included in the component price.	Dollar	$1.03	100	$103.00
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	0	$0.00

Practice: 612 - Tree/Shrub Establishment

Scenario: #10 - Hardwood Planting 1 gal pots

Scenario Description:

Hardwood seedlings (potted) to be planted to restablish an upland hardwood forest. Planting will be by hand. The resource setting is an area that historically was an upland hardwood 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 area of treatment is 10 acres. Potted/containerized hardwood seedlings are planted by hand. Post vegetation control should be evaluated and conducted it necessary.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $8,974.46 **Scenario Cost/Unit:** $897.45

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	$41.41	8	$331.28
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
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	35	$667.10
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	$33.06	8	$264.48
Materials						
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	1500	$7,260.00
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 included in the component price.	Dollar	$1.03	100	$103.00
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	0	$0.00

Practice: 612 - Tree/Shrub Establishment

Scenario: #11 - Hardwood Est.-Direct Seeding

Scenario Description:

Native seed (acorns, nuts, etc) from natvie tree species are directly planted in the soil. Site preparation is completed (discing to eliminate competing vegetation). 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 hardwood forest is degrading. 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. Site preparation is done prior to direct seeding. 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: 10

Scenario Cost: $1,083.61 **Scenario Cost/Unit:** $108.36

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	$26.12	4	$104.48
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$11.74	4	$46.96
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	$2.21	4	$8.84
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	4	$75.60
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	$19.06	6	$114.36
Materials						
Trees and shrubs, seed	1871	Brush Chipper, 12" capacity, typically 35 HP. Includes chipper and power unit. Does not include labor.	Pound	$4.67	75	$350.25
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	$191.56	2	$383.12

Practice: 612 - Tree/Shrub Establishment

Scenario: #12 - Shrub Planting

Scenario Description:

Shrubs are planted to provide a more diverse habitat. Plantings are in either uplands or bottomlands. The site lacks ground level habitat structure and diversity for widlife. Resource concern is inadequate habitat for fish and wildife - habitat fragmentation.

Before Situation:

No shrubbery vegetation, or very little, is present under the forest overstory. Wildlife species that need shrub cover are not present. An adequate stand of overstory trees is present, but it is a single level, not multi-level.

After Situation:

A 10 acre area is planted with shrubs. Shrubs are not planted over the entire 10 acres. They are planted in groups or motts. The motts, more or less circular in shape, are 50 feet in diameter, with 50 shrubs planted within each mott. 4 motts are planted per acre for a total of 200 shrubs per acre. Motts are randomly established to take advantage of site conditions and shrub species being planted.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $2,007.20 **Scenario Cost/Unit:** $200.72

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	15	$174.30
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	6	$248.46
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	$33.06	6	$198.36
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	$19.06	18	$343.08
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	2000	$940.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	0	$0.00
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 included in the component price.	Dollar	$1.03	100	$103.00

Practice: 614 - Watering Facility

Scenario: #1 - Permanent Drinking/Storage <500 Gallons

Scenario Description:

A permanent watering facility for livestockor wildlife constructed of approved materials with less than 500 gallons of capacity,to provide adequate quantity and quality of water for storage and or direct drinking
access.

Before Situation:

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 habitat, water quality, plant productivity and health needs to be improved. Associated practices include: 516-Pipeline, 642-Water Well

After Situation:

A permanent watering facility is installed to ensure an adequate supply and quality of water for livestock or wildlife for storage and or direct drinking access. 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.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 250

Scenario Cost: $921.22 **Scenario Cost/Unit:** $3.68

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	$2.35	0.5	$1.18
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	2	$82.82
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	2	$124.76
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	2	$37.80
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	$19.06	2	$38.12
Materials						
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	250	$317.50
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	0.5	$9.78
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 614 - Watering Facility

Scenario: #2 - Permanent Drinking/Storage > 500-1000 Gallons

Scenario Description:

A permanent watering facility for livestockor wildlife constructed of approved materials with 500-1000 gallons of capacity,to provide adequate quantity and quality of water for storage and or direct drinking
access.

Before Situation:

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 habitat, water quality, plant productivity and health needs to be improved. Associated practices include: 516-Pipeline, 642-Water Well

After Situation:

A permanent watering facility is installed to ensure an adequate supply and quality of water for livestock or wildlife for storage and or direct drinking access. 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.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 750

Scenario Cost: $2,008.52 **Scenario Cost/Unit:** $2.68

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	$62.38	6	$374.28
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	$2.35	2	$4.70
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	6	$248.46
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	6	$114.36
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	$27.30	6	$163.80
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	6	$113.40
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	2	$39.10
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, > 300 - 1,000 gallon	1068	Includes tank materials and float valve	Gallon	$0.75	750	$562.50
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	$78.65	1	$78.65
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 614 - Watering Facility

Scenario: #3 - Permanent Drinking/Storage >1000-5000 Gallons

Scenario Description:

A permanent watering facility for livestockor wildlife constructed of approved materials with >1000-5000 gallons of capacity,to provide adequate quantity and quality of water for storage and or direct drinking
access.

Before Situation:

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 habitat, water quality, plant productivity and health needs to be improved. Associated practices include: 516-Pipeline, 642-Water Well

After Situation:

A permanent watering facility is installed to ensure an adequate supply and quality of water for livestock or wildlife for storage and or direct drinking access. 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.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 2,000

Scenario Cost: $3,222.36 **Scenario Cost/Unit:** $1.61

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	$2.35	13	$30.55
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	8	$499.04
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	8	$331.28
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	$127.06	5	$635.30
Plate compactor	1915	Manually guided vibratroy plate compactor. Equipment only.	Hour	$5.39	4	$21.56
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	8	$151.20
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	$19.06	8	$152.48
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	$27.30	8	$218.40
Materials						
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 Bottomless Livestock, ≤ 6,000 gallon	1069	Includes tank materials, shipping, and float valve, no liner	Gallon	$0.28	2000	$560.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	5.5	$155.98
Mobilization						

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
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	$78.65	2	$157.30

Practice: 614 - Watering Facility

Scenario: #4 - Permanent Drinking/Storage >5000 Gallons

Scenario Description:

A permanent watering facility for livestockor wildlife constructed of approved materials with >5000 gallons of capacity,to provide adequate quantity and quality of water for storage and or direct drinking
access.

Before Situation:

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 habitat, water quality, plant productivity and health needs to be improved. Associated practices include: 516-Pipeline, 642-Water Well

After Situation:

A permanent watering facility is installed to ensure an adequate supply and quality of water for livestock or wildlife for storage and or direct drinking access. 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.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 10,000

Scenario Cost: $8,491.31 **Scenario Cost/Unit:** $0.85

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	$127.06	12	$1,524.72
Plate compactor	1915	Manually guided vibratroy plate compactor. Equipment only.	Hour	$5.39	8	$43.12
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	$2.35	26	$61.10
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	16	$998.08
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	16	$662.56
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	$33.06	20	$661.20
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	20	$378.00
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	$19.06	40	$762.40
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	$27.30	16	$436.80
Materials						
Tank, Galvanized Steel Bottomless Livestock, > 6,000 gallon	1070	Includes tank materials, shipping, and float valve, no liner	Gallon	$0.19	10000	$1,900.00
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.47	1	$24.47

Materials

Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	11	$311.96

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	$78.65	2	$157.30
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 614 - Watering Facility

Scenario: #5 - Frost Free Waterer

Scenario Description:

A frost/freeze free waterer for livestock constructed of approved materials that supplies adequate quantity and quality of water for 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.

Before Situation:

Confined animal facilities are adjacent or near surface or at risk ground water sources, resulting in water quality resource concerns.

After Situation:

Facilities are moved and adequate livestock water sources are provided protecting the surface and or ground water quality resources of concern.

Scenario Feature Measure: Number of facilities

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $972.30 **Scenario Cost/Unit:** $972.30

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	$127.06	1	$127.06
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	1	$62.38
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	2	$38.12
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	2	$37.80
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$27.99	0.5	$14.00
Tank, Freeze Proof, 2 hole	280	Tank, Freeze Proof with 2 drinking holes. Includes materials and shipping.	Each	$692.94	1	$692.94

Practice: 614 - Watering Facility

Scenario: #6 - Permanent Drinking/Storage >1000-5000 Gallons - remote locations

Scenario Description:

A permanent watering facility for livestockor wildlife constructed of approved materials with >1000-5000 gallons of capacity,to provide adequate quantity and quality of water for storage and or direct drinking access in remote areas that are more than 50 miles from source of equipment and/or materials.

Before Situation:

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 habitat, water quality, plant productivity and health needs to be improved. Associated practices include: 516-Pipeline, 642-Water Well

After Situation:

A permanent watering facility is installed to ensure an adequate supply and quality of water for livestock or wildlife for storage and or direct drinking access. 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.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 2,000

Scenario Cost: $3,840.36 **Scenario Cost/Unit:** $1.92

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	$41.41	8	$331.28
Plate compactor	1915	Manually guided vibratroy plate compactor. Equipment only.	Hour	$5.39	4	$21.56
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	8	$499.04
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	$2.35	13	$30.55
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	$127.06	5	$635.30
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	$19.06	8	$152.48
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	8	$151.20
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	$27.30	8	$218.40
Materials						
Tank, Galvanized Steel Bottomless Livestock, ≤ 6,000 gallon	1069	Includes tank materials, shipping, and float valve, no liner	Gallon	$0.28	2000	$560.00
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.47	1	$24.47
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	5.5	$155.98
Mobilization						

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	600	$618.00
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	$78.65	2	$157.30
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 620 - Underground Outlet

Scenario: #1 - Underground Outlet <=6 inch

Scenario Description:

Install 500 feet of 6" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. 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. This practice is often installed in conjunction with terraces, diversions, sediment control basins, waterways or simlar practices.

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. 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: 500

Scenario Cost: $4,065.62 **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, 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	$2.01	170	$341.70
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	$2.27	2	$4.54
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	$2.72	170	$462.40
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	$33.06	2	$66.12
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	1	$53.51
Pipe, PVC, 6", SDR 35	993	Materials: - 6" - PVC - SDR 35 - ASTM D3034	Foot	$3.84	500	$1,920.00
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	$647.75	1	$647.75
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 620 - Underground Outlet

Scenario: #2 - Underground Outlet <=6 inch with Riser

Scenario Description:

Install 500 feet of 6" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Costs include 6" HDPE corrugated single wall plastic tubing, 8" Perforated PVC Riser Inlet, trench excavation, trench backfill, rodent guard and laid up stone headwall at outlet. This practice is often installed in conjunction with terraces, diversions, sediment control basins, waterways or simlar practices.

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. 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: 500

Scenario Cost: $3,325.84 **Scenario Cost/Unit:** $6.65

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	$2.72	105	$285.60
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	$2.27	2	$4.54
Trencher, wheel type	1259	Wheel type Trencher, typically 350 HP with 6' max depth. Equipment only.	Hour	$295.05	5	$1,475.25
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	5	$94.50
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$33.06	2	$66.12
Materials						
Pipe, HDPE, 6", CPT, Single Wall	1242	Pipe, Corrugated Plastic Tubing, Single Wall, 6" diameter - ASTM F405. Material cost only.	Foot	$1.12	500	$560.00
Inlet, riser, 8"	1262	Riser, polymer, complete vertical perforated UGO inlet with Tee, orifice plate if needed, 8" diameter. Materials only.	Each	$108.36	2	$216.72
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	1	$53.51
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 620 - Underground Outlet

Scenario: #3 - Underground Outlet - 8-12 inch

Scenario Description:

Install 500 feet of 10" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. 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. This practice is often installed in conjunction with terraces, diversions, sediment control basins, waterways or simlar practices.

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. 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: 500

Scenario Cost: $5,255.94 **Scenario Cost/Unit:** $10.51

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	$2.01	210	$422.10
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	$2.72	210	$571.20
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	$2.27	2	$4.54
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	$33.06	4	$132.24
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	1	$53.51
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	$5.71	500	$2,855.00
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	$647.75	1	$647.75
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 620 - Underground Outlet

Scenario: #4 - Underground Outlet - 8-12 inch with Riser

Scenario Description:

Install 500 feet of 10" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. Costs include 10" HDPE pipe, and 10" Perforated PVC Riser Inlet, trench excavation, trench backfill, rodent guard and laid up stone headwall at outlet. This practice is often installed in conjunction with terraces, diversions, sediment control basins, waterways or simlar practices.

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. 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: 500

Scenario Cost: $6,049.70 **Scenario Cost/Unit:** $12.10

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	$2.27	2	$4.54
Trencher, wheel type	1259	Wheel type Trencher, typically 350 HP with 6' max depth. Equipment only.	Hour	$295.05	5	$1,475.25
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	$2.72	210	$571.20
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	$33.06	4	$132.24
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	5	$94.50
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	$5.71	500	$2,855.00
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	1	$53.51
Inlet, riser, 10"	1263	Riser, polymer, complete vertical perforated UGO inlet with Tee, orifice plate if needed, 10" diameter. Materials only.	Each	$146.93	2	$293.86
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 620 - Underground Outlet

Scenario: #5 - Underground Outlet - 14-18 inch

Scenario Description:

Install 500 feet of 18" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. 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. This practice is often is installed in conjunction with terraces, diversions, sediment control basins, waterways or simlar practices.

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. 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: 500

Scenario Cost: $10,340.14 **Scenario Cost/Unit:** $20.68

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	$2.27	2	$4.54
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	$2.72	330	$897.60
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	$2.01	330	$663.30
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	$33.06	4	$132.24
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	$11.34	500	$5,670.00
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	$647.75	1	$647.75
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	1	$53.51
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	60	$1,701.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 620 - Underground Outlet

Scenario: #6 - Underground Outlet - 20-24 inch

Scenario Description:

Install 500 feet of 24" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. 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. Practice is often installed in conjunction with terraces, diversions, sediment control basins, waterways or simlar practices.

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. 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: 500

Scenario Cost: $15,453.09 **Scenario Cost/Unit:** $30.91

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	$2.27	2	$4.54
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	$2.72	445	$1,210.40
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	$2.01	445	$894.45
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	$33.06	4	$132.24
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	85	$2,410.60
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	$19.06	500	$9,530.00
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	$647.75	1	$647.75
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	1	$53.51
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 620 - Underground Outlet

Scenario: #7 - Underground Outlet - 25-30 inch

Scenario Description:

Install 500 feet of 30" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. 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. This practices is often installed in conjunction with terraces, diversions, sediment control basins, waterways or simlar practices.

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. 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: 500

Scenario Cost: $21,176.79 **Scenario Cost/Unit:** $42.35

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	$2.01	565	$1,135.65
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	$2.27	2	$4.54
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	$2.72	565	$1,536.80
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	$33.06	4	$132.24
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	$27.83	500	$13,915.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	105	$2,977.80
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	1	$53.51
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	$851.65	1	$851.65
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 620 - Underground Outlet

Scenario: #8 - Underground Outlet - >30 inch

Scenario Description:

Install 500 feet of 36" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet. 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. This practice is often installed in conjunction with terraces, diversions, sediment control basins, waterways or simlar practices.

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. 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: 500

Scenario Cost: $26,788.84 **Scenario Cost/Unit:** $53.58

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	$2.27	2	$4.54
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	$2.01	690	$1,386.90
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	$2.72	690	$1,876.80
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	$33.06	4	$132.24
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	135	$3,828.60
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.51	1	$53.51
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	$36.17	500	$18,085.00
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	$851.65	1	$851.65
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 629 - Waste Treatment

Scenario: #1 - Litter Windrow Pasteurization

Scenario Description:

This practice scenario includes the in house windrowing of poultry litter to promote pasteurization between flocks. 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: Amendments for Treatment of Agricultural Waste (591), Waste Storage Facility (313), & Nutrient Management (590)

Before Situation:

A poultry operation typically removes part of the litter and bedding between flocks, called a cakeout. A full cleanout of litter and bedding is typically done once every 1-3 years depending on the operation. Over time, the accumulation of poultry waste in the litter contributes to an increase in odors and high ammonia emissions in the house contribute to impacts on bird health.

After Situation:

This scenario assumes 4 flocks per year in an operation with 2 - 42 x 500 square foot houses. Three (3) in-house pasteurization events will be performed annually. There will be a full cleanout after the 4th flock.

Formula to calculate the total number of pasteurization events per year on a 1000 SF basis:
(Square Feet of house) / 1000 SF X (Number of houses) X (Number of pasteurization events) = Number of 1000SF.
21,000 SF / 1000 SF X 2 houses X 3 events = 126 units of 1000SF

In house pasteurization of poultry litter is achieved by windrowing the litter in the house. The process takes approximately one week. This process successfully addresses the air quality impacts (ammonia emissions, PM and PM precursors) and bird health resource concerns. This process also improves the quality of poultry litter that must be spread on farmland. Bird health is improved and bird mortality is reduced.

Scenario Feature Measure: Surface Area of housing floor windrowed per year in 1000 SF

Scenario Unit: 1,000 Square Foot

Scenario Typical Size: 126

Scenario Cost: $5,570.52 **Scenario Cost/Unit:** $44.21

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Aerator Attachment, 8", PTO	1707	Aerator attachment for mounting to tractor and PTO, 8" diameter. Equipment cost only with out tractor. Brown Bear R24C-8' or equivalent	Hour	$10.30	30	$309.00
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$60.82	66	$4,014.12
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	66	$1,247.40

Practice: 629 - Waste Treatment

Scenario: #2 - Milking Parlor Waste Treatment System with Dosing System and Bed

Scenario Description:

This practice scenario includes a dosed treatment system with bark bed for milking parlor wastewater. The purpose of the practice is to address resource concerns related to water quality degradation due to (excess nutrient, salts and pathogens).

Associated practices: Nutrient Management (590), Pumping Plant (533), Fence (382), & Waste Storage Facility (313)

Before Situation:

Milkhouse waste water currently outlets in an untreated manner which presents potential soil, water and air quality concerns.

After Situation:

This scenario assumes that the treatment system is designed for 500 gal/day of wastewater from the milking parlor. It assumes a two tank scenario. The grease trap acts as the primary settling basin. The wastewater overflows into the septic tank, which is then dosed to the treatment bed (bark bed or leaching gallery). It is assumed that the treatment bed is dosed at 0.16 gal/square ft (3125 sq ft). To maintain bark bed performance, additional bark may need to be added every 3 to 5 years as an O&M task. This practice scenario reduces nutrient content, organic strength, or pathogen levels of agricultural waste; improve air quality by reducing odors and gaseous emissions (methane or ammonia).

Scenario Feature Measure: Design Flow

Scenario Unit: Gallon per Day

Scenario Typical Size: 500

Scenario Cost: $23,605.56 **Scenario Cost/Unit:** $47.21

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						
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.95	116	$110.20
Aggregate, Wood Chips	1098	Includes materials, equipment and labor	Cubic yard	$22.35	350	$7,822.50
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	$4.01	254	$1,018.54
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	118	$678.50
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.38	450	$621.00
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	$27.30	32	$873.60
Materials						
Prefabricated concrete septic tank, 1500 gal	1738	Precast concrete septic tank, 1,500 gal. Materials only.	Each	$1,972.48	2	$3,944.96
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.40	290	$406.00
Pipe, PVC, 4", SCH 40	978	Materials: - 4" - PVC - SCH 40 - ASTM D1785	Foot	$4.12	10	$41.20
Pipe, PVC, 6", SCH 40	980	Materials: - 6" - PVC - SCH 40 - ASTM D1785	Foot	$6.79	200	$1,358.00
Pipe, PE, 2", DR 9	1000	Materials: - 2" - PE - 160 psi - ASTM D3035 DR 9	Foot	$2.23	250	$557.50
Geotextile, non-woven, light weight	1209	Non-woven less than 8 ounce/square yard geotextile with staple anchoring. Materials and shipping only.	Square Yard	$1.13	382	$431.66
Dosing System, siphon	1763	Dosing system siphon with typical 3" diameter and 12" drawdown. Includes materials and shipping only.	Each	$272.65	1	$272.65

Materials

Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	119	$2,326.45

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	$78.65	2	$157.30
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	$191.56	4	$766.24
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	4	$2,175.08

Practice: 629 - Waste Treatment

Scenario: #3 - Milking Parlor Waste Treatment System with Dosing System

Scenario Description:

This practice scenario includes a dosed treatment system for milking parlor wastewater that will outlet to a constructed wetland and/or vegetated treatment area and/or other acceptable treatment. The purpose of the practice is to address resource concerns related to water quality degradation due to (excess nutrient, salts and pathogens).

Associated practices: Constructed Wetland (656), Vegetated Treatment Area (635), Waste Transfer (634), Nutrient Management (590), Pumping Plant (533), Fence (382), & Waste Storage Facility (313)

Before Situation:

Milkhouse waste water currently outlets in an untreated manner which presents potential soil, water and air quality concerns.

After Situation:

This scenario assumes that the treatment system is designed for 500 gal/day of wastewater from the milking parlor. It assumes a two tank scenario. The grease trap acts as the primary settling basin. The wastewater overflows into the septic tank, which is then dosed to a treatment area (constructed wetland and/or vegetated treatment area and/or other acceptable treatment). This practice scenario reduces nutrient content, organic strength, or pathogen levels of agricultural waste; improve air quality by reducing odors and gaseous emissions (methane or ammonia).

Scenario Feature Measure: Design Flow

Scenario Unit: Gallon per Day

Scenario Typical Size: 500

Scenario Cost: $11,624.24 **Scenario Cost/Unit:** $23.25

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						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	118	$678.50
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.38	450	$621.00
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	$4.01	138	$553.38
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	$27.30	16	$436.80
Materials						
Dosing System, siphon	1763	Dosing system siphon with typical 3" diameter and 12" drawdown. Includes materials and shipping only.	Each	$272.65	1	$272.65
Prefabricated concrete septic tank, 1500 gal	1738	Precast concrete septic tank, 1,500 gal. Materials only.	Each	$1,972.48	2	$3,944.96
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	3	$58.65
Pipe, PE, 2", DR 9	1000	Materials: - 2" - PE - 160 psi - ASTM D3035 DR 9	Foot	$2.23	250	$557.50
Pipe, PVC, 6", SCH 40	980	Materials: - 6" - PVC - SCH 40 - ASTM D1785	Foot	$6.79	200	$1,358.00
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	$78.65	2	$157.30

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	$191.56	4	$766.24
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	4	$2,175.08

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: Horsepower

Scenario Typical Size: 1

Scenario Cost: $1,259.11 **Scenario Cost/Unit:** $1,259.11

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	$27.30	2	$54.60
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: Horse Power of aerator

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $9,650.76 **Scenario Cost/Unit:** $9,650.76

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	$27.30	3	$81.90
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: #6 - Straw Pond Cover

Scenario Description:

This practice scenario is a permeable organic cover applied to the liquid surface of a waste storage facility that has a surface area less than or equal to 2 acres. Straw cover applications can remain on top of the pond for between 2 and 6 months. The cover will reduce radiation and wind velocity over the surface of a manure storage to reduce transmission of odors and act as a medium for growth of microorganisms that utilize carbon, nitrogen, and sulfur to decompose odorous compounds. Associated practices include Waste Storage Facility (313).

Before Situation:

This practice is applicable on a dairy or swine operation in which the waste goes into a liquid storage pond or tank and the bio-treatment of emissions will improve air quality. The maximum recommended surface area is 2 acres.

After Situation:

Permeable organic cover applied to the liquid surface of a waste storage or treatment facility. Organic materials often used as covers include straws, cornstalks and peat moss. Typical application is an 8" straw application on a 120' diameter storage tank every 3 months. The scenario unit calculation is (Surface Area of Pond)*(Number of applications per year). For this scenario, the calculation is: (120/2)^2*pi *4 = 45,239sf Organic covers can reduce odors up to 90 percent if the straw cover is 12" deep.

Scenario Feature Measure: Surface Area of Pond or Tank per application

Scenario Unit: Square Foot

Scenario Typical Size: 45,239

Scenario Cost: $32,573.91 **Scenario Cost/Unit:** $0.72

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	$60.82	16	$973.12
Brush Chipper, 6" capacity	938	Brush Chipper, 6" capacity, typically 35 HP. Includes chipper and power unit. Labor not included.	Hour	$24.61	40	$984.40
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	16	$302.40
Materials						
Straw	1237	Small grain straw (non organic and certified organic). Includes materials only.	Ton	$118.54	242.8	$28,781.51
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	$191.56	8	$1,532.48

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 Per Minute

Scenario Typical Size: 600

Scenario Cost: $377,520.03 **Scenario Cost/Unit:** $629.20

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	$108.13	149.2	$16,133.00
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	$27.30	803.5	$21,935.55
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, 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 included in the component price.	Dollar	$1.03	7442	$7,665.26
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77

Practice: 632 - Waste Separation Facility

Scenario: #1 - Mechanical Separation Facility

Scenario Description:

A small 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. Mechanical separators may include, but are not limited to: static inclined screens , vibratory screens, rotating screens, centrifuges, screw or roller presses, or other systems.

Associated practices include Nutrient Management (590), Composting Facility (317), Anaerobic Digester (366), Waste Storage Facility (313), Waste Recycling (633), 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 mechanical separation facility (a vibratory or rotating screen) 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: $33,550.57 **Scenario Cost/Unit:** $33,550.57

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	$127.06	10	$1,270.60
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	$27.30	16	$436.80
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	$19.06	32	$609.92
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, 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	$78.65	3	$235.95
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	$191.56	2	$383.12
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 632 - Waste Separation Facility

Scenario: #2 - 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 Recycling (633), 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 top width by 200 ft top length by 3 ft deep with 2.5:1 side slopes, 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: $11,513.40 **Scenario Cost/Unit:** $0.38

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	$127.06	12	$1,524.72
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	$2.35	1000	$2,350.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	1000	$4,370.00
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	$19.06	8	$152.48
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	14	$397.04
Weeping Wall	1765	Weeping wall or picket screen structure for solid settling basin. Materials only.	Foot	$52.98	24	$1,271.52
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	$78.65	3	$235.95
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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	$191.56	2	$383.12

Practice: 632 - Waste Separation Facility

Scenario: #3 - Concrete Basin

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 Recycling (633), 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: $9,621.26 **Scenario Cost/Unit:** $5.35

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	$127.06	12	$1,524.72
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	$2.35	50	$117.50
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	50	$117.50
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	$401.46	12	$4,817.52
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	50	$218.50
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	$19.06	8	$152.48
Materials						
Weeping Wall	1765	Weeping wall or picket screen structure for solid settling basin. Materials only.	Foot	$52.98	6	$317.88
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	32	$907.52
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	$543.77	1	$543.77

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	$78.65	3	$235.95
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
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	$191.56	2	$383.12

Practice: 632 - Waste Separation Facility

Scenario: #4 - Concrete Basin, Multiple Cells, Gravity

Scenario Description:

A concrete basin containing multiple cells with concrete walls and floor. Basin cells use gravity and time to separate a portion of the solids from a liquid waste stream from a drylot dairy, animal production or confinement facility. Often used where manure is cleaned by flushing. Use of multiple separation cells allows for the continuous operation and management of the waste stream to be altered between cells thereby providing time for the solids portion to drain to be handled as a solid, according to the nutrient management plan. Removes a 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 Recycling (633), 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 and locations 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 gravity settling basin containing multiple cells. The multi cell basin structure is 70 feet wide by 80 ft long and 6 ft deep with an additional 10:1 entrance ramp. There are three cells to the basin with a clean out ramp the width of the structure on just one end. The center cell, used to drain the liquid portion, has 6 ft reinforced concrete "T" walls with weeping wall structures. The center cell design volume is considered no more than half full to maintain drainage of the facility. The two outside cells collecting the separated solids (25 ft x 80 ft x 6 ft plus ramp storage) have outside walls that are designed to store the solid settled portion of the waste. The waste stream enters the basin at either of the outside cells via a waste transfer component, the liquid portion of the waste flows into the center cell where it is then pumped to a waste storage facility. The pump and long-term liquid and solid waste storage facilities are contracted separately. Basin removes a portion of the solids that otherwise make handling the waste stream solids content difficult to manage over time. Part of an animal waste and nutrient management system.

Scenario Feature Measure: Cubic Foot of Design Storage

Scenario Unit: Cubic Foot

Scenario Typical Size: 26,250

Scenario Cost: $84,129.58 **Scenario Cost/Unit:** $3.20

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	$2.35	570	$1,339.50
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	182	$795.34
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	$127.06	154	$19,567.24
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	$401.46	133	$53,394.18
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	16	$304.96
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	182	$5,161.52

Materials

Weeping Wall	1765	Weeping wall or picket screen structure for solid settling basin. Materials only.	Foot	$52.98	40	$2,119.20

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	$191.56	2	$383.12
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
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	$78.65	3	$235.95
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	1	$543.77

Practice: 632 - Waste Separation Facility

Scenario: #5 - 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 Recycling (633), 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: $24,280.94 **Scenario Cost/Unit:** $4.86

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	$127.06	90	$11,435.40
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	90	$393.30
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	$401.46	20	$8,029.20
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	$2.35	180	$423.00
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	90	$2,552.40
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	$543.77	1	$543.77
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	$191.56	2	$383.12
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80
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	$78.65	3	$235.95

Practice: 633 - Waste Recycling

Scenario: #1 - Export Ag Waste By-products Recycled for Use Off Farm

Scenario Description:

Agricultural by-products on the farm are in excess of the ability of the farm and limited crop landbase to utilize. These waste materials are accumulating in such a manner that the water, soil and/or air quality have resource concerns. The application of a waste management plan will recycle these by-products such that the quality of the natural resources will be improved and the environment protected. The agricultural by-products are tested and exported off the farm operation for external uses. Records are kept detailing disposition of the waste, including date, amount, and receiver of the waste. Results of the agricultural by-product laboratory analysis is also provided to the receiver.

Associated practices: 313-Waste Storage Facility, 317-Composting Facility, 590-Nutrient Management

Before Situation:

Agricultural by-products are produced or accumulated on the farm in amounts that cannot be utilized by the farm without causing resource concerns such as degradation of water quality, soil health and/or air quality.

After Situation:

Twice a year the excess agricultural by-products that have been collected at the farm are sampled and laboratory tested to determine the characteristics of the waste material that is recycled. The results of this analysis will determine the basis of its use. The agricultural by-products are then handled according to the waste management system plan. The intended off-farm use of the recycled agricultural waste by-products will refer to the laboratory analysis. Records shall be kept of the analysis, dates and quantities of recycled waste exported.

Scenario Feature Measure: Farm

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $439.48 **Scenario Cost/Unit:** $439.48

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	$108.13	2	$216.26
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$33.06	4	$132.24
Materials						
Test, Manure Analysis	306	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$45.49	2	$90.98

Practice: 633 - Waste Recycling

Scenario: #2 - Import Non-Ag Waste By-products, Compost with Manure for Use On Farm

Scenario Description:

A farm has soil quality reasource concerns. The farm also has an energy goal to reduce their use of transportation fuels and is interested in utilizing locally available material. The farm is located near a food processor that has excess waste available for recycling. The farm has agreed to receive an amount of waste material which it plans to mix with animal manure solids. This blended waste material will be composted. The finished compost product will be used both for animal bedding and land applied as a soil amendment and nutrient source. The land applied material will comply with the nutrient management plan for agronomic crop nutrient utilization. Records are kept to document the methods and utilization of the non-agricultural products for agricultural purposes.
Associated practices: 313-Waste Storage Facility, 317-Composting Facility, 590-Nutrient Management

Before Situation:

A farm has a soil quality reasource concerns. The operator also has an energy goal to reduce the farm associated transportation fuels. Additional soil amendments could improve their soil quality but the local fertilizer dealer imports all their material by truck from out of state. Other non-agricultural by-products are locally available but cannot be applied directly on the land. The farm may be able to generate beneficial soil amendments by composting the non-agricultural by-products but does not know the best recipe to use for a compost mix, the time and temperatures required to break down the material or recommended rate of land application .

After Situation:

A dairy farm has soil quality resource concerns and plans to improve their soil by utilizing non-agricultural waste materials available locally. The dairy is located near an oyster producer that needs to dispose of excess oyster shells. The calcium in oyster shells can be used to buffer the pH of their soils. The dairy has agreed to receive excess oyster shells which are blended with dairy manure solids and composted. The finished product is laboratory tested to determine the characteristics such as pH and nutrient content. The composted product is used both for dairy bedding and land applied as a soil amendment and nutrient source. Recordkeeping is done for the quantity of non-agricultural material received, ratio blended with manure solids, composting temperatures and times with the corresponding tested sample analysis. Records of the recycled non-agricultural by-products applied to the land is maintained as part of their dairy nutrient management plan.

Scenario Feature Measure: Cubic Foot

Scenario Unit: Cubic Foot

Scenario Typical Size: 400

Scenario Cost: $1,318.02 **Scenario Cost/Unit:** $3.30

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	$108.13	6	$648.78
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$33.06	12	$396.72
Materials						
Test, Compost Analysis	307	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$45.42	6	$272.52

Practice: 633 - Waste Recycling

Scenario: #3 - Import Non-Agricutural By-Products, Land Applied

Scenario Description:

A farm has resource concerns about the low soil organic matter content on several fields. The fields are located where a source of municipal green waste may be available. The green, municipal waste could contain material such as food waste, green yard waste and waste from local processing facilities. The farmer agrees to recieve waste materials in bulk two times a year, once in the spring and once in the fall. A blended sample of the waste is tested for nutrients and any potential chemicals of concern. It is then land applied in such a manner that soil organic matter is enhanced, crop nutrents are available and soil compaction is minimized. Records of the tested samples and rates of land application are maintained and accounted for in the nutrient management plan.
Associated practices: 590-Nutrient Management, (Temporary Field) Waste Storage

Before Situation:

A farm has several fields with low soil organic matter and is located near a community where the local municipality collects green waste. The farmer is concerned about land applying the green waste directly to the fields and that the applied material may tie-up nutrients as well as possible soil compaction issues from equipment the municipality may use for spreading. The farmer wants to make sure the waste material that may be applied is safe and existing soil quality conditions are protected before agreeing to recycle any imported green waste.

After Situation:

A farm has low soil organic matter content on several fields and can import non-agricultural green waste material. The farm imports the green waste material that has been chopped and screened for land application. The imported material is briefly stock piled, for no more than 7 days while a blended sample is tested. The sample is tested for nutrient content and any potential chemcials of concern. Based on results of the tested sample and in consultation with an agronomist the waste material is land applied on the agricultural fields. Soil is protected from compaction by applying the waste in an appropiate manner. Records of the sample test and rate of land application in the field are maintained. The sampled test information is used to adjust fertilizer application rates and to prevent crop nutrient tie-up resulting from increased carbon in the soil. The green waste recycling activity on the farm is documented and included in the nutrient management plan records.

Scenario Feature Measure: Ton

Scenario Unit: Ton

Scenario Typical Size: 20

Scenario Cost: $439.48 **Scenario Cost/Unit:** $21.97

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	$108.13	2	$216.26
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$33.06	4	$132.24
Materials						
Test, Manure Analysis	306	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$45.49	2	$90.98

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; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management; 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: $7,041.70 **Scenario Cost/Unit:** $7.04

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	$74.86	4	$299.44
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$60.82	4	$243.28
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	8	$499.04
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	$127.06	4	$508.24
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.21	2	$36.42
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	$401.46	2	$802.92
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	$19.06	24	$457.44
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	8	$151.20

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	$26.75	8	$214.00
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	$33.06	16	$528.96

Materials

Catch Basin, concrete, 60" dia.	1754	Precast 60-in diameter catch basin, 6' deep, with collar and grate cover. Materials only.	Each	$2,250.29	1	$2,250.29
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	5	$97.75

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	$191.56	2	$383.12
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 634 - Waste Transfer

Scenario: #2 - Wastewater reception pit, 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; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management; 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: $13,280.59 **Scenario Cost/Unit:** $3.09

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	$60.82	8	$486.56
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.21	3	$54.63
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	$127.06	6	$762.36
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	$401.46	14	$5,620.44
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	8	$598.88
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	24	$1,497.12
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	$26.75	24	$642.00
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	16	$302.40

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	$19.06	64	$1,219.84
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	$33.06	24	$793.44

Materials

Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	12	$234.60
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, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
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	$191.56	2	$383.12

Practice: 634 - Waste Transfer

Scenario: #3 - Wastewater basin, 5000 gal. and larger

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; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management; 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: $19,821.99 **Scenario Cost/Unit:** $2.30

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	$127.06	11	$1,397.66
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	$401.46	22	$8,832.12
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	12	$898.32
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	32	$1,996.16
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$60.82	16	$973.12
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.21	4	$72.84
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	$19.06	80	$1,524.80

Labor

Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	28	$529.20
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	$26.75	32	$856.00
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	$33.06	40	$1,322.40

Materials

Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	15	$293.25
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

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	$191.56	2	$383.12
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 634 - Waste Transfer

Scenario: #4 - Medium sized wastewater reception pit with 6 inch conduit transfer pipe to waste storage pond

Scenario Description:

Installation for a wastewater collection system that includes materials and structures to collect a design volume between 1000 and 5000 gallons of liquids such as silage leachate, lot runoff and other contaminated liquid effluent which is then transferred through a 6" low pressure conduit to the waste storage structure. This scenario includes a reinforced concrete manure reception pit and a 6" PVC SDR 41 conduit to transfer the manure and wastewater to a waste storage pond. Reception Pit includes safety fence w/gate or solid/grated cover. The transfer conduit consists of the pipe plus the inlet structure connection and all other fittings, trench excavation and backfill, labor and equipment for installation. If pumping is required for the pipe flow velocity that needs to be contracted under PS 533, Pumping Plant

Associated practices may include: PS 313 Waste Storage Facility; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management; 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 transfer of waste water to a waste storage facility is required for the CNMP.

After Situation:

This practice scenario is for the estimated design volume for waste collection and transfer of 4300 gallons of liquid waste and can be transferred under gravity or low pressure flow in a 6" PVC pipeline to a waste storage pond. The practice scenario typically includes materials and installation of flat and formed concrete for curbs and gutters at the basin 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 transfer pipeline is assumed to be 300 feet long, 6" PVC gasketted SDR 41 pipe with an adapter for the concrete basin, couplers, air-vac vents, all other fittings placed as specified by the design, trench excavation, pipe bedding and backfill. Pipe length for contract is increased by 10% to account for required fittings. The cost includes excavation, placement of subgrade as needed, forming, pouring and finishing of concrete structure and backfilling as well as pipeline installation. 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: $16,801.19 **Scenario Cost/Unit:** $3.91

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	$74.86	8	$598.88
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$60.82	16	$973.12
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.21	3	$54.63
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	32	$1,996.16
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	$401.46	14	$5,620.44
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	$127.06	6	$762.36
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	$33.06	32	$1,057.92

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	$19.06	96	$1,829.76
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	24	$453.60
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	$26.75	32	$856.00

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	40	$115.60
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	18	$351.90
Pipe, PVC, 6", SDR 41	984	Materials: - 6" - PVC - SDR 41 100 psi - ASTM D2241	Foot	$3.57	330	$1,178.10

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
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	$191.56	2	$383.12

Practice: 634 - Waste Transfer

Scenario: #5 - Large reception pit, 8 inch pipe to treatment, plus 6 inch pipe to storage.

Scenario Description:

Installation for a wastewater collection system that includes materials and structures to collect liquids such as lot runoff, manure slurry and other contaminated liquid effluent. The wastewater collected in this 8600 gallon pit is intended to be transferred to final storage within a 48 hour period. The waste is transferred through an 8" conduit to a waste treatment location. After treatment the remaining liquids are transferred to the waste storage pond in a 6" pipeline. This scenario includes a reinforced concrete manure reception pit an 8" conduit to transfer the manure and wastewater to a treatment location and a secondary 6" transfer pipeline. Reception Pit includes safety fence w/gate or solid/grated cover. The 8" transfer conduit and 6" transfer pipeline consists of the pipe plus the inlet structures connections and all other fittings, trench excavation and backfill, labor and equipment for installation. If pumping is required for the pipe flow velocity that needs to be contracted under PS 533, Pumping Plant

Associated practices may include: PS 313 Waste Storage Facility; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management; 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 transfer of waste water to a waste storage facility is required for the CNMP. Additional waste treatment is required for the waste stream prior to reaching in the waste storage pond.

After Situation:

This practice scenario is suitable where the estimated design volume for waste collection and transfer is greater than 5000 gallons of liquid waste and can be transferred under gravity or low pressure flow in an 8" conduit to a waste treatment site. Then the remaining liquids will be transferred in a 6" pipeline to a waste storage pond. 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 first stage transfer pipeline is assumed to be 200 feet long, 8" PVC gasketted SDR 41 pipe with an adapter for the concrete basin, couplers, air-vac vents, all other fittings placed as specified by the design. The second stage transfer pipe is assumed to be 500 feet long 6" PVC gasketted SDR 41 pipe with an adapter for the wastewater treatment system, couplers, air-vac vents, all other fittings placed as specified by the design.. Pipe length for contract is increased by 10% to account for required fittings. The cost includes excavation, placement of subgrade as needed, forming, pouring and finishing of concrete structure and backfilling as well as pipeline installation costs for trench excavation, pipe bedding and backfill. 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: $26,475.69 **Scenario Cost/Unit:** $3.08

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	$127.06	11	$1,397.66
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	$401.46	22	$8,832.12
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	12	$898.32
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.21	4	$72.84
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$60.82	24	$1,459.68

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	$62.38	40	$2,495.20

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	$19.06	140	$2,668.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	36	$680.40
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	$26.75	40	$1,070.00
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	$33.06	40	$1,322.40

Materials

Pipe, PVC, 6", SDR 41	984	Materials: - 6" - PVC - SDR 41 100 psi - ASTM D2241	Foot	$3.57	220	$785.40
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	$19.55	23	$449.65
Pipe, PVC, 8", SDR 41	985	Materials: - 8" - PVC - SDR 41 100 psi - ASTM D2241	Foot	$5.85	550	$3,217.50

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
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	$191.56	2	$383.12

Practice: 634 - Waste Transfer

Scenario: #6 - 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; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management; 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 5" 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: $12,292.48 **Scenario Cost/Unit:** $10.24

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	$127.06	22	$2,795.32
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	$401.46	11	$4,416.06
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	8	$598.88
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.21	4	$72.84
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	$33.06	50	$1,653.00
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	$19.06	64	$1,219.84
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	$26.75	8	$214.00
Materials						

Materials

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
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	26	$508.30

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 634 - Waste Transfer

Scenario: #7 - Concrete Channel, push-off wall at pond and safety gate

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 a collection basin and/or waste storage facility at the end of a push-off ramp. A safety gate is installed at the end of the push-off ramp.

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; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management; 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 5" thick concrete slab with curbing on each side of the slab that is 2' high, 6" thick with footing for the entire length. The push-off ramp is a concrete cantilever structure that allows the waste to be moved into the storage facility. The purpose is to transfer liquids or manure slurry from one area to a collection basin or waste storage facility. Includes safety gate for human and animal exclusion.

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: $15,367.49 **Scenario Cost/Unit:** $12.81

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	$18.21	5	$91.05
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	$127.06	22	$2,795.32
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	$401.46	17	$6,824.82
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	8	$598.88
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	$33.06	50	$1,653.00
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	$26.75	8	$214.00
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	$19.06	98	$1,867.88
Materials						

Materials

Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	26	$508.30
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	$284.80	2	$569.60

Practice: 634 - Waste Transfer

Scenario: #8 - Concrete channel, to medium sized wastewater reception pit

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 a 4300 gallon wastewater 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; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management; 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 5" 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 a 8'x12'x6' collection basin or waste storage facility. Includes safety chain around the basin 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: $21,203.06 **Scenario Cost/Unit:** $17.67

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	$18.21	4	$72.84
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	$401.46	23	$9,233.58
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	24	$1,497.12
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	$127.06	22	$2,795.32
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	8	$598.88
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	8	$151.20
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	$26.75	24	$642.00
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	$33.06	60	$1,983.60

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	$19.06	120	$2,287.20

Materials

Pipe, Steel, 3", SCH 40	1003	Materials: - 3" - Steel SCH 40	Foot	$9.89	30	$296.70
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	50	$144.50
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	28	$547.40

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
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	$191.56	2	$383.12

Practice: 634 - Waste Transfer

Scenario: #9 - Concrete channel, to medium reception pit, 6 inch pipe to storage.

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 a 4300 gallon collection basin and/or waste storage facility. The wastewater is then transferred from the basin to the waste storage pond through a 6" diameter low pressure pipeline.

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; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management; 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. Waste transfer structures are needed to transfer wastes to a waste storage pond

After Situation:

Typical installation of a 12 foot wide 100' long concrete channel that consists of a 5" thick concrete slab with curbing on each side of the slab that is 2' high, 6" thick with footing for the entire length. The waste transfer scenario is to scrape liquids or manure slurry from the waste production area down the channel to a 8'x12'x6' collection basin. From the basin it is then transferred through a 6" pipe 500 feet to the waste storage pond. The scenario also includes a safety chain around the basin. The transfer pipe is a 6" diameter gasketted PVC SDR 41 low pressure pipeline. Pipe length for contract is increased by 10% to account for required fittings. The cost includes excavation, placement of subgrade as needed, forming, pouring and finishing of concrete structure and backfilling as well as pipeline installation costs for trench excavation, pipe bedding and backfill. Transfer pump if needed must be contracted under pumping plant, PS 533.

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: $25,562.11 **Scenario Cost/Unit:** $21.30

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	$74.86	8	$598.88
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	24	$1,497.12
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.21	4	$72.84
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	45	$258.75
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	$401.46	23	$9,233.58
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	$127.06	22	$2,795.32
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.13	500	$1,565.00
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	$26.75	24	$642.00
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	$33.06	60	$1,983.60
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	$19.06	150	$2,859.00
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	8	$151.20

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	50	$144.50
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	28	$547.40
Pipe, Steel, 3", SCH 40	1003	Materials: - 3" - Steel SCH 40	Foot	$9.89	30	$296.70
Pipe, PVC, 6", SDR 41	984	Materials: - 6" - PVC - SDR 41 100 psi - ASTM D2241	Foot	$3.57	550	$1,963.50

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
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	$191.56	2	$383.12

Practice: 634 - Waste Transfer

Scenario: #10 - Small Flush System, less than 1000 gallon per flush to reception pit, 8 inch pipe to storage.

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; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management; 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: $13,296.62 **Scenario Cost/Unit:** $13.30

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	$127.06	7	$889.42
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$60.82	4	$243.28
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.21	4	$72.84
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	4	$299.44
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	20	$1,247.60
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	$401.46	3	$1,204.38
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	$33.06	30	$991.80

Labor

Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	8	$151.20
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	$19.06	60	$1,143.60
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	$26.75	20	$535.00

Materials

Pipe, PVC, 8", SDR 21	988	Materials: - 8" - PVC - SDR 21 200 psi - ASTM D2241	Foot	$11.20	55	$616.00
Pipe, PVC, 8", SDR 35	994	Materials: - 8" - PVC - SDR 35 - ASTM D3034	Foot	$6.89	220	$1,515.80
Catch Basin, concrete, 60" dia.	1754	Precast 60-in diameter catch basin, 6' deep, with collar and grate cover. Materials only.	Each	$2,250.29	1	$2,250.29
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	15	$293.25
Tank, Poly enclosed Storage, 300-1000 gal	1074	Water storage tanks. Includes materials and shipping only.	Gallon	$0.89	1000	$890.00

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
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	$191.56	2	$383.12

Practice: 634 - Waste Transfer

Scenario: #11 - Wastewater Flush Transfer System, Pipes only, 12 inch diameter

Scenario Description:

Installation of the pipe for a manure and wastewater flush system that provides the structures to utilize recycled wastewater to flush waste from a concrete surface into a waste storage pond. This may include pipe and valves, concrete flush lane, concrete curbs or gutter. The animal waste will be transferred by recycled flush water through the pipe system to rinse the concrete production surface and carry the waste to a waste storage pond.

Associated practices may include: PS 313 Waste Storage Facility; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management; PS 633, Waste Recycling.

This scenario addresses the potential for surface water and groundwater quality degradation from animal waste.

Before Situation:

An animal production facility does not have an efficient method for collecting and transferring the animal waste produced. Wastewater however is available in a sufficient quantity to provide a flush cycle to clean the production floor and collect the waste materials deposited.

After Situation:

This practice scenario is suitable where wastewater can be recycled for a flush system. Supplemental piping is needed to install the recycled flush water as a means to collect the animal waste deposited on the concrete production surfaces. The pipe design for the flush volume requires100 feet of 12 inch diameter pipe for pressure flow. The flushed wastes are then piped from an existing collection basin to the waste storage pond an estimated length of 200 feet through a 12 inch diameter low pressure pipe with an open outlet at the pond. The cost includes excavation, placement of bedding as needed, flush and conveyance pipelines with valves and pipe backfill. Pumps must be contracted under pumping plant, PS 533.

Scenario Feature Measure: Flush - pipes

Scenario Unit: Foot

Scenario Typical Size: 300

Scenario Cost: $16,133.60 **Scenario Cost/Unit:** $53.78

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	$60.82	8	$486.56
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	30	$1,871.40
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	66	$379.50
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	$127.06	8	$1,016.48
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.21	4	$72.84
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	$19.06	70	$1,334.20
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	$33.06	35	$1,157.10
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	8	$151.20
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	$26.75	30	$802.50

Materials

Pipe, PVC, 12", SDR 35	1252	Pipe, PVC, SDR 35, 12" Diameter - ASTM D3034. Material cost only.	Foot	$23.03	220	$5,066.60
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	6	$117.30
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$27.99	10	$279.90
Pipe, PVC, 12", SDR 21	1717	Materials: - 12" - PVC - SDR 21 - ASTM D2241	Foot	$22.23	110	$2,445.30

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
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	$191.56	2	$383.12

Practice: 634 - Waste Transfer

Scenario: #12 - Hopper gravity inlet, 24 inch diameter HDPE pipeline, to waste storage facility

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 inlet structure or hopper with an adaptor to a smooth interior large diameter HDPE 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 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; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management; 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 collection hopper with an adaptor to a water tight smooth interior 24"diameter HDPE sanitary sewer grade pipe that will flow to an outlet at the site of manure treatment or storage. This scenario includes the collection hopper, 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: Foot

Scenario Typical Size: 80

Scenario Cost: $8,820.36 **Scenario Cost/Unit:** $110.25

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	$127.06	7	$889.42
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.59	15	$53.85
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	$62.38	16	$998.08
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.21	4	$72.84
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	33	$189.75
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	$2.35	61	$143.35
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	$33.06	16	$528.96

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	$19.06	36	$686.16
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	$26.75	16	$428.00

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	$19.06	88	$1,677.28
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$19.55	7	$136.85
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$27.99	7	$195.93
Catch Basin, concrete, 60" dia.	1754	Precast 60-in diameter catch basin, 6' deep, with collar and grate cover. Materials only.	Each	$2,250.29	1	$2,250.29

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 634 - Waste Transfer

Scenario: #13 - 30 inch HDPE conduit, gravity flow, from an existing inlet structure to site of treatment or storage.

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; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management; 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: Foot

Scenario Typical Size: 150

Scenario Cost: $12,464.76 **Scenario Cost/Unit:** $83.10

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	$2.35	125	$293.75
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	$127.06	14	$1,778.84
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	57	$327.75
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.59	45	$161.55
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	30	$1,871.40
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.21	7	$127.47
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	$19.06	48	$914.88

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	$26.75	30	$802.50
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$33.06	20	$661.20

Materials

Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$27.99	13	$363.87
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	$27.83	165	$4,591.95

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 634 - Waste Transfer

Scenario: #14 - 12 inch diameter, Low pressure flow, PVC conduit

Scenario Description:

Low pressure flow conduit is typically a PVC pipeline used to transfer wastewater or manure slurry by pumping from one production location to a storage or treatment location. Low pressure flow PVC transfer pipelines can be between 3" and 30" diameter and are designed for a pumping pressure of no more than 100 psi. The low pressure transfer system typically consists of an inlet structure or hopper connected to a smooth interior PVC pipe sized to deliver the design flow. This practice includes the pipe plus the inlet structure connection 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 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; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management; 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. The site of waste collection or structure has the capacity to install a pumping plant but needs a pipeline to transfer the liquid manure slurry under low pressure from the collection site to the treatment or storage structure.

After Situation:

Install a 300 foot long 12 inch diameter low pressure wastewater pipeline to transfer wastewater or manure slurry from one location to another. The low pressure flow situation refers to pipeflow that has an unrestricted outlet and low pumping head pressure. A pumping plant will send the liquid through a pipe inlet at an existing waste collection basin into a 12 inch diameter pipeline to transfer the design volume to an outlet at the wastewater treatment or storage site. This scenario includes the pipe, inlet connection, outlet, couplers and all other fittings, trench excavation, pipe bedding and backfill. The site should be evaluated by the designing engineer before contracting. If required a pumping plant may be contracted under PS 533, Pumping Plant to support this system.

The low pressure transfer conduit will provide collection, transfer and containment of the manure slurry, thereby protecting water quality resources.

Scenario Feature Measure: Length of pipe installed

Scenario Unit: Foot

Scenario Typical Size: 300

Scenario Cost: $12,703.39 **Scenario Cost/Unit:** $42.34

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	$3.59	33	$118.47
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	$127.06	14	$1,778.84
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$18.21	7	$127.47
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$62.38	32	$1,996.16
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	$2.35	97	$227.95
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	56	$322.00
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	$26.75	32	$856.00

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	$19.06	64	$1,219.84

Materials

Pipe, PVC, 12", SCH 40	1716	Materials: 12" dia. PVC SCH 40, ASTM D1785	Foot	$15.44	330	$5,095.20
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$27.99	14	$391.86

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 634 - Waste Transfer

Scenario: #15 - 10 inch diameter, Low pressure flow PVC pipeline, from waste storage pond to land application site.

Scenario Description:

Low pressure flow pipeline used to transfer manure wastewater by a low pressure pump from the waste storage pond to the field where it is applied according to the CNMP. The pipeline moves the water from the pond through a buried mainline with low pressure outlets that spread the water on a vegetated treatment area or to a site where the water is applied through an existing field application system. Low pressure flow PVC transfer pipelines can be between 3" and 30" diameter and are designed for a pumping pressure of 100 psi or less. This practice includes the pipe plus an inlet riser structure, clean-out risers and outlet risers plus all other valves and fittings, trench excavation and backfill, labor and a equipment for installation. 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.

This pipeline 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; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management; PS 633, Waste Recycling; PS 635, Vegetated Treatment Area.

Before Situation:

The waste storage structure is separated from the application fields where wastewater nutrients are needed. Soil nutrients in the near fields have high phosphorus levels from over application near the waste storage facility. The current application operation is high in the use of time and energy and may cause water quality concerns as it is not efficient in transporting the waste to the field.

After Situation:

Install a 1000 foot long 10 inch diameter PVC gasketted IPS pipe that has an SDR of 41 and is water tight under low pressure flow to transfer the manure wastewater. An inlet riser and is located near the pump site of the waste storage pond and designed for the desired pumping pressure and flow volume for the application system. This scenario includes the pipe, inlet riser, couplers, air-vac vents, all other fittings, and risers placed as specified by the design, trench excavation, pipe bedding and backfill. The site should be evaluated by the designing engineer to make sure the design will function.

The transfer pipeline will deliver the manure slurry to the fields for agronomic nutrient utilization according to the CNMP, thereby protecting water quality resources.

Scenario Feature Measure: Length of pipe installed

Scenario Unit: Foot

Scenario Typical Size: 1,000

Scenario Cost: $23,294.31 **Scenario Cost/Unit:** $23.29

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	$127.06	1	$127.06
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	127	$730.25
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.13	1000	$3,130.00
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	$19.06	70	$1,334.20
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	$33.06	20	$661.20

Materials

Pipe, PVC, 10", SDR 21	1714	Materials: - 10" - PVC - SDR 21 - ASTM D2241	Foot	$15.22	1100	$16,742.00

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 634 - Waste Transfer

Scenario: #16 - 6 inch diameter, Pressure flow PVC pipeline, from waste storage pond to land application site.

Scenario Description:

Pressure flow pipeline used to transfer manure wastewater by pumping from the waste storage pond to the field where it is to be applied according to the CNMP. Pressure flow transfer pipelines can be between 3" and 12" diameter but 6" diameter is a commonly used pipe size. Pressure pipe will handle an internal pumping pressure between 130 and 200 psi depending on the designed pumping system and must have gasketted joints to seal for the wastewater transfer.

The pressure pipe moves the water by pumping from the intake riser location, through a buried mainline with outlet risers spaced at 300 ft intervals for a traveler applicator. This practice includes the pipe plus an inlet riser structure, clean-out risers and outlet risers plus all other valves and fittings, trench excavation and backfill, labor and a equipment for installation. 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.

This pipeline 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; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management; PS 633, Waste Recycling; PS 635, Vegetated Treatment Area.

Before Situation:

The waste storage structure is separated from the application fields where wastewater nutrients are needed. Soil nutrients in the near fields have high phosphorus levels from over application near the waste storage facility. The current application operation is high in the use of time and energy and may cause water quality concerns as it is not efficient in transporting the waste to the field.

After Situation:

Install a 1000 foot long 6 inch diameter PVC gasketted IPS pipe that has an SDR of 21 and is water tight under pressure flow to transfer the manure wastewater. An inlet riser and is located near the pump site of the waste storage pond and designed for the desired pressure and flow for the application system. This scenario includes the pipe, inlet riser, couplers, air-vac vents, all other fittings, and risers placed as specified by the design, trench excavation, pipe bedding and backfill. The site should be evaluated by the designing engineer to make sure the design will function.

The transfer pipeline will deliver the manure slurry to the fields for agronomic nutrient utilization according to the CNMP, thereby protecting water quality resources.

Scenario Feature Measure: Length of pipe installed

Scenario Unit: Foot

Scenario Typical Size: 1,000

Scenario Cost: $13,665.56 **Scenario Cost/Unit:** $13.67

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	$127.06	1	$127.06
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.75	90	$517.50
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.13	1000	$3,130.00
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	$33.06	20	$661.20

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	$19.06	70	$1,334.20

Materials

Pipe, PVC, 6", SDR 21	987	Materials: - 6" - PVC - SDR 21 200 psi - ASTM D2241	Foot	$6.66	1100	$7,326.00

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 634 - Waste Transfer

Scenario: #17 - Agitator, small, mixing contents of a reception pit that is no more than than 10 ft. deep.

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; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management; 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: $11,667.12 **Scenario Cost/Unit:** $11,667.12

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	294				2	
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	$27.30	11	$300.30
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	$78.65	2	$157.30

Practice: 634 - Waste Transfer

Scenario: #18 - Agitator, medium, mixing contents of a reception pit that is 10 ft to 15 ft. deep.

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. This scenario does not include a pump.

Associated practices may include: PS 313 Waste Storage Facility; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management; 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: $18,034.53 **Scenario Cost/Unit:** $18,034.53

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	294				2	
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	$27.30	12	$327.60
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	$191.56	2	$383.12

Practice: 634 - Waste Transfer

Scenario: #19 - Agitator, large, mixing contents of a reception pit that is over 15 ft. deep.

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. This scenario does not include a pump.

Associated practices may include: PS 313 Waste Storage Facility; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management; 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: $26,373.39 **Scenario Cost/Unit:** $26,373.39

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	294				2	
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	$27.30	12	$327.60
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	$284.80	2	$569.60

Practice: 635 - Vegetated Treatment Area

Scenario: #1 - Graded Area, Gravity Flow Surface Application

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), Waste Separation Facility (632), Manure Transfer (634), Roof runoff Management (558), Pumping Plant (533), Subsurface Drain (606), Critical Area Planting (342), Terrace (600), Nutrient Management (590), Diversion (362), 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: $7,731.86 **Scenario Cost/Unit:** $7,731.86

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	$2.35	70	$164.50
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	16	$1,197.76
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	400	$940.00
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	$19.06	20	$381.20
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	$26.75	16	$428.00
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	$23.71	80	$1,896.80
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	70	$1,985.20
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.40	45	$63.00
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	$78.65	1	$78.65
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 635 - Vegetated Treatment Area

Scenario: #2 - Graded Area, Pumped Into A Basin, Gravity Flow Surface Application

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), Waste Separation Facility (632), Manure Transfer (634), Irrigation System, Sprinkler (442), Roof runoff Management (558), Pumping Plant (533), Subsurface Drain (606), Critical Area Planting (342), Terrace (600), Nutrient Management (590), Diversion (362), 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: $12,511.41 **Scenario Cost/Unit:** $12,511.41

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	$401.46	12	$4,817.52
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.35	400	$940.00
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	$127.06	2	$254.12
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	$2.35	100	$235.00
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	$19.06	40	$762.40
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	70	$1,985.20
Pipe, PE, 6", DR 9, perforated	1728	Materials: -6" - Perforated PE- 160 psi - ASTM D3035 DR 9	Foot	$23.71	80	$1,896.80
Coupling, PVC, endcap, 2", SCH 20	1727	2" - PVC- SCH 40- ASTM D1785 pipe endcaps. Materials only.	Each	$1.81	15	$27.15

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	$1.40	45	$63.00
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$27.99	6	$167.94

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60
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	$78.65	2	$157.30

Practice: 635 - Vegetated Treatment Area

Scenario: #3 - Graded Area, 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), Waste Separation Facility (632), Manure Transfer (634), Irrigation System, Sprinkler (442), Roof runoff Management (558), Pumping Plant (533), Subsurface Drain (606), Critical Area Planting (342), Terrace (600), Nutrient Management (590), Diversion (362), 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: $2,215.52 **Scenario Cost/Unit:** $2,215.52

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	$74.86	16	$1,197.76
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	$26.75	16	$428.00
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	$19.06	16	$304.96
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 635 - Vegetated Treatment Area

Scenario: #4 - Existing Vegetative Area, Gravity Flow Surface Application

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), Waste Separation Facility (632), Manure Transfer (634), Irrigation System, Sprinkler (442), Roof runoff Management (558), Pumping Plant (533), Subsurface Drain (606), Critical Area Planting (342), Terrace (600), Nutrient Management (590), Diversion (362), 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 gravel trenchs and perforated pipe to establish sheet flow into the VTA where an 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: $9,369.48 **Scenario Cost/Unit:** $9,369.48

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	$2.35	445	$1,045.75
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	$2.35	75	$176.25
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	$401.46	7	$2,810.22
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	16	$304.96
Materials						
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	$23.71	100	$2,371.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	75	$2,127.00
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.40	40	$56.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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	$78.65	2	$157.30

Practice: 635 - Vegetated Treatment Area

Scenario: #5 - Existing Area, Pod Sprinkler System 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), Waste Separation Facility (632), Manure Transfer (634), Irrigation System, Sprinkler (442), Roof runoff Management (558), Pumping Plant (533), Subsurface Drain (606), Critical Area Planting (342), Terrace (600), Nutrient Management (590), Diversion (362), 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 2.0 ac in size. Typically does not require grading and shaping to maintain as uniform application onto the VTA is made through a mobile pod type sprinkler system. 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.

The system is sized such that the total number of Pods will distribute wastewater to half of the VTA, 1 ac. The pods will be relocated to distribute wastewater to the other half of the VTA. The VTA is 400 ft x 220 ft. A 400 ft pipeline with 8 risers spaced 50 ft apart extends down one side of the VTA. Each Pod Line is 200 ft long with 5 pods spaced at 40 ft increments. The total number of Pods is 20 (8 risers/2 x 5 pods/line = 20 pods).

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 onto 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: 2

Scenario Cost: $10,185.24 **Scenario Cost/Unit:** $5,092.62

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trencher, 8"	936	Equipment and power unit costs. Labor not included.	Hour	$100.13	8	$801.04
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	8	$151.20
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	$19.06	16	$304.96
Materials						
Ball Valve, 4"	1726	4" ball valve, metal body. Materials only.	Each	$317.69	8	$2,541.52
Irrigation, Pod System, w/Appurtenances	323	Pod irrigation system that includes pod, pipe, sprinklers, connections, and appurtenances. Includes materials only.	Each	$238.96	20	$4,779.20
Pipe, PVC, 4", SDR 21	986	Materials: - 4" - PVC - SDR 21 200 psi - ASTM D2241	Foot	$3.09	428	$1,322.52
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 636 - Water Harvesting Catchment

Scenario: #1 - 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; 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: $31,184.48 **Scenario Cost/Unit:** $62.37

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	$74.86	12	$898.32
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	$33.06	24	$793.44
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	$26.75	12	$321.00
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	$19.06	72	$1,372.32
Materials						
Pipe, PVC, 8", SDR 35	994	Materials: - 8" - PVC - SDR 35 - ASTM D3034	Foot	$6.89	140	$964.60
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Yard	$5.90	4500	$26,550.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 636 - Water Harvesting Catchment

Scenario: #2 - 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; 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. This system is the primary collection component of a Water Harvesting Catchment (CPS 636) facility. Divert collected water from roof with guttering and downspout through a 4" diameter PVC Sch-40 pipe,

Scenario Feature Measure: Surface Area of Catchment

Scenario Unit: Square Yard

Scenario Typical Size: 53

Scenario Cost: $4,408.31 **Scenario Cost/Unit:** $83.18

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	$62.38	4	$249.52
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	$401.46	1.5	$602.19
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	$33.06	8	$264.48
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	40	$762.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	4	$75.60
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	$27.30	20	$546.00
Materials						
Pipe, PVC, 6", SCH 40	980	Materials: - 6" - PVC - SCH 40 - ASTM D1785	Foot	$6.79	60	$407.40
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
Gutter, Downspout, PVC, 5"	1388	5" PVC guttering. Materials only.	Foot	$0.53	24	$12.72
Corrugated Steel, 28 gage	223	Corrugated or ribbed, galvanized, 28 gauge, includes fasteners, materials only.	sq ft	$1.60	480	$768.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 638 - Water & Sediment Control Basin

Scenario: #1 - WASCOB, greater than 250 CY

Scenario Description:

Typical scenario s 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 Basis is constructed with 700 CY of excavation/earthfill with dozer, scraper and/or road grader. Rill and/or gully erosion is reduced. If riser and underground outlet are needed, then include Underground Outlet (620). 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: $2,221.86 **Scenario Cost/Unit:** $3.17

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	$2.72	700	$1,904.00
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	$33.06	1	$33.06
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 638 - Water & Sediment Control Basin

Scenario: #2 - WASCOB topsoil

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 Basis is constructed with 700 CY of excavation/earthfill with dozer, scraper and/or road grader. Rill and/or gully erosion is reduced. If riser and underground outlet are needed, then include Underground Outlet (620). 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: $2,459.36 **Scenario Cost/Unit:** $3.51

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	$0.95	250	$237.50
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	$2.72	700	$1,904.00
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	$33.06	1	$33.06
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 638 - Water & Sediment Control Basin

Scenario: #3 - WASCOB less than 250 CY

Scenario Description:

Typical scenario s for the construction of 200 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 Basis is constructed with 200 CY of excavation/earthfill with dozer, scraper and/or road grader. Rill and/or gully erosion is reduced. If riser and underground outlet are needed, then include Underground Outlet (620). 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: 200

Scenario Cost: $861.86 **Scenario Cost/Unit:** $4.31

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	$2.72	200	$544.00
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	$33.06	1	$33.06
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 642 - Water Well

Scenario: #1 - Well <=100 Ft

Scenario Description:

Typical construction is for the installation of a well, in areas where sufficient water is known to occur at <100 feet of depth from 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 improve the efficiency of an existing irrigation system. An average well depth is 50 feet, using PVC or steel well casings 4-6" in diameter.

Before Situation:

Livestock have insufficient water or are fenced from their water source. Major resource concern is Inadequate Water for domestic animals or wildlife.

After Situation:

Sufficient water is available for livestock or wildlife. Utilize Pumping Plant (533) and Pipeline (516) as associated practices. Use Critical Area Seeding (342) where necessary to prevent erosion following construction activities.

Scenario Feature Measure: Depth of Well

Scenario Unit: Linear Foot

Scenario Typical Size: 50

Scenario Cost: $2,688.83 **Scenario Cost/Unit:** $53.78

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	$174.36	4	$697.44
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	$19.06	4	$76.24
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	$33.06	2	$66.12
Materials						
Well Casing, Metal, 6"	1810	Steel well casing, 6". Materials only.	Foot	$14.01	21	$294.21
Well Cap, 6"	1786	Well cap, 6". Materials only.	Each	$33.29	1	$33.29
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	$758.13	1	$758.13
Well Casing, Plastic, 6"	1804	PVC or ABS non-threaded well casing, 6". Materials only.	Foot	$6.46	30	$193.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 642 - Water Well

Scenario: #2 - Well >100-300 Ft

Scenario Description:

Typical construction is for the installation of a well, in areas where sufficient water is known to occur at >100-300 feet of depth from 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 improve the efficiency of an existing irrigation system. An average well depth is 200 feet, using PVC or steel well casings 4-6" in diameter.

Before Situation:

Livestock have insufficient water or are fenced from their water source. Major resource concern is Inadequate Water for domestic animals or wildlife.

After Situation:

Sufficient water is available for livestock or wildlife. Utilize Pumping Plant (533) and Pipeline (516) as associated practices. Use Critical Area Seeding (342) where necessary to prevent erosion following construction activities.

Scenario Feature Measure: Depth of Well

Scenario Unit: Linear Foot

Scenario Typical Size: 200

Scenario Cost: $6,177.23 **Scenario Cost/Unit:** $30.89

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	$174.36	16	$2,789.76
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	$33.06	8	$264.48
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	16	$304.96
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	$758.13	1	$758.13
Well Cap, 6"	1786	Well cap, 6". Materials only.	Each	$33.29	1	$33.29
Well Casing, Metal, 6"	1810	Steel well casing, 6". Materials only.	Foot	$14.01	21	$294.21
Well Casing, Plastic, 6"	1804	PVC or ABS non-threaded well casing, 6". Materials only.	Foot	$6.46	180	$1,162.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 642 - Water Well

Scenario: #3 - Well >300-600 Ft

Scenario Description:

Typical construction is for the installation of a well, in areas where sufficient water is known to occur at 300 - 600 feet of depth from 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 improve the efficiency of an existing irrigation system. An average well depth is 450 feet, using PVC or steel casing 4-6" in diameter.

Before Situation:

Livestock have insufficient water or are fenced from their water source. Major resource concern is Inadequate Water for domestic animals or wildlife.

After Situation:

Sufficient water is available for livestock or wildlife. Utilize Pumping Plant (533) and Pipeline (516) as associated practices. Use Critical Area Seeding (342) where necessary to prevent erosion following construction activities.

Scenario Feature Measure: Depth of Well

Scenario Unit: Linear Foot

Scenario Typical Size: 450

Scenario Cost: $11,991.23 **Scenario Cost/Unit:** $26.65

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	$174.36	36	$6,276.96
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	$19.06	36	$686.16
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	$33.06	18	$595.08
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	$758.13	1	$758.13
Well Casing, Metal, 6"	1810	Steel well casing, 6". Materials only.	Foot	$14.01	21	$294.21
Well Casing, Plastic, 6"	1804	PVC or ABS non-threaded well casing, 6". Materials only.	Foot	$6.46	430	$2,777.80
Well Cap, 6"	1786	Well cap, 6". Materials only.	Each	$33.29	1	$33.29
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 642 - Water Well

Scenario: #4 - Well >600 Ft

Scenario Description:

Typical construction is for the installation of a well, in areas where sufficient water is known to occur > 600 feet of depth from 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 improve the efficiency of an existing irrigation system. An average well depth is 700 feet, using PVC or steel casing 4-6" in diameter.

Before Situation:

Livestock have insufficient water or are fenced from their water source. Major resource concern is Inadequate Water for domestic animals or wildlife.

After Situation:

Sufficient water is available for livestock or wildlife. Utilize Pumping Plant (533) and Pipeline (516) as associated practices. Use Critical Area Seeding (342) where necessary to prevent erosion following construction activities.

Scenario Feature Measure: Depth of Well

Scenario Unit: Linear Foot

Scenario Typical Size: 700

Scenario Cost: $18,563.36 **Scenario Cost/Unit:** $26.52

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	$174.36	56	$9,764.16
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	$33.06	28	$925.68
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	$19.06	56	$1,067.36
Materials						
Well Cap, 6"	1786	Well cap, 6". Materials only.	Each	$33.29	1	$33.29
Well Casing, Plastic, 6"	1804	PVC or ABS non-threaded well casing, 6". Materials only.	Foot	$6.46	680	$4,392.80
Well Casing, Metal, 6"	1810	Steel well casing, 6". Materials only.	Foot	$14.01	21	$294.21
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	$758.13	2	$1,516.26
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 642 - Water Well

Scenario: #5 - Dug Well

Scenario Description:

Typical construction is for the excavation of a shallow dug well. The purpose of the practice is to provide water for livestock. A typical dug well is 4 foot in diameter and 15 feet in depth. The well is excavated using a backhoe. Excavate to a depth where the water recharge is greater than the equipment can remove. Washed gravel is placed in the base of the dug opening. Concrete manhole risers are installed to hold the water. Pea gravel is placed above the washed gravel to transition to the earth backfill. The hole is backfilled and sloped to direct surface water away from entering the manhole cover.

Before Situation:

Livestock have insufficient water or are fenced from their water source.

After Situation:

Sufficient water is available for livestock. 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: $15,410.25 **Scenario Cost/Unit:** $15,410.25

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	$62.38	10	$623.80
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	$19.06	10	$190.60
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	$26.75	10	$267.50
Materials						
Test, Standard Water Test, Well Water	309	Well Water Suitability test. Includes materials and shipping only.	Each	$40.64	1	$40.64
Manhole, 4' x 4'	1053	Precast Manhole with base and top delivered. 4' diameter x 4' depth. Materials only.	Each	$1,713.14	5	$8,565.70
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	$31.27	1	$31.27
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	$758.13	7	$5,306.91
Chlorine	1335	Liquid chlorine bleach. Includes materials only.	Gallon	$2.79	5	$13.95
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$28.36	3	$85.08
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 642 - Water Well

Scenario: #6 - Remote Locations

Scenario Description:

Typical construction is for the installation of a well, in areas where sufficient water is known to occur >300 feet of depth from 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. An average well depth is 400 feet. Well casings are 4-6" in diameter. Steel casing is installed to a depth of 400 feet. Location is remote - more than 50 miles from an improved roadway.

Before Situation:

Remote locations where livestock have insufficient water or are fenced from their water source.

After Situation:

Sufficient water is available for livestock or micro-irrigation. 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: Depth of Well

Scenario Unit: Linear Foot

Scenario Typical Size: 400

Scenario Cost: $13,472.16 **Scenario Cost/Unit:** $33.68

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	$174.36	40	$6,974.40
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	$33.06	20	$661.20
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	$19.06	40	$762.40
Materials						
Well Casing, Plastic, 6"	1804	PVC or ABS non-threaded well casing, 6". Materials only.	Foot	$6.46	380	$2,454.80
Well Cap, 6"	1786	Well cap, 6". Materials only.	Each	$33.29	1	$33.29
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	$758.13	2	$1,516.26
Well Casing, Metal, 6"	1810	Steel well casing, 6". Materials only.	Foot	$14.01	21	$294.21
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 included in the component price.	Dollar	$1.03	200	$206.00
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	2	$569.60

Practice: 643 - Restoration and Management of Rare and Declining Habitats

Scenario: #1 - Habitat Monitoring and Management, Very-Low Intensity and Complexity

Scenario Description:

This scenario is applied to all landuse types were the native plant condition (i.e. T&E plant species) or wildlife habitat is the resource concern, and where very-low intensity and complexity of monitoring or management will treat the identified resource concern. Only 1 monitoring effort is needed and each requiring 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.

Before Situation:

Rare or declining habitat is deficient and annual monitoring and adaptive management actions of very-low intensity and complexity will improved conditions.

After Situation:

Rare and declining 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: 640

Scenario Cost: $699.20 **Scenario Cost/Unit:** $1.09

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	$7.01	2	$14.02
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	3	$124.23
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						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	10	$190.60
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	$108.13	3	$324.39

Practice: 643 - Restoration and Management of Rare and Declining Habitats

Scenario: #2 - 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 native plant conditions (T&E plants) or wildlife have been identified as the resource concern, and where low intensity and complexity of monitoring or management will treat the identified resource concern. Only 1 monitoring effort is needed and each requiring 2 people and 3 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 8 hours labor per year.

Before Situation:

Rare or declining habitat is deficient due to the absence of annual monitoring and adaptive management actions of low intensity and complexity.

After Situation:

Rare and declining habitat is improved by implementation of annual adaptive management actions of low intensity and complexity.

Scenario Feature Measure: Monitoring efforts and adaptive management actions

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $428.86 **Scenario Cost/Unit:** $4.29

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	$41.41	3	$124.23
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	$7.01	1	$7.01
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	$33.06	3	$99.18
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	8	$152.48

Practice: **643 - Restoration and Management of Rare and Declining Habitats**

Scenario: **#3 - Rare or Declining Habitat Monitoring and Management, Medium Intensity and Complexity, with Forgone Income**

Scenario Description:

This scenario is applied to all landuse types including those with wildlife as a modifier, where any resource concern is identified related to rare or declining habitats, and where medium intensity and complexity of monitoring or management will treat the identified resource concern. Two monitoring efforts are needed and each requiring 2 people and 3 hours per effort. Two adaptive management efforts are required (such as cutting of limbs that impede monitoring efforts, replacing damaged fence markers, or other minor adaptive management activities). The adaptive mgmt requires hand labor and the occasional use of light equipment. A crew of 2 is needed for the hand labor efforts. Mowing of roads and trail is required to provide access for monitoring and management.

Before Situation:

Rare or declining habitat is deficient due to the absence of annual monitoring and adaptive management actions of medium intensity and complexity.

After Situation:

Rare or declining 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: 100

Scenario Cost: $1,983.88 **Scenario Cost/Unit:** $19.84

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						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	6	$42.06
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	8	$331.28
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	50	$574.50
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	$108.13	6	$648.78
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	18	$343.08

Practice: 643 - Restoration and Management of Rare and Declining Habitats

Scenario: #4 - Habitat Monitoring and Management, High Intensity and Complexity, with Forgone Income

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. Two monitoring efforts are needed and each requiring 2 people and 4 hours per effort. Two adaptive management efforts are required (such as cutting of limbs that impede monitoring efforts, replacing damaged fence markers, or other minor adaptive management activities). The adaptive mgmt requires hand labor and the occasional use of light equipment. A crew of 2 is needed for the hand labor efforts. 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 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: 100

Scenario Cost: $3,710.18 **Scenario Cost/Unit:** $37.10

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	$56.58	5	$282.90
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	8	$56.08
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	2	$91.92
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	16	$662.56
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	50	$574.50
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	$108.13	8	$865.04
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	$33.06	10	$330.60
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	$19.06	28	$533.68
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	$27.30	8	$218.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	5	$94.50

Practice: 643 - Restoration and Management of Rare and Declining Habitats

Scenario: #5 - Development of Shallow Micro-Topographic Features with Normal Farming Equipment.

Scenario Description:

This typical scenario is installed on open non-wetlands. The purpose is to increase plant species richness and diversity, create micro-habitats for invertebrates, increase water infiltration and reduce run-off. The area is plowed to loosen the soil. Then the soil is excavated with normal farming equipment (e.g. tractor and box-blade) to a depth of 2-6 inches and immediately deposited. This lowering and raising of a box-blade restores the original micro-topographic features (6' X 6' depressions and mounds) common to most landscapes and landforms prior to clearing, tilling, and annual mowing. Restoration of shallow but frequent micro-topographic features has been lost by the smoothing action of tillage, mowing and the original land-clearing. This scenario it typically implemented for ecosystem restoration projects such as prairie restoration and range-land restoration, and particularly on moderately well-drained soils.

Before Situation:

Micro-topographic features have been eliminated by past conversion to agriculture and/or past cultural practices. This has resulted in the lack of micro-soil moisture gradients within the field. The opportunity for plant species richness and diversity is minimal. Water storage potential is absent. Water rapidly runs off the field after rains and snow melt, carrying nutrients, solids and surface organic materials. No micro-ponding sites are available for invertebrate use.

After Situation:

Shallow micro-depressions and mounds are numerous. This varied micro-topographic features provided varied moisture gradients required for high plant species richness and diversity. Wildlife habitat is improved. Water conservation is increased, increasing vegetative production. Water quality is improved as the micro depressions capture sediments, nutrients and manure. Over time, the micro-depressions become more nutrient rich than the micro-highs, further increasing plant species richness.

Scenario Feature Measure: hours of tractor use

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $828.32 **Scenario Cost/Unit:** $41.42

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	$60.82	6	$364.92
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$17.50	20	$350.00
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	6	$113.40

Practice: 643 - Restoration and Management of Rare and Declining Habitats

Scenario: #6 - Development of Deep Micro-Topographic Features with Heavy Equipment.

Scenario Description:

This typical scenario is installed on open non-wetlands, where micro-topographic features have been removed by past farming and/or ranching cultural practices. The purpose is to increase plant species richness and diversity, create micro-habitats for invertebrates, increase water infiltration and reduce run-off. The area is plowed 2 weeks prior to excavation to kill existing vegetation and allow for proper dirt work. Then the soil is excavated with track equipment (dozer) to a depth of 6-12 inches and immediately deposited. This lowering and raising of a dozer -blade restores the original deep micro-topographic features (10' X10' depressions and mounds) common to many landscapes and landforms prior to the lands conversion to agricultural lands. This scenario it typically implemented for ecosystem restoration projects such as wetland restoration (herbaceous or prior to planting of woody species), prairie restoration and range-land restoration. It is most commonly applied to well-drained soils as the purpose is for the micro-depression to pond water for short duration (less than 7 days).

Before Situation:

Micro-topographic features have been eliminated by past conversion to agriculture and/or past cultural practices. This has resulted in the lack of micro-soil moisture gradients within the field. The opportunity for plant species richness and diversity is minimal. Water storage potential is absent. Water rapidly runs off the field after rains and snow melt, carrying nutrients, solids and surface organic materials. No micro-ponding sites are available aquatic dependent invertebrates. Vertebrate wildlife habitat is lacking diversity.

After Situation:

Deep (6" - 12" depth) micro-depressions and mounds are numerous. These varied micro-topographic features provide varied moisture gradients required for development of high plant species richness and diversity. Wildlife habitat is improved. Water conservation is increased, increasing vegetative production. Water quality is improved as the deep micro-depressions capture sediments, nutrients and manure. Over time, the micro-depressions become more nutrient rich than the micro-highs, further increasing plant species richness.

Scenario Feature Measure: Hours

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $2,353.79 **Scenario Cost/Unit:** $117.69

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	$207.67	6	$1,246.02
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$17.50	20	$350.00
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	$26.75	8	$214.00
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	$543.77	1	$543.77

Practice: 644 - Wetland Wildlife Habitat Management

Scenario: #1 - Habitat Monitoring and Management, Very-Low Intensity and Complexity

Scenario Description:

This scenario is applied to wetlands within 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.

Before Situation:

Wetland wildlife habitat is deficient due to the absence of annual monitoring and adaptive management actions of very-low intensity and complexity.

After Situation:

Wetland wildlife 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: 640

Scenario Cost: $699.20 **Scenario Cost/Unit:** $1.09

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	$7.01	2	$14.02
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	3	$124.23
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						
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	$108.13	3	$324.39
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	10	$190.60

Practice: 644 - Wetland Wildlife Habitat Management

Scenario: #2 - Wetland Widlife Habitat Monitoring and Management, Low Intensity and Complexity

Scenario Description:

This scenario is applied to wetlands on landuse types including those with wildlife as a modifier, where any resource concern is identified for wildlife, and where 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 8 hours labor per year.

Before Situation:

Wetland wildlife habitat is deficient due to the absence of annual monitoring and adaptive management actions of low intensity and complexity.

After Situation:

Widlife habitat is improved by implementation of annual adaptive management actions of low intensity and complexity.

Scenario Feature Measure: Monitoring efforts and adaptive management actions

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $534.78 **Scenario Cost/Unit:** $5.35

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
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	1.5	$62.12
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	1	$7.01
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	$108.13	3	$324.39
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	5	$95.30

Practice: 644 - Wetland Wildlife Habitat Management

Scenario: #3 - Habitat Monitoring and Management, Medium Intensity and Complexity, with Foregone Income

Scenario Description:

This scenario is applied to wetland areas located on 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, cleaning of nest structures and debris around other structures). 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. Mowing of roads and trail is required to provide access for monitoring and management. Deferment of use for one season to implement adaptive managment action will be needed.

Before Situation:

Wetland wildlife habitat is deficient due to the absence of annual monitoring and adaptive management actions of medium intensity and complexity.

After Situation:

wetland 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: 160

Scenario Cost: $3,081.56 **Scenario Cost/Unit:** $19.26

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
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	6	$248.46
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$56.58	5	$282.90
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	4	$28.04
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	80	$919.20
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	5	$94.50
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	$19.06	20	$381.20
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	$108.13	10	$1,081.30

Practice: 644 - Wetland Wildlife Habitat Management

Scenario: #4 - Habitat Monitoring and Management, High Intensity and Complexity, with Foregone Income

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. Two - four monitoring efforts are needed and each requiring less than 2 people and less than 8 hours per effort. The adaptive management actions (2 - 5 efforts) such as cutting of limbs that are impeding access of birds into nest boxes, replacing damaged fence markers, 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. Deferment of use for one season to implement adaptive managment action will be needed.

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: 80

Scenario Cost: $3,114.20 **Scenario Cost/Unit:** $38.93

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	$127.04	4	$508.16
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	8	$56.08
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	6	$248.46
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$56.58	3	$169.74
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
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	40	$459.60
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	$19.06	20	$381.20
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	3	$56.70
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	$26.75	4	$107.00
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	$108.13	10	$1,081.30

Practice: 644 - Wetland Wildlife Habitat Management

Scenario: #5 - Development of Shallow Micro-Topographic Features with Normal Farming Equipment.

Scenario Description:

This typical scenario is installed on non-forested wetlands, including openlands prior to tree planting. The purpose is to increase plant species richness and diversity, create micro-habitats for invertebrates, increase water infiltration and reduce run-off. The area is plowed to loosen the soil. Then the soil is excavated with normal farming equipment (e.g. tractor and box-blade) to a depth of 2-6 inches and immediately deposited. This lowering and raising of a box-blade restores the original micro-topographic features (6' X 6' depressions and mounds) common to most landscapes and landforms prior to clearing, tilling, and annual mowing. Restoration of shallow but frequent micro-topographic features has been lost by the smoothing action of tillage, mowing and the original land-clearing. This scenario it typically implemented for ecosystem restoration projects such as prairie restoration and range-land restoration, and particularly on moderately well-drained soils.

Before Situation:

Micro-topographic features have been eliminated by past conversion to agriculture and/or past cultural practices. This has resulted in the lack of micro-soil moisture gradients within the field. The opportunity for plant species richness and diversity is minimal. Water storage potential is absent. Water rapidly runs off the field after rains and snow melt, carrying nutrients, solids and surface organic materials. No micro-ponding sites are available for invertebrate use.

After Situation:

Shallow micro-depressions and mounds are numerous. This varied micro-topographic features provided varied moisture gradients required for high plant species richness and diversity. Wildlife habitat is improved. Water conservation is increased, increasing vegetative production. Water quality is improved as the micro depressions capture sediments, nutrients and manure. Over time, the micro-depressions become more nutrient rich than the micro-highs, further increasing plant species richness.

Scenario Feature Measure: hours of tractor use

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $828.32 **Scenario Cost/Unit:** $41.42

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	$17.50	20	$350.00
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$60.82	6	$364.92
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	6	$113.40

Practice: 644 - Wetland Wildlife Habitat Management

Scenario: #6 - Development of Deep Micro-Topographic Features with Heavy Equipment.

Scenario Description:

This typical scenario is installed on non-forested wetlands (or open land prior to tree planting), where micro-topographic features have been removed by past farming and/or ranching cultural practices. The purpose is to increase plant species richness and diversity, create micro-habitats for invertebrates, increase water infiltration and reduce run-off. The area is plowed 2 weeks prior to excavation to kill existing vegetation and allow for proper dirt work. Then the soil is excavated with track equipment (dozer) to a depth of 6-12 inches and immediately deposited. This lowering and raising of a dozer -blade restores the original deep micro-topographic features (10' X10' depressions and mounds) common to many landscapes and landforms prior to the lands conversion to agricultural lands. This scenario it typically implemented for ecosystem restoration projects such as wetland restoration (herbaceous or prior to planting of woody species), prairie restoration and range-land restoration. It is most commonly applied to well-drained soils as the purpose is for the micro-depression to pond water for short duration (less than 7 days).

Before Situation:

Micro-topographic features have been eliminated by past conversion to agriculture and/or past cultural practices. This has resulted in the lack of micro-soil moisture gradients within the field. The opportunity for plant species richness and diversity is minimal. Water storage potential is absent. Water rapidly runs off the field after rains and snow melt, carrying nutrients, solids and surface organic materials. No micro-ponding sites are available aquatic dependent invertebrates. Vertebrate wildlife habitat is lacking diversity.

After Situation:

Deep (6" - 12" depth) micro-depressions and mounds are numerous. These varied micro-topographic features provide varied moisture gradients required for development of high plant species richness and diversity. Wildlife habitat is improved. Water conservation is increased, increasing vegetative production. Water quality is improved as the deep micro-depressions capture sediments, nutrients and manure. Over time, the micro-depressions become more nutrient rich than the micro-highs, further increasing plant species richness.

Scenario Feature Measure: Hours

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $2,353.79 **Scenario Cost/Unit:** $117.69

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	$207.67	6	$1,246.02
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$17.50	20	$350.00
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	$26.75	8	$214.00
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	$543.77	1	$543.77

Practice: 645 - Upland Wildlife Habitat Management

Scenario: #1 - Monitoring and Mgmt, Low Intensity, no FI

Scenario Description:

Setting is grazinglands with the potential to provide upland wildlife habitat and that potential is not currently being captured. The identified upland wildlife habitat limiting factors can be restored, enhanced or created, with the application of this practice alone, or in combination with other supporting and facilitating practices. Monitoring will be used to determine if the conservation system meets or exceeds the minimum quality criteria for the targeted wildlife. Management will be implemented based on the findings of the habitat assessment and monitoring. Upland wildlife habitat management and monitoring needed to treat the resource concerns requires no training, no qualitative data assessment, no water quality monitoring and is low in complexity and intensity. Examples of prescribed monitoring, include but are not limited to: photo points taken, use documentation by livestock, regeneration/breeding success, completing an annual management records log, documenting wildlife sightings, documenting location and species of invasive plants and condition of vegetative and structural treatments. No decision or treatment associated with this practice or facilitating practices will require income foregone. The planner will specify locations and identify the methods to the customer who will implement the monitoring and management plan. Facilitating practices may include but not limited to: 314, 315, 327, 342, 380, 384, 390, 391, 422, 472, 490, 511, 528, 550, 612, 647, 650, 654, 660, 666.

Before Situation:

Existing degraded plant conditions and resulting inadequate habitat for fish and wildlife have resulting in low use of the area by target and associated upland wildlife species.

After Situation:

Based on the results of a State-approved upland wildlife habitat assessment process, the application of upland wildlife habitat management efforts and prescribed monitoring have been implemented. With the application of this practice alone, or in combination with other supporting and facilitating practices, the inadequate upland wildlife habitat conditions have addressed. Monitoring has maximized the benefits of the needed upland wildlife habitat treatment efforts.

Scenario Feature Measure: Acres Managed and Monitored

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $709.82 **Scenario Cost/Unit:** $7.10

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	$7.01	1	$7.01
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	6	$248.46
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	6	$114.36
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	$108.13	3	$324.39
Materials						
Miscellaneous, containers, traps, etc.	298	Pheromone Traps, Culture container with lid. Includes materials and shipping only.	Each	$3.90	4	$15.60

Practice: 645 - Upland Wildlife Habitat Management

Scenario: #2 - Monitoring and Mgmt, Medium Intensity with FI

Scenario Description:

Setting is grazinglands with the potential to provide upland wildlife habitat and that potential is not currently being captured. The identified upland wildlife habitat limiting factors can be restored, enhanced or created, with the application of this practice alone, or in combination with other supporting and facilitating practices. Monitoring will be used to collect information/data that will result in adaptive management adoption. Upland wildlife habitat management and monitoring needed to treat the resource concerns may require training, no qualitative data assessment, no water quality monitoring and is medium in complexity and intensity. Examples of monitoring, include but are not limited to: photo points taken, use documentation by livestock, regeneration/breeding success, completing an annual management records log, documenting wildlife sightings, documenting location and species of invasive plants and condition of vegetative and structural treatments. Decisions or treatments associated with this practice or facilitating practices will require income foregone due to the deferment of livestock. The planner will specify locations and identify the methods to the customer who will implement the monitoring and management plan. Facilitating practices may include but not limited to: 314, 315, 327, 342, 380, 384, 390, 391, 422, 472, 490, 511, 528, 550, 612, 647, 650, 654, 660, 666.

Before Situation:

Existing degraded plant conditions and resulting inadequate habitat for fish and wildlife have resulting in low use of the area by target and associated upland wildlife species.

After Situation:

Based on the results of a State-approved upland wildlife habitat assessment process, the application of upland wildlife habitat management efforts and prescribed monitoring have been implemented. With the application of this practice alone, or in combination with other supporting and facilitating practices, the inadequate upland wildlife habitat conditions have addressed. Monitoring has maximized the benefits of the needed upland wildlife habitat treatment efforts.

Scenario Feature Measure: Acres Managed and Monitored.

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $1,810.10 **Scenario Cost/Unit:** $18.10

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						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	6	$42.06
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	6	$248.46
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	50	$574.50
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	$19.06	12	$228.72
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	$108.13	6	$648.78
Materials						
Miscellaneous, containers, traps, etc.	298	Pheromone Traps, Culture container with lid. Includes materials and shipping only.	Each	$3.90	6	$23.40

Practice: 645 - Upland Wildlife Habitat Management

Scenario: #3 - Monitoring and Mgmt, High Intensity with FI

Scenario Description:

Setting is grazinglands with the potential to provide upland wildlife habitat and that potential is not currently being captured. The identified upland wildlife habitat limiting factors can be restored, enhanced or created, with the application of this practice alone, or in combination with other supporting and facilitating practices. Monitoring will be used to determine if the conservation system meets or exceeds the minimum quality criteria for the targeted wildlife. Management will be implemented based on the findings of the habitat assessment and monitoring. Upland wildlife habitat management and monitoring needed to treat the resource concerns may require training, qualitative data assessment, water quality monitoring and is high in complexity and intensity. Examples of prescribed monitoring, include but are not limited to: qualitative data assessment or water quality monitoring, photo points taken, use documentation by livestock, regeneration/breeding success, completing an annual management records log, documenting wildlife sightings, documenting location and species of invasive plants and condition of vegetative and structural treatments. Decisions or treatments associated with this practice or facilitating practices will require income foregone. The planner will specify locations and identify the methods to the customer who will implement the monitoring and management plan. Facilitating practices may include but not limited to: 314, 315, 327, 342, 380, 384, 390, 391, 422, 472, 490, 511, 528, 550, 612, 647, 650, 654, 660,
666.

Before Situation:

Existing degraded plant conditions and resulting inadequate habitat for fish and wildlife have resulting in low use of the area by target and associated upland wildlife species.

After Situation:

Based on the results of a State-approved upland wildlife habitat assessment process, the application of upland wildlife habitat management efforts and prescribed monitoring have been implemented. With the application of this practice alone, or in combination with other supporting and facilitating practices, the inadequate upland wildlife habitat conditions have addressed. Monitoring has maximized the benefits of the needed upland wildlife habitat treatment efforts.

Scenario Feature Measure: Acres Managed and Monitored.

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $993.06 **Scenario Cost/Unit:** $9.93

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	$41.41	8	$331.28
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	8	$56.08
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	50	$574.50
Materials						
Miscellaneous, containers, traps, etc.	298	Pheromone Traps, Culture container with lid. Includes materials and shipping only.	Each	$3.90	8	$31.20

Practice: 645 - Upland Wildlife Habitat Management

Scenario: #4 - Monitoring and Management, Low Intensity with Foregone Income

Scenario Description:

Setting is a grazinglands with the potential to provide habitat for species of plants and animals identified as Rare and Declining and the habitat potential is not currently being captured. The identified habitat limiting factors can be restored, enhanced or created, with the application of this practice alone, or in combination with other supporting and facilitating practices. Monitoring will be used to determine if the conservation system meets or exceeds the minimum quality criteria for the targeted wildlife. Management will be implemented based on the findings of the habitat assessment and monitoring. Habitat management and monitoring needed to treat the resource concerns requires no training, no qualitative data assessment, no water quality monitoring and is low in complexity and intensity. Examples of prescribed monitoring, include but are not limited to: photo points taken, use documentation by livestock, regeneration/breeding success, completing an annual management records log, documenting wildlife sightings, documenting location and species of invasive plants and condition of vegetative and structural treatments. No decision or treatment associated with this practice or facilitating practices will require income foregone. The planner will specify locations and identify the methods to the customer who will implement the monitoring and management plan.

Before Situation:

Existing degraded plant conditions and resulting inadequate habitat for fish and wildlife have resulted in low use of the area by target species identified as Rare and Declining and associated species.

After Situation:

Based on the results of a State-approved upland wildlife habitat assessment process, the application of habitat management efforts and prescribed monitoring have been implemented. With the application of this practice alone, or in combination with other supporting and facilitating practices, the inadequate habitat conditions have been addressed. Monitoring has maximized the benefits of the needed habitat treatment efforts.

Scenario Feature Measure: Acres Managed and Monitored.

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $839.78 **Scenario Cost/Unit:** $8.40

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	$41.41	4	$165.64
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$11.49	50	$574.50
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	$19.06	4	$76.24
Materials						
Miscellaneous, containers, traps, etc.	298	Pheromone Traps, Culture container with lid. Includes materials and shipping only.	Each	$3.90	6	$23.40

Practice: 646 - Shallow Water Development and Management

Scenario: #1 - Shallow Water Management

Scenario Description:

This scenario addresses inadequate habitat for fish and wildlife on cropland. The resource concern is addressed by providing shallow water habitat for wildlife such as shorebirds, waterfowl, wading birds, mammals, fish, reptiles, amphibians, and other species that require shallow water for at least part of their life cycle. Sites are flooded up to a depth of 18" with an average depth of 9". Water is provided by natural flooding and/or precipitation.

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 for the same fields and cost shared under Structure for Water Control (587) and Dike (356). If a natural water source (i.e. precipitation or flooding) is not available, Pumping Plant (533) may be cost shared to provide a water source. Depending on local conditions, other Conservation Practices may also be required.

Scenario Feature Measure: Acre of shallow water

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $63.24 **Scenario Cost/Unit:** $63.24

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	$44.18	1	$44.18
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	1	$19.06

Practice: 646 - Shallow Water Development and Management

Scenario: #2 - Shallow Water Management, High Level

Scenario Description:

This scenario addresses inadequate habitat for fish and wildlife on cropland. To facilitate practice code 643, 644, 645, or 395, seasonal shallow water is provided annually for target species by purchasing of water, lifting of such water, monitoring of the water quality, response by target plant community, use by target flora or fauna. Sites are flooded up to a depth of 18"with an average depth of 9". Monitoring and adaptive management accomplished of existing water control structures is accomplished to meet very specific conditions needed to address previously identified degraded plant conditions or inadequate habitat for fish and/or wildlife. This high-level managmenet is applied to lands used for crop, pasture, hay, forests or wildlife lands where target flora and fauna have been identified as a primary concern. Loss of some level of crop, forage, hay or forest products may occur depending on site specific conditions.

Before Situation:

The site has existing infrastructure (reliable water source, dikes, water control structures, pumps, gates) to provide a reliable seasonal water source. The site is not subject to frequent natural flooding. 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 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 Dikes or Water Control Structures are not currently present on the fields planned to be flooded, these practices may be planned for the same fields and cost shared under Structure for Water Control (587) and Dike (356). If a natural water source (i.e. precipitation or flooding) is not available, Pumping Plant (533) may be cost shared to provide a water source. Depending on local conditions, other Conservation Practices may also be required.

Scenario Feature Measure: Acre of shallow water

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $169.97 **Scenario Cost/Unit:** $169.97

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 management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$142.30	0.75	$106.73
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	1	$19.06

Practice: 647 - Early Successional Habitat Development and Management

Scenario: #1 - Mowing

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. This scenario can be used nationwide. The typical setting for this scenario is at the edge of crop fields, in pastures, at the edge of woodlands or brushy areas, and in odd areas such as pivot corners. 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 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 has provided more sun light for forb establishment. The heterogeneity of the habitat structure has been increased.

Scenario Feature Measure: width and length of treated area

Scenario Unit: Acres

Scenario Typical Size: 2

Scenario Cost: $493.48 **Scenario Cost/Unit:** $246.74

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	$56.58	4	$226.32
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	4	$75.60
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	$191.56	1	$191.56

Practice: 647 - Early Successional Habitat Development and Management

Scenario: #2 - Disking

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. The typical setting for this scenario is at the edge of crop fields, in pastures, and in odd areas such as pivot corners. This scenario is applicable nationwide. 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.

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: width and length of treated area

Scenario Unit: Acres

Scenario Typical Size: 2

Scenario Cost: $215.04 **Scenario Cost/Unit:** $107.52

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	$11.74	2	$23.48
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	$191.56	1	$191.56

Practice: 649 - Structures for Wildlife

Scenario: #1 - Nesting Box, Small no pole

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. Addresses resource concern for wildlife of inadequate cover/shelter

Before Situation:

The area lacks sufficient nesting habitat sites (natural cavities). 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. These structures/features enhance habitat, cover, and improve species survivability.

Scenario Feature Measure: Number of structures

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $40.02 **Scenario Cost/Unit:** $40.02

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	$19.06	0.5	$9.53
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 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:

This area lacked sufficient nesting sites to support viable populations of targeted species. Location and conditions suggest that predator guards are not needed.

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 of structures with poles.

Scenario Unit: Number

Scenario Typical Size: 1

Scenario Cost: $59.75 **Scenario Cost/Unit:** $59.75

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	$19.06	0.75	$14.30
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	1	$14.96
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: #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:

The area lacks sufficient overall habitat conditions to support viable populations of targeted species. A suitable location to mount the box is available. Predator guards not needed.

After Situation:

The installation of nesting and rearing boxes support the life-cycle needs of targeted species, 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 of structures.

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $81.08 **Scenario Cost/Unit:** $81.08

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	$19.06	0.5	$9.53
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 or Rapture Perch, Large, with Pole

Scenario Description:

Constructing a nest box or rapture perch 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 woodducks, bats, barn owls or to provide needed perches or nesting structures for raptures. Addresses Resource Concern: Inadequate Cover/Shelter.

Before Situation:

The area lacks sufficient overall nesting sites to support viable populations of targeted species. Predator guards provide needed protection of target species during nesting and rearing.

After Situation:

The installation of pole mounted nesting and rearing boxes support the life-cycle needs of targeted species, such as bats and waterfowl.

Scenario Feature Measure: Number of structures

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $365.30 **Scenario Cost/Unit:** $365.30

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	$127.06	0.1	$12.71
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$34.13	0.5	$17.07
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	1.5	$28.59
Materials						
Pipe, steel, galvanized, threaded, 1¼ ", schedule 40	256	Spec. A-53, includes coupling and clevis hanger assembly sized for covering, 10' OC	Foot	$20.61	10	$206.10
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 - Escape Ramp

Scenario Description:

Retrofit an existing watering trough/tank with an appropriately designed and installed wildlife escape ramp to reduce wildlife mortality and maintain water quality within the watering facility.

Before Situation:

Existing watering facilities lack escape potential for wildlife. This results in death of the small wildlife accessing the facility for water, and resulting poor water quality as the animal decays.

After Situation:

Watering facilities provide wildlife safe access. Water quality is improved within the watering facility and wildlife mortality is reduced.

Scenario Feature Measure: Each Ramp

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $34.00 **Scenario Cost/Unit:** $34.00

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	$19.06	0.5	$9.53
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: #6 - 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. 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 pose a collision threat to wildlife of special concern.

After Situation:

Fence related mortality of species of special concern is reduced.

Scenario Feature Measure: feet of fence marked

Scenario Unit: Foot

Scenario Typical Size: 1,320

Scenario Cost: $165.17 **Scenario Cost/Unit:** $0.13

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	$34.13	0.5	$17.07
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	5	$95.30
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: #7 - Brush Pile - Small

Scenario Description:

Small brush piles are created to provide shrubby/woody escape cover for wildlife. Pushing or cutting of select small trees and placement in selected locations to provide wildlife cover. Typical scenario of 10' x 20' area for structure covered by interlocking limbs of trees less than 12 inches in diameter.

Before Situation:

The existing habitat lacks escape, ground nesting and safe loafing cover.

After Situation:

Small brush piles provide needed escape, ground nesting and safe loafing cover for targeted wildlife species.

Scenario Feature Measure: brush piles

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $33.49 **Scenario Cost/Unit:** $33.49

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	$48.07	0.5	$24.04
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	0.5	$9.45

Practice: 649 - Structures for Wildlife

Scenario: #8 - Brush Pile - Large

Scenario Description:

Downed tree structures are created to provide shrubby/woody escape cover for wildlife. Existing sod will be killed prior to placement of tree structures. Felling of select trees and placement in selected locations to provide wildlife cover. Typical scenario of 30' x 50' area for structure covered by interlocking limbs of trees at least 12" in diameter.

Before Situation:

The existing habitat lacks escape, ground nesting and safe loafing cover.

After Situation:

Large brush piles provide needed escape, ground nesting and safe loafing cover for targeted wildlife species.

Scenario Feature Measure: brush piles

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $131.16 **Scenario Cost/Unit:** $131.16

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	$7.01	1	$7.01
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	1	$48.07
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	3	$57.18
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	1	$18.90

Practice: 649 - Structures for Wildlife

Scenario: #9 - 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.

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: Each

Scenario Typical Size: 1

Scenario Cost: $575.95 **Scenario Cost/Unit:** $575.95

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	$19.06	1	$19.06
Materials						
Concrete mix, bag	1226	Pre-mixed dry concrete mix in 60 pound bag. Materials only.	Each	$3.65	3	$10.95
Pipe, steel, galvanized, threaded, 2", schedule 40	257	Spec. A-53, includes coupling and clevis hanger assembly sized for covering, 10' OC	Foot	$30.33	18	$545.94

Practice: 649 - Structures for Wildlife

Scenario: #10 - Burrowing Owl Burrow

Scenario Description:

A structure is provided to improve wildlife habitat by providing a burrowing owl burrow. 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.

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: Each

Scenario Typical Size: 1

Scenario Cost: $396.72 **Scenario Cost/Unit:** $396.72

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	$62.38	2	$124.76
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	$19.06	2	$38.12
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	2	$37.80
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	$0.46	60	$27.60
Pipe, PVC, 6", SCH 40	980	Materials: - 6" - PVC - SCH 40 - ASTM D1785	Foot	$6.79	24	$162.96

Practice: 649 - Structures for Wildlife

Scenario: #11 - Lunkers

Scenario Description:

A structure is provided to improve aquatic habitat by providing alternative cover when natural cover is not readily available. These structures are designed to enhance habitat by simulating an overhanging/undercut bank. The resulting cavity provides cover and temperature attenuation to support aquatic organism biology and life history needs. A structure made of wood is placed at the toe of a slope on a rock base. The structure is then weighted with rock and covered.

Before Situation:

These structures are targeted for areas that lack sufficient cover and overall habitat conditions to support the life cycle needs of numerous aquatic organisms.

After Situation:

The installation of lunkers, typically in groups of three, provide improved cover. These structures improve species survivability by providing cover and temperature attenuation. Typical installation is a group of three lunkers that are typically 8 ft long and 2 ft wide. Structures are typically located downstream of the apex of a bend to promote flow through the structure and minimize depostion of sediments.

Scenario Feature Measure: Number

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $2,853.38 **Scenario Cost/Unit:** $2,853.38

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	$127.04	8	$1,016.32
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	$19.06	16	$304.96
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	$26.75	16	$428.00
Materials						
Lumber, planks, posts and timbers, untreated, rot resistant	1612	Untreated dimension lumber with nominal thickness greater than 2" milled from rot resistant species such as cedar. Includes lumber and fasteners. Does not include labor.	Board Foot	$2.37	270	$639.90
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$21.10	22	$464.20

Practice: 649 - Structures for Wildlife

Scenario: #12 - 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

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $26.07 **Scenario Cost/Unit:** $26.07

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	$7.01	1	$7.01
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	1	$19.06

Practice: 649 - Structures for Wildlife

Scenario: #13 - 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: $4,973.20 **Scenario Cost/Unit:** $4,973.20

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	$207.67	20	$4,153.40
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	$26.75	20	$535.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 649 - Structures for Wildlife

Scenario: #14 - 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: $22.57 **Scenario Cost/Unit:** $22.57

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	$7.01	0.5	$3.51
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	1	$19.06

Practice: 649 - Structures for Wildlife

Scenario: #15 - 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: $137.73 **Scenario Cost/Unit:** $137.73

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	$7.01	1	$7.01
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	0.5	$24.04
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	1.5	$28.35
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	2	$38.12
Materials						
Log, un-anchored	2035	Price of log picked up at the Mill. Includes material only.	Ton	$40.21	1	$40.21

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.

Before Situation:

1000 feet of livestock shelterbelt, 4 row mix of deciduous and conifer trees/shrubs deteriorating due to being sod bound. Resouce concerns: Degrade plant condition- undesirable plant productivity and health; Livestock Production-Inadequate livestock shelter..

After Situation:

Integrity of windbreak restored. Domestic animal protection restored.

Scenario Feature Measure: Length of Renovation

Scenario Unit: Linear Feet

Scenario Typical Size: 5,000

Scenario Cost: $363.42 **Scenario Cost/Unit:** $0.07

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	$6.47	1	$6.47
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	$19.06	2	$38.12
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	$108.13	1	$108.13
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	$191.56	1	$191.56

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.

Before Situation:

Windbreak functionality has decreased. Windbreak tree and/or shrub species are overly dense and do not provide the desired wind protection. Resouce concern is Degrade plant condition- undesirable plant productivity and health.

After Situation:

Integrity of windbreak restored, function and health improved.

Scenario Feature Measure: Length of Renovation

Scenario Unit: Linear Feet

Scenario Typical Size: 1,100

Scenario Cost: $645.78 **Scenario Cost/Unit:** $0.59

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	$63.26	2	$126.52
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	10	$70.10
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	$19.06	10	$190.60
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	$108.13	2	$216.26
Materials						
Herbicide, Triclopyor	338	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$42.30	1	$42.30

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 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. 1,000 feet of windbreaks or shelterbelts

Scenario Feature Measure: Length of Renovation

Scenario Unit: Linear Feet

Scenario Typical Size: 1,100

Scenario Cost: $524.62 **Scenario Cost/Unit:** $0.48

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	$7.01	10	$70.10
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	$19.06	12	$228.72
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	$108.13	2	$216.26

Practice: 650 - Windbreak/Shelterbelt Renovation

Scenario: #4 - Tree/Shrub Removal with Chain Saw

Scenario Description:

Windbreak renovation requires the removal of degraded or inappropriate trees or shrubs within a windbreak. 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. Resource concerns: Degrade 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. 1,000 feet of windbreak/shelterbelt renovated.

Scenario Feature Measure: Length of Renovation

Scenario Unit: Linear Feet

Scenario Typical Size: 1,000

Scenario Cost: $472.48 **Scenario Cost/Unit:** $0.47

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	$7.01	8	$56.08
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	$108.13	2	$216.26
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	10	$190.60

Practice: 650 - Windbreak/Shelterbelt Renovation

Scenario: #5 - Removal <8 inches DBH with Skidsteer

Scenario Description:

Windbreak renovation requires the removal of degraded or inappropriate trees or shrubs within a windbreak. 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. Resource concerns include Degraded plant condition- undesirable plant productivity and health; Livestock Production-Inadequate livestock shelter, Soil erosion-wind.

Before Situation:

Reduce wind impacts by renovating 1,000 foot windbreaks or shelterbelts using heavy equipment to remove selected trees with average DBH < 8 Inches. Typically trees and shrubs are cleared by a Skidsteer using a tree sheer or saw. All slash material from cutting and pruning is either scattered and crushed, piled and crushed, chipped or removed from the treatment area.

After Situation:

Integrity and function of windbreak restored.

Scenario Feature Measure: Length of Renovation

Scenario Unit: Linear Feet

Scenario Typical Size: 1,000

Scenario Cost: $789.82 **Scenario Cost/Unit:** $0.79

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	$48.07	8	$384.56
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	10	$189.00
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	$108.13	2	$216.26

Practice: 650 - Windbreak/Shelterbelt Renovation

Scenario: #6 - Removal > 8 inches DBH with Dozer

Scenario Description:

Windbreak renovation requires the removal of degraded or inappropriate trees or shrubs within a windbreak. 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. Resource concerns include Degraded plant condition- undesirable plant productivity and health; Livestock Production-Inadequate livestock shelter, Soil erosion-wind.

Before Situation:

Reduce wind impacts by renovating 1,000 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.

After Situation:

Integrity and function of windbreak restored.

Scenario Feature Measure: Length of Renovation

Scenario Unit: Linear Feet

Scenario Typical Size: 1,000

Scenario Cost: $1,538.10 **Scenario Cost/Unit:** $1.54

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	$138.48	8	$1,107.84
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	$108.13	2	$216.26
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	$26.75	8	$214.00

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. 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. 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.

After Situation:

The integrity and function of the windbreak is restored.

Scenario Feature Measure: Area of Renovation

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $496.18 **Scenario Cost/Unit:** $496.18

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	$23.24
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	$108.13	2	$216.26
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	3	$57.18
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	350	$199.50

Practice: 650 - Windbreak/Shelterbelt Renovation

Scenario: #8 - Supplemental Plantings-Bare Root

Scenario Description:

Parts of the windbreak being renovated have died. Supplemental plantings of bare root trees/shrubs will improve the effectiveness and longevity of the windbreak. 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. 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.

After Situation:

The integrity and function of the windbreak is restored.

Scenario Feature Measure: Area of Renovation

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $469.80 **Scenario Cost/Unit:** $469.80

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	3	$34.86
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	$108.13	2	$216.26
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	3	$57.18
Materials						
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.47	200	$94.00
Tree, conifer, seedling, bare root, 1-1	1513	Bare root conifer trees, 1-1 (2 years old). Includes materials and shipping only.	Each	$0.45	150	$67.50

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:

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.

After Situation:

The integrity and function of the windbreak is restored.

Scenario Feature Measure: Area of Renovation

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $631.32 **Scenario Cost/Unit:** $631.32

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	$34.62	8	$276.96
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$20.49	8	$163.92
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	$75.80	2	$151.60
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	$19.42	2	$38.84

Practice: 654 - Road / Trail / Landing Closure and Treatment

Scenario: #4 - Road/Trail/Landing Closure and Treatment, >35% hillslope

Scenario Description:

The practice includes permanent road/trail/landing closure and treatment, and the hydrologically reconnection of the hillslope to applicable drainage networks. The treatment will limit future access. 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 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. The steep slopes makes this scenario costly due to the increased time needed to apply the measures and the need for additional water control devices. 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. Tree/Shrub Site Prep is not included. However, Tree/Shrub Planting is recommended. 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.

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 it's 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.

Scenario Feature Measure: length

Scenario Unit: Feet

Scenario Typical Size: 500

Scenario Cost: $5,227.96 **Scenario Cost/Unit:** $10.46

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$74.86	8	$598.88
	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	2	$14.02
	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	8	$331.28
	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$11.74	0.28	$3.29
	959	Broadcast seed via ground operation. May require post tillage operation to incorporate seed. Includes equipment, power unit and labor costs.	Acre	$13.31	0.28	$3.73
	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	$2.61	500	$1,305.00
	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	$212.37	6	$1,274.22
Labor						
	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	8	$152.48
	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$33.06	6	$198.36
	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$26.75	8	$214.00

Materials

	2312	Native, cool season perennial grass. Includes material and shipping only.	Acre	$161.29	0.28	$45.16

Mobilization

	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$543.77	2	$1,087.54

Practice: 656 - Constructed Wetland

Scenario: #1 - Small, Less Than 0.1 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 small site (i.e. <0.1 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 2000 sq foot constructed wetland (i.e. 20' x 100') will be 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 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: Square Foot

Scenario Typical Size: 2,000

Scenario Cost: $1,428.34 **Scenario Cost/Unit:** $0.71

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	$0.95	37	$35.15
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$296.42	0.05	$14.82
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	$2.72	74	$201.28
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	4	$76.24
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	325	$445.25
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
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	$284.80	1	$284.80

Practice: 656 - Constructed Wetland

Scenario: #2 - Medium, 0.1 to 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 medium site (i.e. 0.1 - 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 0.25 acre constructed wetland (i.e. 45' x 240') will be 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 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: 0

Scenario Cost: $4,129.01 **Scenario Cost/Unit:** #Div/0!

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	$0.95	200	$190.00
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	$2.72	400	$1,088.00
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$296.42	0.25	$74.11
Foregone Income						
FI, Hay, General Grass	2122	General Grass Hay is Primary Land Use	Ton	$41.38	0.12	$4.97
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	14	$266.84
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
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	2	$19.54
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
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

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 1 acre constructed wetland (i.e. 95' x 460') will be 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 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: $11,789.01 **Scenario Cost/Unit:** $11,789.01

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	$2.72	1619	$4,403.68
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.95	809	$768.55
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$296.42	1	$296.42
Foregone Income						
FI, Hay, General Grass	2122	General Grass Hay is Primary Land Use	Ton	$41.38	0.5	$20.69
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	37	$705.22
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	3605	$4,938.85
Test, Standard Water Test, Well Water	309	Well Water Suitability test. Includes materials and shipping only.	Each	$40.64	8	$325.12
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
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 657 - Wetland Restoration

Scenario: #1 - Mineral Flat

Scenario Description:

A Mineral Flat wetland is to be restored. The tract size is 160 Acres consists of surface saturated soils interspersed with shallow depressions that are not depressional class HGM wetlands. The wetland size is also 160 acres. Resource Concerns are: 4-SOIL QUALITY DEGRADATION - Organic matter depletion, 11- WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, 12 - WATER QUALITY DEGRADATION - Pesticides transported to surface and ground waters, 16 - WATER QUALITY DEGRADATION - Excessive sediment in surface waters, 18 - DEGRADED PLANT CONDITION - Undesirable plant productivity and health, 19 - DEGRADED PLANT CONDITION, Inadequate strucuture and composition, 22- INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

Before Situation:

The site has been drained with a tile drain system. A suitable seed bank exists for natural regeneration to re-establish hydrophytic vegetation. The site is in agricultural production.

After Situation:

The drain tiles have been rendered non-functional by excavating 50 foot lengths of tile mains and laterals in 24 separate locations, and backfilling with excavated earth, which is compacted with the excavator bucket. There are no facilitating practices. 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: 160

Scenario Cost: $2,235.52 **Scenario Cost/Unit:** $13.97

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	$62.38	24	$1,497.12
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	24	$453.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 657 - Wetland Restoration

Scenario: #3 - Riverine Levee Removal and Floodplain Features

Scenario Description:

A Riverine HGM tract on a large floodplain is to be restored. It has been converted to agricultural production by surface ditching and clearing of woody vegetation. The size of the tract is 100 acres. The wetland extent is 60 acres, and 40 acres are adjacent non-wetland. Resource Concerns are: 4-SOIL QUALITY DEGRADATION - Organic matter depletion, 11- WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, 12 - WATER QUALITY DEGRADATION - Pesticides transported to surface and ground waters, 16 - WATER QUALITY DEGRADATION - Excessive sediment in surface waters, 18 - DEGRADED PLANT CONDITION - Undesirable plant productivity and health, 19 - DEGRADED PLANT CONDITION, Inadequate strucuture and composition, 22- INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

Before Situation:

A levee prevents floodwater from entering the tract. The original cover was forest. The site is drained by surface ditches which collect surface water and direct it to the river through a flap gate structure. The site has been completely cleared, and no suitable adjacent seedwall exists for natural regeneration of forest species. The lateral connectivity between the channel and floodplain has been altered by construction of levees along the reach.

After Situation:

The hydrology of the site is restored with the installation of ditch plugs, and the excavation of macrotopographic features with an average depth of 6" over 30% of the wetland area. Excavated spoil is placed adjacent to the features on the wetland and adjacent non-wetland area with a maximum depth of 24 inches. The levee has been breached at the upstream and downstream ends of the tract reach, restoring dynamic stream flooding. The breach length is 150 feet long at both locations. Both the wetland and non-wetland areas are planted with a Bottomland Hardwood species mix. The levee breaches are armored with rock riprap. Facilitating practices include Grade Stabilization Structure and Tree and Shrub Planting. 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: 100

Scenario Cost: $40,453.31 **Scenario Cost/Unit:** $404.53

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	$2.35	16520	$38,822.00
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	$543.77	3	$1,631.31

Practice: 657 - Wetland Restoration

Scenario: #4 - Depression Sediment Removal and Ditch Plug

Scenario Description:

A Depressional HGM class wetland is to be restored. The tract size is 15 acres, and the actual wetland size is 10 acres. The site is a recharge depression, fed only from surface runoff. Resource Concerns are: 4-SOIL QUALITY DEGRADATION - Organic matter depletion, 11- WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, 12 - WATER QUALITY DEGRADATION - Pesticides transported to surface and ground waters, 16 - WATER QUALITY DEGRADATION - Excessive sediment in surface waters, 18 - DEGRADED PLANT CONDITION - Undesirable plant productivity and health, 19 - DEGRADED PLANT CONDITION, Inadequate strucuture and composition, 22- 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. The wetland receives surface runoff from an adjacent upland watershed, and ponds water on a shallow perched layer. The watershed has been converted from native to agricultural landuse, and the resultant soil erosion has deposited 6" of sediment in the bottom of the depression.

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: 15

Scenario Cost: $20,433.92 **Scenario Cost/Unit:** $1,362.26

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	$2.35	8067	$18,957.45
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	89	$388.93
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	$543.77	2	$1,087.54

Practice: 657 - Wetland Restoration

Scenario: #5 - Estuarine Fringe Levee Removal

Scenario Description:

An Estuarine Fringe HGM landscape is to be restored. The wetland is subject to tidally induced water level fluctuations. The tract size is 120 acres, and the wetland area is 100 acres. Resource Concerns are: 4-SOIL QUALITY DEGRADATION - Organic matter depletion, 11- WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, 12 - WATER QUALITY DEGRADATION - Pesticides transported to surface and ground waters, 16 - WATER QUALITY DEGRADATION - Excessive sediment in surface waters, 18 - DEGRADED PLANT CONDITION - Undesirable plant productivity and health, 19 - DEGRADED PLANT CONDITION, Inadequate strucuture and composition, 22- 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. The dike is 7 feet high above the current marsh surface. The dike has side slopes of 3:1, with a 12 foot top. A suitable seedbank exists for natural regeneration of the original plant community. The soils are organic, and loss of hydrology has caused the land surface to subside 3 feet due to aerobic decomposition of organic matter (mineralization).

After Situation:

The dike has been breached in 4 locations, corresponding to the number of original inlet channels. The breach locations have 8 foot long steel sheet pile Structures for Water Control installed to prevent tidal surges from causing serious erosion on the subsided land surface. The original flap gate culvert has been removed. The dike is 4 feet higher than the weir crests, so the excavations are 4 feet by 8 feet long, with 3:1 side slopes. The culvert has been removed and salvaged by the landowner. Facilitating practices are Structure for Water Control. 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: 120

Scenario Cost: $2,298.71 **Scenario Cost/Unit:** $19.16

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	$2.35	284	$667.40
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	$543.77	3	$1,631.31

Practice: 657 - Wetland Restoration

Scenario: #6 - Riverine Channel and Floodplain Restoration

Scenario Description:

A Riverine HGM landscape on a small stream on a low stream order riparian landscape has been converted to agricultural production. The stream channel has degraded. The reach is 1500 feet in length, and the tract size is 15 acres. The wetland area is 10 acres. Resource Concerns are: 4-SOIL QUALITY DEGRADATION - Organic matter depletion, 11- WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, 12 - WATER QUALITY DEGRADATION - Pesticides transported to surface and ground waters, 16 - WATER QUALITY DEGRADATION - Excessive sediment in surface waters, 18 - DEGRADED PLANT CONDITION - Undesirable plant productivity and health, 19 - DEGRADED PLANT CONDITION, Inadequate strucuture and composition, 22- INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

Before Situation:

Channel incision has broken the lateral connectivity between the stream and floodplain. The coversion to cropland was accompanied by filling and leveling of backswamp, side channel, and oxbow features which formerly ponded water or exposed the floodplain groundwater table. The site no longer has access to floodwater or water surface profile supported groundwater. No suitable seed bank exists for natural regeneration of the original hydrophytic plant community, either in the channel, or on the floodplain.

After Situation:

The hydrology of the site is restored by the installation of a series of rock check structures to raise the stream water surface profile. Floodplain macrotopographic features replicating the original side channels, oxbows, and backswamps are constructed by excavation. Spoil is placed adjacent to the excavations to replicate natural depositional features. The average depth of the excavated features is 2 feet, and the surface area of the excavations is 25% of the tract size. The eroding stream bank is stabilized with soil bio-engineering features, and fish habitat improvement measures are installed in the channel. The tract is seeded to appropriate hydrophytic and upland vegetation, both woody and herbaceous. Facilitating practices are Streambank and Shoreline protection, Structure for Water Control, Conservation Cover, Tree/Shrub Establishment, and Stream Habitat Improvement and Management. 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: 15

Scenario Cost: $8,196.29 **Scenario Cost/Unit:** $546.42

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	$2.35	3025	$7,108.75
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	$543.77	2	$1,087.54

Practice: 658 - Wetland Creation

Scenario: #1 - Wetland Creation, Wildlife Pond

Scenario Description:

A wetland is created on a flat mineral upland at a location where surface runoff may be intercepted and ponded by excavation. Resource concerns are 22 - INDEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

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: $20,044.99 **Scenario Cost/Unit:** $4,009.00

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	$2.35	8067	$18,957.45
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	$543.77	2	$1,087.54

Practice: 659 - Wetland Enhancement

Scenario: #1 - Mineral Flat

Scenario Description:

A Mineral Flat wetland is to be enhanced. The tract size is 160 Acres consists of surface saturated soils interspersed with shallow depressions that are not depressional class HGM wetlands. The wetland size is also 160 acres. Resource Concerns are: 4-SOIL QUALITY DEGRADATION - Organic matter depletion, 11- WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, 12 - WATER QUALITY DEGRADATION - Pesticides transported to surface and ground waters, 16 - WATER QUALITY DEGRADATION - Excessive sediment in surface waters, 18 - DEGRADED PLANT CONDITION - Undesirable plant productivity and health, 19 - DEGRADED PLANT CONDITION, Inadequate strucuture and composition, 22- INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

Before Situation:

The site has been drained with a tile drain system. A suitable seed bank exists for natural regeneration to re-establish hydrophytic vegetation. The site is in agricultural production.

After Situation:

The drain tiles have been rendered non-functional by excavating 50 foot lengths of tile mains and laterals in 24 separate locations, and backfilling with excavated earth, which is compacted with the excavator bucket. There are no facilitating practices. Enhancement 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: 160

Scenario Cost: $2,235.52 **Scenario Cost/Unit:** $13.97

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	$62.38	24	$1,497.12
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	24	$453.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$284.80	1	$284.80

Practice: 659 - Wetland Enhancement

Scenario: #3 - Riverine Levee Removal and Floodplain Features

Scenario Description:

A Riverine HGM tract on a large floodplain is to be enhanced. It has been converted to agricultural production by surface ditching and clearing of woody vegetation. The size of the tract is 100 acres. The wetland extent is 60 acres, and 40 acres are adjacent non-wetland. Resource Concerns are: 4-SOIL QUALITY DEGRADATION - Organic matter depletion, 11- WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, 12 - WATER QUALITY DEGRADATION - Pesticides transported to surface and ground waters, 16 - WATER QUALITY DEGRADATION - Excessive sediment in surface waters, 18 - DEGRADED PLANT CONDITION - Undesirable plant productivity and health, 19 - DEGRADED PLANT CONDITION, Inadequate strucuture and composition, 22- INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

Before Situation:

A levee prevents floodwater from entering the tract. The original cover was forest. The site is drained by surface ditches which collect surface water and direct it to the river through a flap gate structure. The site has been completely cleared, and no suitable adjacent seedwall exists for natural regeneration of forest species. The lateral connectivity between the channel and floodplain has been altered by construction of levees along the reach.

After Situation:

The hydrology of the site is enhanced with the installation of ditch plugs, and the excavation of macrotopographic features with an average depth of 6" over 30% of the wetland area. Excavated spoil is placed adjacent to the features on the wetland and adjacent non-wetland area with a maximum depth of 24 inches. The levee has been breached at the upstream and downstream ends of the tract reach, restoring dynamic stream flooding. The breach length is 150 feet long at both locations. Both the wetland and non-wetland areas are planted with a Bottomland Hardwood species mix. The levee breaches are armored with rock riprap. Facilitating practices include Grade Stabilization Structure and Tree and Shrub Planting. 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: 100

Scenario Cost: $46,868.81 **Scenario Cost/Unit:** $468.69

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	$2.35	19250	$45,237.50
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	$543.77	3	$1,631.31

Practice: 659 - Wetland Enhancement

Scenario: #4 - Depression Sediment Removal and Ditch Plug

Scenario Description:

A Depressional HGM class wetland is to be enhanced. The tract size is 15 acres, and the actual wetland size is 10 acres. The site is a recharge depression, fed only from surface runoff. Resource Concerns are: 4-SOIL QUALITY DEGRADATION - Organic matter depletion, 11-WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, 12 - WATER QUALITY DEGRADATION - Pesticides transported to surface and ground waters, 16 - WATER QUALITY DEGRADATION - Excessive sediment in surface waters, 18 - DEGRADED PLANT CONDITION - Undesirable plant productivity and health, 19 - DEGRADED PLANT CONDITION, Inadequate strucuture and composition, 22- 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. The wetland receives surface runoff from an adjacent upland watershed, and ponds water on a shallow perched layer. The watershed has been converted from native to agricultural landuse, and the resultant soil erosion has deposited 6" of sediment in the bottom of the depression.

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: 15

Scenario Cost: $20,433.92 **Scenario Cost/Unit:** $1,362.26

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	$2.35	8067	$18,957.45
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$4.37	89	$388.93
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	$543.77	2	$1,087.54

Practice: 659 - Wetland Enhancement

Scenario: #5 - Estuarine Fringe Levee Removal

Scenario Description:

An Estuarine Fringe HGM landscape is to be enhanced. The wetland is subject to tidally induced water level fluctuations. The tract size is 120 acres, and the wetland area is 100 acres. Resource Concerns are: 4-SOIL QUALITY DEGRADATION - Organic matter depletion, 11-WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, 12 - WATER QUALITY DEGRADATION - Pesticides transported to surface and ground waters, 16 - WATER QUALITY DEGRADATION - Excessive sediment in surface waters, 18 - DEGRADED PLANT CONDITION - Undesirable plant productivity and health, 19 - DEGRADED PLANT CONDITION, Inadequate strucuture and composition, 22- 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. The dike is 7 feet high above the current marsh surface. The dike has side slopes of 3:1, with a 12 foot top. A suitable seedbank exists for natural regeneration of the original plant community. The soils are organic, and loss of hydrology has caused the land surface to subside 3 feet due to aerobic decomposition of organic matter (mineralization).

After Situation:

The dike has been breached in 4 locations, corresponding to the number of original inlet channels. The breach locations have 8 foot long steel sheet pile Structures for Water Control installed to prevent tidal surges from causing serious erosion on the subsided land surface. The original flap gate culvert has been removed. The dike is 4 feet higher than the weir crests, so the excavations are 4 feet by 8 feet long, with 3:1 side slopes. The culvert has been removed and salvaged by the landowner. Facilitating practices are Structure for Water Control. 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: 120

Scenario Cost: $2,298.71 **Scenario Cost/Unit:** $19.16

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	$2.35	284	$667.40
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	$543.77	3	$1,631.31

Practice: 659 - Wetland Enhancement

Scenario: #6 - Riverine Channel and Floodplain Restoration

Scenario Description:

A Riverine HGM landscape on a small stream on a low stream order riparian landscape has been converted to agricultural production. The stream channel has degraded. The reach is 1500 feet in length, and the tract size is 15 acres. The wetland area is 10 acres. Resource Concerns are: 4-SOIL QUALITY DEGRADATION - Organic matter depletion, 11- WATER QUALITY DEGRADATION - Excess nutrients in surface and ground waters, 12 - WATER QUALITY DEGRADATION - Pesticides transported to surface and ground waters, 16 - WATER QUALITY DEGRADATION - Excessive sediment in surface waters, 18 - DEGRADED PLANT CONDITION - Undesirable plant productivity and health, 19 - DEGRADED PLANT CONDITION, Inadequate strucuture and composition, 22- INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

Before Situation:

Channel incision has broken the lateral connectivity between the stream and floodplain. The coversion to cropland was accompanied by filling and leveling of backswamp, side channel, and oxbow features which formerly ponded water or exposed the floodplain groundwater table. The site no longer has access to floodwater or water surface profile supported groundwater. No suitable seed bank exists for natural regeneration of the original hydrophytic plant community, either in the channel, or on the floodplain.

After Situation:

The hydrology of the site is restored by the installation of a series of rock check structures to raise the stream water surface profile. Floodplain macrotopographic features replicating the original side channels, oxbows, and backswamps are constructed by excavation. Spoil is placed adjacent to the excavations to replicate natural depositional features. The average depth of the excavated features is 2 feet, and the surface area of the excavations is 25% of the tract size. The eroding stream bank is stabilized with soil bio-engineering features, and fish habitat improvement measures are installed in the channel. The tract is seeded to appropriate hydrophytic and upland vegetation, both woody and herbaceous. Facilitating practices are Streambank and Shoreline protection, Structure for Water Control, Conservation Cover, Tree/Shrub Establishment, and Stream Habitat Improvement and Management. 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: 15

Scenario Cost: $8,196.29 **Scenario Cost/Unit:** $546.42

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	$2.35	3025	$7,108.75
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	$543.77	2	$1,087.54

Practice: 660 - Tree/Shrub Pruning

Scenario: #1 - Pruning

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. 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 8-10') 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: $3,681.72 **Scenario Cost/Unit:** $184.09

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	$7.01	60	$420.60
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
Pruning tool, pole saw	1319	Gasoline powered pole chainsaw. Labor not included.	Hour	$8.03	60	$481.80
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	$19.06	120	$2,287.20
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	$33.06	12	$396.72

Practice: 660 - Tree/Shrub Pruning

Scenario: #2 - Pruning-Low Height

Scenario Description:

Pruning is done by hand with chain saws, tree loppers, hand shears, or hand saws. Trees are identified for pruning. To improve the quality of the stem wood, branches are pruned from the trees. Trees are growing at a fast pace, with leader growth on trees anywhere from 1.5 feet to 4 feet in length.

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: $2,676.90 **Scenario Cost/Unit:** $133.85

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	$7.01	80	$560.80
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
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	80	$1,524.80
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	$33.06	15	$495.90

Practice: 660 - Tree/Shrub Pruning

Scenario: #3 - Pruning- High Height

Scenario Description:

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. To improve the quality of the stem wood, branches are pruned from the trees.

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: $7,096.50 **Scenario Cost/Unit:** $354.83

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	200	$954.00
Pruning tool, pole saw	1319	Gasoline powered pole chainsaw. Labor not included.	Hour	$8.03	100	$803.00
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	100	$701.00
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	$19.06	200	$3,812.00
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	$33.06	25	$826.50

Practice: 660 - Tree/Shrub Pruning

Scenario: #4 - Pruning-Wildlife

Scenario Description:

Pruning of hard/soft mast trees and shrubs to stimulate increased fruit/nut production for wildlife food. Primarily done around old agricultural fields, in old orchards, 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 degrdation 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: $379.62 **Scenario Cost/Unit:** $189.81

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	5	$40.15
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	$7.01	5	$35.05
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	10	$190.60
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	$33.06	2	$66.12

Practice: 660 - Tree/Shrub Pruning

Scenario: #5 - Pruning-Multistory Cropping Understory

Scenario Description:

Pruning trees and/or shrubs is accomplished to extend the life span of trees and or shrubs. Pruning reduces the time periods of replacement by 2/3rds, exposing less bare soil. 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. Alternative row pruning, treating every other row (or one-half the plants), in the same field, is completed 2 times. Renovation pruning is conducted one time for the entire field.

Scenario Feature Measure: individual tree/shrub pruned

Scenario Unit: Each

Scenario Typical Size: 800

Scenario Cost: $610.38 **Scenario Cost/Unit:** $0.76

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	$7.01	10	$70.10
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
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.06	10	$190.60
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	$33.06	10	$330.60

Practice: 660 - Tree/Shrub Pruning

Scenario: #6 - Pruning-MultiStory Cropping-Overstory

Scenario Description:

Overstory tree crowns are pruned to increase 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.

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: $827.40 **Scenario Cost/Unit:** $6.90

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
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	12	$84.12
Pruning tool, pole saw	1319	Gasoline powered pole chainsaw. Labor not included.	Hour	$8.03	12	$96.36
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	$33.06	4	$132.24
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	$19.06	24	$457.44

Practice: 666 - Forest Stand Improvement

Scenario: #1 - Intermediate Silvicultural Rx Using Mastication Equipment on all slopes

Scenario Description:

Adjusting the density, species composition, and spatial arrangement with intermediate silvicultural techniques to achieve the desired condition in a stand of trees. The operation is supervised by a certified forest planner and/or certified TSP forester. This action and is carried out using light to medium mastication equipment, that is suited to the site and job . Resource concerns include Undesirable plant productivity and health; Wildlife habitat degradation; Wildfire hazard; and Inadequate structure and composition.

Before Situation:

The density, species composition, and spatial arrangement of trees in a stand are close to achieving the silvicultural specifications, but still require management to achieve desired conditions. The stand in this scenario still exhibit an increased susceptibility to insects and disease, an unacceptable uncharacteristic wildfire risk and/or hazard, and degraded undstory plant and wildlife conditions.

After Situation:

After adjusting the density, species composition, and spatial arrangement to an acceptable level, stand, and overall quality is improved. As a intermdeiate silvicultural action, the work is not intensive in nature, but meant to quickly and readily improve conditions related to the identified resource concern. Mastication in these stands will not create conditions that artificailly inflate the risk of carrying a fire, or degrading understory plant productivity and wildlife habitat.

Scenario Feature Measure: Effective Acres

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $4,900.28 **Scenario Cost/Unit:** $245.01

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	$48.07	50	$2,403.50
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	15	$621.15
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	50	$945.00
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	$33.06	4	$132.24
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	5	$32.15
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	$191.56	4	$766.24

Practice: 666 - Forest Stand Improvement

Scenario: #2 - Intermediate Silvicultural Rx by Handwork and Light Mechanical Equipment on all slopes

Scenario Description:

Adjusting the density, species composition, and spatial arrangement with intermediate silvicultural techniques such as single tree, crop tree, and other light thinning operations to achieve the desired condition in a forested stand. The operation is supervised by a certified forest planner and/or certified TSP forester. This silvicultural prescription is carried out using handtools such as chainsaws, and light equipment like sheers and grapple on a skidsteer, all of which are suited to the site and job . Resource concerns include, Undesirable plant productivity and health; Wildlife habitat degradation; Wildfire hazard; and Inadequate structure and composition, and degraded wildlife habitat.

Before Situation:

The density, species composition, and spatial arrangement of trees in a stand are close to achieving the silvicultural specifications, but still require management to achieve desired conditions. The stand in this scenario still exhibit an increased susceptibility to insects and disease, an unacceptable uncharacteristic wildfire risk and/or hazard, and degraded undstory plant and wildlife conditions. Given handwork is done a small scales and usually inoperable sites for ground based logging systems

After Situation:

After adjusting the density, species composition, and spatial arrangement to an acceptable level, stand, and overall quality is improved. As a intermdeiate silvicultural action, the work is not intensive in nature, but meant to quickly and readily improve conditions related to the identified resource concern. and to achieve desired condition.

Scenario Feature Measure: Effective Acres

Scenario Unit: Acres

Scenario Typical Size: 20

Scenario Cost: $9,698.95 **Scenario Cost/Unit:** $484.95

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	$48.07	80	$3,845.60
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	80	$560.80
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	32	$1,325.12
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	$33.06	4	$132.24
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	80	$1,512.00
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	$19.06	80	$1,524.80
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	5	$32.15
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	$191.56	4	$766.24

Practice: **666 - Forest Stand Improvement**

Scenario: **#3 - Intermediate Silvicultural Rx Silvicultural Rx Using Ground Based Logging/Heavy Equipment on all slopes**

Scenario Description:

Minimally adjusting the density, species composition, and spatial arrangement with minor silvicultural intensity to achieve the desired condition in a stand of trees. The operation is supervised by a certified forest planner and/or certified TSP forester. This action and is carried out using light or heavy mastication equipment, that is suited to the site and job . Resource concerns include Undesirable plant productivity and health; Wildlife habitat degradation; Wildfire hazard; and Inadequate structure and composition. Ground based logging will be used for larger projects, i.e. 50 acres+, where economies of scale will be able to drive costs down from current per acre estimates, and encourage larger treatment areas and effective acres

Before Situation:

The density, species composition, and spatial arrangement of trees in a stand are close to achieving the silvicultural specifications, but still require management to achieve desired conditions. The stand in this scenario still exhibit an increased susceptibility to insects and disease, an unacceptable uncharacteristic wildfire risk and/or hazard, and degraded undstory plant and wildlife conditions..

After Situation:

After adjusting the density, species composition, and spatial arrangement to an acceptable level, stand, and overall quality is improved. As a intermdeiate silvicultural action, the work is not intensive in nature, but meant to quickly and readily improve conditions related to the identified resource concern. and to achieve desired condition.

Scenario Feature Measure: Effective Acres

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $13,229.27 **Scenario Cost/Unit:** $661.46

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Feller buncher	941	Equipment and power unit costs. Labor not included.	Hour	$96.04	30	$2,881.20
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	10	$414.10
Log skidder	942	Equipment and power unit costs. Labor not included.	Hour	$143.05	40	$5,722.00
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	$33.06	4	$132.24
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	$26.75	70	$1,872.50
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	5	$32.15
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	$543.77	4	$2,175.08

Practice: 666 - Forest Stand Improvement

Scenario: #4 - Even-aged Silvicultural Rx Using Mastication Equipment on All Slopes

Scenario Description:

Utilizing heavy mastication equipment to achieve even-aged silvicultural practices such as shelterwood, seed tree, and clearcuts, with and without reserves are employed to appropriately address resource concerns including, Undesirable plant productivity and health; Wildlife habitat degradation; Wildfire hazard; and Inadequate structure and composition.

Before Situation:

Large acreages of uniform stand structure, or where undesirable forest structure (species, age, size) that is susceptible to disease and fire. To qualify for mastication with even-aged silvicultural desired conditions, the site cannot have high basal areas, and stems per acre, as this will result in heavy surface fuels and obstructions that negate a resource benefit to the identified resource concerns.

After Situation:

Create conditions that support regeneration of desired species and densities, with spatial patterns that provide benefits to reduced fire behavior, and early successional wildlife habitat, and understory plant communities. Mastication in these stands will not create conditions that artificailly inflate the risk of carrying a fire or change other fire behavior characteristics, or degrading understory plant productivity and wildlife habitat.

Scenario Feature Measure: Area Treated

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $9,387.61 **Scenario Cost/Unit:** $469.38

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	$143.05	40	$5,722.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	10	$414.10
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	$26.75	40	$1,070.00
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	1	$6.43
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	$543.77	4	$2,175.08

Practice: 666 - Forest Stand Improvement

Scenario: #5 - Even-aged Hand and Light Mechanized Equipment on Slopes Less than 25%

Scenario Description:

Utilizing hand tools and light mechanized equipment on easily operable ground, to achieve even-aged silvicultural practices such as shelterwood, seed tree, and clearcuts, with and without reserves are employed to address resource concerns including Undesirable plant productivity and health; Wildlife habitat degradation; Wildfire hazard; and Inadequate structure and composition. Will only be used in select situations where larger equipment cannot operate due to primarily access issues.

Before Situation:

Large acreages of uniform stand structure (species, age, size) that is susceptible to disease and fire.

After Situation:

Create conditions that support regeneration of desired species and densities, with spatial patterns that provide benefits to reduced fire behavior, and early successional wildlife habitat, and understory plant communities.

Scenario Feature Measure: Area Treated

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $30,944.10 **Scenario Cost/Unit:** $1,547.21

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	$48.07	280	$13,459.60
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	260	$1,822.60
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	80	$3,312.80
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	280	$5,292.00
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	$19.06	260	$4,955.60
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	$33.06	40	$1,322.40
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	2	$12.86
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	$191.56	4	$766.24

Practice: 666 - Forest Stand Improvement

Scenario: #6 - Even-aged Hand and Light Mechanized Equipment on Slopes Greater than 25%

Scenario Description:

Utilizing hand tools and light mechanized equipment on steeper ground, to achieve even-aged silvicultural practices such as shelterwood, seed tree, and clearcuts, with and without reserves are employed to address resource concerns including Undesirable plant productivity and health; Wildlife habitat degradation; Wildfire hazard; and Inadequate structure and composition. Will only be used in select situations where larger equipment cannot operate due to primarily access issues.

Before Situation:

Large acreages of uniform stand structure (species, age, size) that is susceptible to disease and fire.

After Situation:

Create conditions that support regeneration of desired species and densities, with spatial patterns that provide benefits to reduced fire behavior, and early successional wildlife habitat, and understory plant communities.

Scenario Feature Measure: Area treated

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $37,827.65 **Scenario Cost/Unit:** $1,891.38

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	$41.41	80	$3,312.80
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	280	$1,962.80
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$48.07	375	$18,026.25
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	$19.06	280	$5,336.80
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	375	$7,087.50
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$33.06	40	$1,322.40
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	2	$12.86
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	$191.56	4	$766.24

Practice: 666 - Forest Stand Improvement

Scenario: #7 - Even-aged Outcomes Using Ground Based Logging on Slopes Less Than 25%

Scenario Description:

Utilizing ground based mechanized logging equipment on easily operable ground, to achieve even-aged silvicultural practices such as shelterwood, seed tree, and clearcuts, with and without reserves are employed to address resource concerns including Undesirable plant productivity and health; Wildlife habitat degradation; Wildfire hazard; and Inadequate structure and composition.

Before Situation:

Large acreages of uniform stand structure (species, age, size) that is susceptible to disease and fire.

After Situation:

Create conditions that support regeneration of desired species and densities, with spatial patterns that provide benefits to reduced fire behavior, and early successional wildlife habitat, and understory plant communities.

Scenario Feature Measure: Area treated

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $42,001.17 **Scenario Cost/Unit:** $2,100.06

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	$41.41	15	$621.15
Feller buncher	941	Equipment and power unit costs. Labor not included.	Hour	$96.04	90	$8,643.60
Log skidder	942	Equipment and power unit costs. Labor not included.	Hour	$143.05	150	$21,457.50
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	$26.75	240	$6,420.00
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	$33.06	15	$495.90
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	2	$12.86
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	$543.77	8	$4,350.16

Practice: 666 - Forest Stand Improvement

Scenario: #8 - Even-aged Outcomes Using Ground Based Logging on Slopes Greater Than 25%

Scenario Description:

Utilizing ground based mechanized logging equipment on steeper ground, to achieve even-aged silvicultural practices such as shelterwood, seed tree, and clearcuts, with and without reserves are employed to address resource concerns including Undesirable plant productivity and health; Wildlife habitat degradation; Wildfire hazard; and Inadequate structure and composition.

Before Situation:

Large acreages of uniform stand structure (species, age, size) that is susceptible to disease and fire.

After Situation:

Create conditions that support regeneration of desired species and densities, with spatial patterns that provide benefits to reduced fire behavior, and early successional wildlife habitat, and understory plant communities.

Scenario Feature Measure: Area Treated

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $50,778.87 **Scenario Cost/Unit:** $2,538.94

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	$41.41	15	$621.15
Feller buncher	941	Equipment and power unit costs. Labor not included.	Hour	$96.04	120	$11,524.80
Log skidder	942	Equipment and power unit costs. Labor not included.	Hour	$143.05	180	$25,749.00
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	$26.75	300	$8,025.00
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	$33.06	15	$495.90
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	2	$12.86
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	$543.77	8	$4,350.16

Practice: 666 - Forest Stand Improvement

Scenario: #9 - Uneven-aged Silvicultural Rx Using Mastication Equipment on All Slopes

Scenario Description:

Mastication will be used to achieve uneven-aged stand structure on all operable ground, where resource concerns including Undesirable plant productivity and health; Wildlife habitat degradation; Wildfire hazard; and Inadequate structure and composition. Will only be used in select situations where site productivity does not warrant utilization, and will not negatively impact goals associated with understory plant productivity and wildfire hazard.

Before Situation:

The density, species composition, and spatial arrangement of trees in a stand are close to achieving the silvicultural specifications, but still require management to achieve desired conditions. The stand in this scenario still exhibit an increased susceptibility to insects and disease, an unacceptable uncharacteristic wildfire risk and/or hazard, and degraded undstory plant and wildlife conditions. Large acreages of uniform stand structure, or where undesirable forest structure (species, age, size) that is susceptible to disease and fire. To qualify for mastication with Uneven-aged silvicultural desired conditions, the site cannot have high basal areas, and stems per acre that would be redistirbuted to the understory, as this will result in heavy surface fuels and obstructions that negate a resource benefit to the identified resource concerns.

After Situation:

Create conditions that support regeneration of desired species and densities, with spatial patterns that provide benefits to reduced fire behavior, and early successional wildlife habitat, and understory plant communities. Mastication in these stands will not create conditions that artificailly inflate the risk of carrying a fire or change other fire behavior characteristics, or degrading understory plant productivity and wildlife habitat.

Scenario Feature Measure: Affected Acres

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $11,490.78 **Scenario Cost/Unit:** $574.54

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	$41.41	12	$496.92
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$143.05	50	$7,152.50
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	$26.75	50	$1,337.50
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$33.06	8	$264.48
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
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	$543.77	4	$2,175.08

Practice: 666 - Forest Stand Improvement

Scenario: #10 - Uneven-aged Silvicultural Rx Using Hand and Light Mechanized Equipment on Slopes Less than 25%

Scenario Description:

Utilizing light equipment and hand work on accessible ground, to achieve uneven-aged silvicultural practices such as group selection and group retention, free thinning, single tree harvesting, are employed to address resource concerns including Undesirable plant productivity and health; Wildlife habitat degradation; Wildfire hazard; and Inadequate structure and composition.

Before Situation:

The density, species composition, and spatial arrangement of trees in a stand are close to achieving the silvicultural specifications, but still require management to achieve desired conditions. The stand in this scenario still exhibit an increased susceptibility to insects and disease, an unacceptable uncharacteristic wildfire risk and/or hazard, and degraded undstory plant and wildlife conditions. Large acreages of uniform stand structure, or where undesirable forest structure (species, age, size) that is susceptible to disease and fire.

After Situation:

Create conditions that support regeneration of desired species and densities, with spatial patterns that provide benefits to reduced fire behavior, and early successional wildlife habitat, and understory plant communities. Mastication in these stands will not create conditions that artificailly inflate the risk of carrying a fire or change other fire behavior characteristics, or degrading understory plant productivity and wildlife habitat.

Scenario Feature Measure: Affected Acres

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $31,913.74 **Scenario Cost/Unit:** $1,595.69

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	$48.07	320	$15,382.40
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	190	$1,331.90
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	80	$3,312.80
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	$33.06	40	$1,322.40
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	$19.06	190	$3,621.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	320	$6,048.00
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	20	$128.60
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	$191.56	4	$766.24

Practice: **666 - Forest Stand Improvement**

Scenario: **#11 - Uneven-aged Silvicultural Rx Using Hand and Light Mechanized Equipment on Slopes Greater than 25%**

Scenario Description:

Utilizing light equipment and hand work on steeper ground, to achieve uneven-aged silvicultural practices such as group selection and group retention, free thinning, single tree harvesting, are employed to address resource concerns including Undesirable plant productivity and health; Wildlife habitat degradation; Wildfire hazard; and Inadequate structure and composition.

Before Situation:

The density, species composition, and spatial arrangement of trees in a stand are close to achieving the silvicultural specifications, but still require management to achieve desired conditions. The stand in this scenario still exhibit an increased susceptibility to insects and disease, an unacceptable uncharacteristic wildfire risk and/or hazard, and degraded undstory plant and wildlife conditions..

After Situation:

Create conditions that support regeneration of desired species and densities, with spatial patterns that provide benefits to reduced fire behavior, and early successional wildlife habitat, and understory plant communities. Mastication in these stands will not create conditions that artificailly inflate the risk of carrying a fire or change other fire behavior characteristics, or degrading understory plant productivity and wildlife habitat.

Scenario Feature Measure: Affected Acres

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $38,175.84 **Scenario Cost/Unit:** $1,908.79

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	$48.07	400	$19,228.00
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$7.01	320	$2,243.20
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	20	$828.20
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	$19.06	320	$6,099.20
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$18.90	400	$7,560.00
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	$33.06	40	$1,322.40
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	20	$128.60
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	$191.56	4	$766.24

Practice: 666 - Forest Stand Improvement

Scenario: #12 - Uneven-aged Silvicultural Rx Using Ground Based Heavy Logging Equipment on Slopes Less than 25%

Scenario Description:

Utilizing ground based mechanical logging equipment on accessbile ground, to achieve uneven-aged silvicultural practices such as group selection and group retention, free thinning, single tree harvesting, are employed to address resource concerns including Undesirable plant productivity and health; Wildlife habitat degradation; Wildfire hazard; and Inadequate structure and composition.

Before Situation:

The density, species composition, and spatial arrangement of trees in a stand are close to achieving the silvicultural specifications, but still require management to achieve desired conditions. The stand in this scenario still exhibit an increased susceptibility to insects and disease, an unacceptable uncharacteristic wildfire risk and/or hazard, and degraded undstory plant and wildlife conditions..

After Situation:

Create conditions that support regeneration of desired species and densities, with spatial patterns that provide benefits to reduced fire behavior, and early successional wildlife habitat, and understory plant communities. Mastication in these stands will not create conditions that artificailly inflate the risk of carrying a fire or change other fire behavior characteristics, or degrading understory plant productivity and wildlife habitat.

Scenario Feature Measure: Affected Acres

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $58,334.00 **Scenario Cost/Unit:** $2,916.70

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	$7.01	60	$420.60
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	40	$1,656.40
Feller buncher	941	Equipment and power unit costs. Labor not included.	Hour	$96.04	130	$12,485.20
Log skidder	942	Equipment and power unit costs. Labor not included.	Hour	$143.05	190	$27,179.50
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	$33.06	40	$1,322.40
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	$19.06	60	$1,143.60
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	$26.75	320	$8,560.00
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	20	$128.60
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	$543.77	10	$5,437.70

Practice: **666 - Forest Stand Improvement**

Scenario: **#13 - Uneven-aged Silvicultural Rx Using Ground Based Heavy Logging Equipment on Slopes Greater than 25%**

Scenario Description:

Utilizing ground based mechanical logging equipment on steeper slopes and less operable ground, to achieve uneven-aged silvicultural practices such as group selection and group retention, free thinning, single tree harvesting, are employed to address resource concerns including Undesirable plant productivity and health; Wildlife habitat degradation; Wildfire hazard; and Inadequate structure and composition.

Before Situation:

The density, species composition, and spatial arrangement of trees in a stand are close to achieving the silvicultural specifications, but still require management to achieve desired conditions. The stand in this scenario still exhibit an increased susceptibility to insects and disease, an unacceptable uncharacteristic wildfire risk and/or hazard, and degraded undstory plant and wildlife conditions..

After Situation:

Create conditions that support regeneration of desired species and densities, with spatial patterns that provide benefits to reduced fire behavior, and early successional wildlife habitat, and understory plant communities. Mastication in these stands will not create conditions that artificailly inflate the risk of carrying a fire or change other fire behavior characteristics, or degrading understory plant productivity and wildlife habitat.

Scenario Feature Measure: Affected Acres

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $69,763.00 **Scenario Cost/Unit:** $3,488.15

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	$7.01	60	$420.60
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$41.41	30	$1,242.30
Feller buncher	941	Equipment and power unit costs. Labor not included.	Hour	$96.04	160	$15,366.40
Log skidder	942	Equipment and power unit costs. Labor not included.	Hour	$143.05	240	$34,332.00
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	$19.06	60	$1,143.60
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	$26.75	400	$10,700.00
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	$33.06	30	$991.80
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	20	$128.60
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	$543.77	10	$5,437.70

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: $17.39 **Scenario Cost/Unit:** $17.39

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	$19.06	0.167	$3.18
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: $22.30 **Scenario Cost/Unit:** $22.30

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	$19.06	0.167	$3.18
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 - 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: $328.93 **Scenario Cost/Unit:** $328.93

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	$27.30	1	$27.30
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: #4 - 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: $28.22 **Scenario Cost/Unit:** $28.22

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	$27.30	1	$27.30
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: #5 - 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: $262.42 **Scenario Cost/Unit:** $262.42

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	$27.30	4	$109.20
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: $14,200.00 **Scenario Cost/Unit:** $0.71

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	$0.71	20000	$14,200.00

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: $6,885.00 **Scenario Cost/Unit:** $1.53

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	$1.53	4500	$6,885.00

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: $3,624.00 **Scenario Cost/Unit:** $1.51

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	$1.51	2400	$3,624.00

Practice: 672 - Building Envelope Improvement

Scenario: #5 - 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: $47,436.80 **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	$27.30	16	$436.80
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: 798 - Seasonal High Tunnel for Crops

Scenario: #1 - Contiguous US

Scenario Description:

Used for contiguous US states in areas with low or no snowfall. A quonset-style (round) manufactured frame of tubular steel (30 x 72 ft.) covered with 4-year 6mil plastic. Costs are based on purchase of manufactured kit and landowner installing the structure. Structure must be installed to manufacturer's specifications.

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 there is decreased energy use by producing food locally.

Scenario Feature Measure: Area of Tunnel Installed

Scenario Unit: Square Foot

Scenario Typical Size: 2,160

Scenario Cost: $8,157.26 **Scenario Cost/Unit:** $3.78

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	$19.06	71	$1,353.26
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 not include labor.	Square Foot	$3.15	2160	$6,804.00

Practice: 798 - Seasonal High Tunnel for Crops

Scenario: #2 - Contiguous US - Snow

Scenario Description:

Used for contiguous US states in areas with high snowfall. A gothic-style (peaked) manufactured frame of tubular steel (30 x 72 ft.) covered with 4-year 6mil plastic. Costs are based on purchase of manufactured kit and landowner installing the structure. Structure must be installed to manufacturer's specifications.

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 there is decreased energy use by producing food locally.

Scenario Feature Measure: Area of Tunnel Installed

Scenario Unit: Square Foot

Scenario Typical Size: 2,160

Scenario Cost: $10,598.06 **Scenario Cost/Unit:** $4.91

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	$19.06	71	$1,353.26
Materials						
Hoop House, gothic style, base package	1278	Includes heavy-duty, gothic framework complete with all predrilled steel, hardware and instructions. Includes 6 mil 4-year polyethylene film to cover tunnel, roll-up sides, lumber, and polylock for sides and ends for a gothic style (peaked top) hoop house. Materials only, does not include labor.	Square Foot	$4.28	2160	$9,244.80