Practice: 313 - Waste Storage Facility

Scenario: #1 - Embankment Storage Pond

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 865,400 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). Adequately protect liner at agitation and access points. The impoundment will have constructed berms greater than 3' high.

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

Before Situation:

Operator presently has a confined animal feeding operation without a waste management system adequate to handle the waste stream leaving the animal production facilities. Manure and other agricultural waste by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or are being transported but not properly utilized or disposed of. This situation poses an 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 865,400 ft3; The design storage of the pond is 250' x 250' bottom, with 10.8 feet of depth. The pond is constructed by a combination of excavation and earthfill with an embankment fill height greater than 3 feet. 3:1 inside and outside side slopes are utilizedfor the excavation and embankment; (not inclued in design volume - freeboard and sludge accumulation).

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 865,400

Scenario Cost: $68,199.68 **Scenario Cost/Unit:** $0.08

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	16520	$65,584.40
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	1860	$1,599.60
Materials						
Structural steel tubing, 2" diameter	1120	Structural steel tubing, 2" diameter, 1/8" wall thickness, materials only	Foot	$3.84	8	$30.72
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	2	$984.96

Practice: 313 - Waste Storage Facility

Scenario: #2 - Excavated Storage Pond

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 382,000 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). Adequately protect liner at agitation and access points. The impoundment will have constructed berms less than 3' high.

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

Before Situation:

Operator presently has a confined animal feeding operation without a waste management system adequate to handle the waste stream leaving the animal production facilities. Manure and other agricultural waste by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or are being transported but not properly utilized or disposed of. This situation poses an 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 382,000 ft3; The pond bottom is 280' x 120' x 10' deep with a small berm normally less than 3' high around the outside of the pond. 3:1 inside and outside side slopes; (not included in design volume - freeboard and sludge accumulation).

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 382,000

Scenario Cost: $53,894.62 **Scenario Cost/Unit:** $0.14

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.63	12733	$46,220.79
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	1210	$1,040.60
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	1415	$5,617.55
Materials						
Structural steel tubing, 2" diameter	1120	Structural steel tubing, 2" diameter, 1/8" wall thickness, materials only	Foot	$3.84	8	$30.72
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	2	$984.96

Practice: 313 - Waste Storage Facility

Scenario: #3 - Buried Concrete Tank, Less than 14,999 c.f. of storage

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: 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), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Solid/Liquid 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 of. 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.
Tank typically 7' deep, with a bottom area of 1400 SF, and a design storage volume of approximately 9,000 cubic feet plus 6" freeboard. Sizing based on manure, other wastes, rainfall, lot runoff, etc. as appropriate. Volume does not include 6" of freeboard.

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 9,000

Scenario Cost: $21,195.93 **Scenario Cost/Unit:** $2.36

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	12	$522.48
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	$2.14	620	$1,326.80
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	$319.94	30.7	$9,822.16
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	195	$1,017.90
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$146.94	39.1	$5,745.35
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	12	$252.48
Materials						
Waterstop, PVC, ribbed, 3/16" x 6"	1614	Waterstop, PVC, ribbed, 3/16" thick by 6"wide. Includes materials, equipment and labor.	Foot	$3.44	180	$619.20
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	61.6	$1,373.68
Mobilization						

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 313 - Waste Storage Facility

Scenario: #4 - Buried Concrete Tank, Between 15,000 to 110,000 c.f. of storage

Scenario Description:

This scenario consists of installing a concrete tank that has a design storage volume from 15,000 to 110,000 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: 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), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Solid/Liquid 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 of. 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.
Tank typically 10' deep, with a bottom area of 2,947 SF, and a design storage volume of 20,659 cubic feet plus 2' freeboard and 1' residual. Sizing based on manure, other wastes, rainfall, lot runoff, etc. as appropriate. Volume does not include 2' of freeboard, or 1' of residual.

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 20,659

Scenario Cost: $34,846.34 **Scenario Cost/Unit:** $1.69

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	$5.22	334	$1,743.48
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.26	922	$3,005.72
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	$3.63	1263	$4,584.69
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	$146.94	49	$7,200.06
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	$319.94	48	$15,357.12
Materials						
Waterstop, PVC, ribbed, 3/16" x 6"	1614	Waterstop, PVC, ribbed, 3/16" thick by 6"wide. Includes materials, equipment and labor.	Foot	$3.44	193	$663.92
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	49	$1,092.70
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	2	$984.96

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	$71.23	3	$213.69

Practice: 313 - Waste Storage Facility

Scenario: #5 - Buried Concrete Tank, Greater than 110,000 c.f. of storage

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: 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), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Solid/Liquid 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 of. 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.
Tank typically 102' X 160' X 8' deep with a bottom area of 16,320 SF and a design storage volume of 81,600 CF plus 2' freeboard, and 1' residual. Sizing based on manure, other wastes, rainfall, lot runoff, etc. as appropriate. Volume does not include 2' of freeboard, and 1' residual.

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 81,600

Scenario Cost: $113,535.34 **Scenario Cost/Unit:** $1.39

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$146.94	302.2	$44,405.27
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	$319.94	134.3	$42,967.94
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.63	2115	$7,677.45
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	$2.14	2115	$4,526.10
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	3	$130.62
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	432	$2,255.04
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	3	$63.12

Materials

Materials

Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	368	$8,206.40
Waterstop, PVC, ribbed, 3/16" x 6"	1614	Waterstop, PVC, ribbed, 3/16" thick by 6"wide. Includes materials, equipment and labor.	Foot	$3.44	524	$1,802.56

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	2	$984.96
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 313 - Waste Storage Facility

Scenario: #6 - Steel or Concrete Above Ground Storage Structure

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 typical scenario has a design storage volume of 66,000 ft3. This practice will address soil and water quality by reducing the pollution potential for surface water and groundwater quality degradation.

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

Before Situation:

Operator presently has a confined animal feeding operation without a waste management system adequate to handle the waste stream leaving the animal production facilities. Manure and other agricultural waste by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or are being transported but not properly utilized or disposed of. This situation poses an 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 66,000 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: 66,000

Scenario Cost: $161,071.27 **Scenario Cost/Unit:** $2.44

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	$319.94	39	$12,477.66
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	$2.14	250	$535.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	250	$992.50
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	$146.94	65	$9,551.10
Materials						
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	66000	$135,300.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	73	$1,627.90
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$71.23	1	$71.23

Practice: 313 - Waste Storage Facility

Scenario: #7 - Bedded Pack - Concrete Floor and Concrete Walls

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. Concrete walls required to withstand the heavy equipment that the producer operates.

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 of. 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.
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.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 4,000

Scenario Cost: $26,915.06 **Scenario Cost/Unit:** $6.73

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.63	74	$268.62
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	102	$87.72
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	16	$83.52
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	37	$146.89
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	$2.14	34	$72.76
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	$319.94	42	$13,437.48
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$146.94	74	$10,873.56
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	61.7	$1,357.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Mobilization

Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$71.23	1	$71.23

Practice: 313 - Waste Storage Facility

Scenario: #8 - Bedded Pack - Concrete Floor and Wood Walls

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. Scenario is needed to meet design limitations (i.e. small footprint, availability, varying regulations, etc.)

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 of. 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. 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.
Typical design: floor area 4,000 ft2, (40' X 100'); 5' wood wall height, 3' footing depth with a 6" concrete floor; 20' openings on each end of structure.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 4,000

Scenario Cost: $20,658.43 **Scenario Cost/Unit:** $5.16

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	$8.44	12	$101.28
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	$3.63	148	$537.24
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	12	$522.48
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	222	$881.34
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$319.94	2	$639.88
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	$146.94	62	$9,110.28
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	$101.26	5.5	$556.93
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	12	$252.48

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	$17.44	90	$1,569.60

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	$1.60	1104	$1,766.40
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.86	1620	$1,393.20
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	61.7	$1,357.40

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	$492.48	4	$1,969.92

Practice: 313 - Waste Storage Facility

Scenario: #9 - Bedded Pack - Earth Floor and Wood Walls

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 practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground water.

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

Before Situation:

Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an 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:

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 an 18" thick compacted 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. Manure and other agricultural by-products are being controlled, by the collection at the source, and stored temporarily, at an environmentally suitable location, until such time that they are disposed of or utilized in a proper manner, typically in accordance with a nutrient management plan.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 4,000

Scenario Cost: $9,309.41 **Scenario Cost/Unit:** $2.33

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	$101.26	5.5	$556.93
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	12	$522.48
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.44	12	$101.28
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	$3.63	148	$537.24
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	$319.94	2	$639.88
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	12	$252.48
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	$17.44	90	$1,569.60
Materials						
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.86	1620	$1,393.20

Materials

Lumber, planks, posts and timbers, treated	1609	Treated dimension lumber with nominal thickness greater than 2". Includes lumber and fasteners. Does not include labor.	Board Foot	$1.60	1104	$1,766.40

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	$492.48	4	$1,969.92

Practice: 313 - Waste Storage Facility

Scenario: #10 - Bedded Pack - Earth Floor and Concrete Walls

Scenario Description:

This scenario consists of a dry stack facility (covered) with compacted earthen floor with concrete walls. This scenario is intended to provide storage for manure and agricutural by-products that is protected from the environment and can be either inside the animal housing area or a separate facility for separated solids. The purpose of this practice is to properly store manure and other agricultural by-products until they can be removed from the site for proper 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. Compacted earth floors required to meet state guidelines for seepage should be installed with CPS 521-D, Pond Sealing or Lining - Compacted Clay Treatment.

Potential Associated practices: 521D-Pond Sealing or Lining; Compacted Clay Treatement, 342-Critical Area Planting, 362-Diversion, 561-Heavy Use Area Protection, 367-Roofs and Covers, 558-Roof Runoff Structure, 317-Composting Facility, 632 - Solid/Liquid Waste Separation, 633-Waste Recycling, 634-Waste Transfer, 635-Vegetated Treatment Area

Before Situation:

Livestock are currently on open lots with runoff un-controlled. Un-controlled runoff is causing off-site damage due to sedimentation and elevated nutrient levels in receiving waters.

After Situation:

The typical size of the bedded pack Facility is 40' x 100' (4,000 SF). Facility has an earth floor and 4' high walls with 3' deep footings. A 10' opening is located on each end for access. When used as housing, the animal density can be increased by placing under roof and existing open lots abandoned. 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.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 4,000

Scenario Cost: $15,637.53 **Scenario Cost/Unit:** $3.91

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	$2.46	150	$369.00
Trencher, 8"	936	Equipment and power unit costs. Labor not included.	Hour	$90.68	3	$272.04
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	$319.94	45	$14,397.30
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	3	$63.12
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	$17.44	6	$104.64
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	$173.49	1	$173.49
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 313 - Waste Storage Facility

Scenario: #11 - Bedded Pack - Earth Floor with Concrete Walls and Concrete Apron

Scenario Description:

This scenario consists of a dry stack facility (covered) with compacted earthen floor with concrete walls. This scenario is intended to provide storage for manure and agricutural by-products that is protected from the environment and can be either inside the animal housing area or a separate facility for separated solids. The purpose of this practice is to properly store manure and other agricultural by-products until they can be removed from the site for proper 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. Compacted earth floors required to meet state guidelines for seepage should be installed with CPS 521-D, Pond Sealing or Lining - Compacted Clay Treatment. Concrete floor will be constructed behind the feedbunk in the area with largest manure accumulation, and also to provide an adequate base where equipment will be frequently removing manure.

Potential Associated practices: 521D-Pond Sealing or Lining; Compacted Clay Treatement, 342-Critical Area Planting, 362-Diversion, 561-Heavy Use Area Protection, 367-Roofs and Covers, 558-Roof Runoff Structure, 317-Composting Facility, 632 - Solid/Liquid Waste Separation, 633-Waste Recycling, 634-Waste Transfer, 635-Vegetated Treatment Area

Before Situation:

Livestock are currently on open lots with runoff un-controlled. Un-controlled runoff is causing off-site damage due to sedimentation and elevated nutrient levels in receiving waters.

After Situation:

The typical size of the bedded pack Facility is 40' x 100' (4,000 SF). Facility has an earth floor and 4' high walls with 3' deep footings. It has a 12' x 100' concrete apron. A 10' opening is located on each end for access. When used as housing, the animal density can be increased by placing under roof and existing open lots abandoned. 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.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 4,000

Scenario Cost: $19,306.60 **Scenario Cost/Unit:** $4.83

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	$90.68	3	$272.04
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	$319.94	45	$14,397.30
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	$146.94	22.2	$3,262.07
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	$2.46	150	$369.00
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	$17.44	6	$104.64
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	3	$63.12
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	18.5	$407.00
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	$173.49	1	$173.49
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 313 - Waste Storage Facility

Scenario: #12 - Dry Stack - Concrete floor and Wood walls

Scenario Description:

This scenario consists of a dry stack facility with reinforced concrete Floor with pressure treated wood walls. This scenario is intended for situations where consistency of manure or geographical conditions prohibit earthen floors. 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 of. 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:

The typical is 4,000 SqFt (40' x 100'). 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. Manure and other agricultural by-products are being controlled, by the collection at the source, and stored temporarily, at an environmentally suitable location, until such time that they are disposed of or utilized in a proper manner, typically in accordance with a nutrient management plan.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 4,000

Scenario Cost: $20,089.38 **Scenario Cost/Unit:** $5.02

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	$8.44	12	$101.28
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	12	$522.48
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	$319.94	2	$639.88
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	$146.94	62	$9,110.28
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	$101.26	5.5	$556.93
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.63	148	$537.24
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	74	$293.78
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	90	$1,569.60

Labor

Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	12	$252.48

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	$1.60	1104	$1,766.40
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	61.7	$1,375.91
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.86	1620	$1,393.20

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	$492.48	4	$1,969.92

Practice: 313 - Waste Storage Facility

Scenario: #13 - Dry Stack - Concrete floor and no walls

Scenario Description:

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

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

Before Situation:

Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an 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:

The typical is 4,000 SqFt (40' x 100'). The facility floor is 6" reinforced concrete without side walls. Manure and other agricultural by-products are being controlled, by the collection at the source, and stored temporarily, at an environmentally suitable location, until such time that they are disposed of or utilized in a proper manner, typically in accordance with a nutrient management plan.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 4,000

Scenario Cost: $14,804.19 **Scenario Cost/Unit:** $3.70

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.63	148	$537.24
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	74	$293.78
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	$146.94	74.1	$10,888.25
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	50	$1,115.00
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	$492.48	4	$1,969.92

Practice: 313 - Waste Storage Facility

Scenario: #14 - Dry Stack - Concrete floor and concrete walls

Scenario Description:

This scenario consists of a dry stack facility with reinforced concrete floor with side walls. This scenario is intended for situations where consistency of manure or geographical conditions prohibit earthen floors. The purpose of this practice is to properly store manure and other agricultural by-products until they can be hauled away from the site for proper disposal or utilization on land at agronomical rates. Concrete walls required to withstand the heavy equipment that the producer operates. This practice will address soil and water quality by reducing the pollution potential to soil, surface water and ground
water.

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

Before Situation:

Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an 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:

The typical is 4,000 SqFt (40' x 100'). The facility floor is 6" reinforced concrete with 4' walls on 3 sides. Manure and other agricultural by-products are being controlled, by the collection at the source, and stored temporarily, at an environmentally suitable location, until such time that they are disposed of or utilized in a proper manner, typically in accordance with a nutrient management plan.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 4,000

Scenario Cost: $22,386.77 **Scenario Cost/Unit:** $5.60

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.63	148	$537.24
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	$146.94	74.1	$10,888.25
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	$319.94	23.7	$7,582.58
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	74	$293.78
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	50	$1,115.00
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	$492.48	4	$1,969.92

Practice: 314 - Brush Management

Scenario: #1 - Mechanical, General

Scenario Description:

Using small mechanical equipment to remove or cut off woody plants. Typical area is moderately rolling to gently sloping, moderately deep to deep soils that have stands of woody and non herbaceous species that are in the early phases of invasion. Typical unit is 30 acres.

Before Situation:

Area is infested with woody non-herbaceous species that degrade ecological sites or habitat for desired wildlife species. Future degradation of key forage species and ecological site condition promote 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 progressing in an upward trend, hydrology and plant health and vigor are sustained.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 30

Scenario Cost: $14,381.48 **Scenario Cost/Unit:** $479.38

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	$129.56	80	$10,364.80
Brush Chipper, 6" capacity	938	Brush Chipper, 6" capacity, typically 35 HP. Includes chipper and power unit. Labor not included.	Hour	$22.29	50	$1,114.50
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	$17.44	50	$872.00
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	80	$1,683.20
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	$173.49	2	$346.98

Practice: 314 - Brush Management

Scenario: #5 - Chemical, Uplands

Scenario Description:

This practice is for the implementation of brush management on range, pasture or native pasture to reduce undersirable brush in uplands, and other areas not in, or directly adjacent to, streams, ponds, or wetlands. The typical method of control uses aerial or broadcast application of herbicides to control undesirable plants. Entire unit has infestation levels exceeding state identified levels; entire unit is treated with broadcast application.

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 select individual plants.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 50

Scenario Cost: $1,421.13 **Scenario Cost/Unit:** $28.42

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	50	$293.00
Materials						
Herbicide, Triclopyor	338	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$42.30	15	$634.50
Herbicide, Picloram	337	Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$19.12	15	$286.80
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
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	$71.23	1	$71.23

Practice: 314 - Brush Management

Scenario: #6 - Chemical - Riparian

Scenario Description:

Apply chemical brush management techniques on an isolated riparian area within a 80 acre planning unit which is directly adjacent to a stream (may include ponds or wetlands) associated with rangeland (may include grazed forest, pasture, or other landuses) to control undesirable deciduous species in order to improve ecological/range site condition. Treatment is applied to a 2 acres isolated area adjacent to a stream which uses broadcast/aerial specialized herbicide(s) application on the entire 2 acres to reduce or remove trees and/or brush which are not appropriate for the site(s).

Before Situation:

Plant, animal, or wildlife resource concerns associated with ripairian areas and other areas in or adjacent to the stream (incl. ponds or wetlands) on grazed range (incl. grazed forest, pasture, or other landuses) which are adversely affected by undesirable trees and/or brush which degrade ecological site condition as identified by state specific ecological/range site description.

After Situation:

Isolated riprarian community infested with undesirable tree and/or shrub species within a range unit (incl. grazed forest, pasture, or other landuse) where reduction or removal of undesirable deciduous species adjacent to a stream (incl. ponds or wetlands) has been accomplished through the use of appropriate chemical application to address plant, animal, and wildlife resource concerns, thus improving ecological/range site condition.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 2

Scenario Cost: $313.28 **Scenario Cost/Unit:** $156.64

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	2	$11.72
Materials						
Herbicide, Triclopyor	338	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$42.30	1	$42.30
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	1	$1.32
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 314 - Brush Management

Scenario: #7 - Chemical, Foliar Spot Treatment

Scenario Description:

Apply foliar chemical brush management techniques (aerial fixed wing or ground rig) on isolated upland areas within a 80 acre planning unit (not directly adjacent to streams, ponds or wetlands) associated with rangeland (may include grazed forest, pasture, or other landuses) to control undesirable deciduous species in order to improve ecological/range site conditions. Treatment is applied to 10 acre isolated areas (not adjacent to a stream, wetland or pond), using broadcast/aerial herbicide(s) application, on the entire 10 acres to reduce or remove trees and/or brush which are not appropriate for the site(s). Foliar application of material using the most effecitve, low cost chemical(s).

Before Situation:

Plant, animal, or wildlife resource concerns associated with upland areas (not in or adjacent to streams, ponds, or wetlands) on grazed range (incl. grazed forest, pasture, or other landuses) which are adversely affected by undesirable trees and/or brush which degrade ecological site conditions as identified by state specific ecological/range site description.

After Situation:

Isolated upland areas infested with undesirable tree and/or shrub species within a range unit (incl. grazed forest, pasture, or other landuse) where reduction or removal of undesirable deciduous species (not adjacent to or within a stream, ponds, or wetlands) has been accomplished through the use of appropriate foliar chemical application to address plant, animal, and wildlife resource concerns, thus improving ecological/range site conditions.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $420.95 **Scenario Cost/Unit:** $42.09

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.91	2.5	$77.28
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	2	$13.56
Herbicide, Picloram	337	Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$19.12	4	$76.48
Herbicide, Triclopyor	338	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$42.30	4	$169.20
Herbicide, Surfactant	1095	Surfactants reduce the surface tension of water to produce more uniform coverage and penetration of herbicides, and weed killers. Paraffin Based Petroleum Surfactant. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$1.32	10	$13.20
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	$71.23	1	$71.23

Practice: 314 - Brush Management

Scenario: #8 - Mechanical, Mowing

Scenario Description:

Using small mechanical equipment to remove or cut off woody plants. Typical area is moderate rolling to gently sloping, moderately deep to deep soils, that have stands of woody and no-herbaceous species that are in the early phases of invasion. Typical unit is 10 acres.

Before Situation:

Area is infested with woody non-herbaceous species that degrade the ecological site or 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 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: $310.16 **Scenario Cost/Unit:** $31.02

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	$51.24	4	$204.96
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	5	$105.20

Practice: 315 - Herbaceous Weed Control

Scenario: #1 - 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 consists of excessive stands of herbaceous weeds in existing or newly seeded or planted stands. Excessive weed growth degrades health and vigor of native herbaceous species, promoting noxious and invasive species or undesirable plant species and degrading wildlife habitat.

After Situation:

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

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 160

Scenario Cost: $3,823.09 **Scenario Cost/Unit:** $23.89

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	160	$937.60
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	160	$2,500.80
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	160	$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	$173.49	1	$173.49

Practice: 315 - Herbaceous Weed Control

Scenario: #3 - Mechanical

Scenario Description:

Removal of light infestations of herbaceous weeds on gently sloping terrain with moderately deep to deep soils. The practice entails the removal of herbaceous weeds by the use of a mower, brush hog, disc, or other light equipment, in order to reduce fuel load and improve the ecological site condition. Weeds have exceeded desired levels based on ecological site potential. For organic and non-organic farms.

Before Situation:

Area consists of excessive stands of herbaceous weeds degrading the health and vigor of native herbaceous species and wildlife habitat while promoting noxious and invasive species encroachment.

After Situation:

Herbaceous weeds are removed to achieve the desired 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 are returning to near normal levels, and wildlife habitat is improved.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $292.16 **Scenario Cost/Unit:** $14.61

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	$51.24	4	$204.96
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	$17.44	5	$87.20

Practice: 315 - Herbaceous Weed Control

Scenario: #4 - Mechanical, Tree Establishment

Scenario Description:

Land unit on which weed control would be beneficial to set back the plant community succession, improve the ecological condition, and improve stand establishment of herbaceous or deciduous plantings. The practice entails the eradication of vegetation by use of weed treatment, through tillage, to eliminate undesirable weeds, promote stand establishment, improve ecological condition and wildlife habitat.

Before Situation:

Area consists of excessive stands of herbaceous weeds degrading the health and vigor of tree species in rows or plantings.

After Situation:

Undesirable herbaceous weeds are controlled or removed in and around tree planting, through tillage, to achieve a desirable plant community based on species composition, structure, and density. Tree stand condition is progressing in an upward trend, hydrology and plant health and vigor are returning to near normal levels, and wildlife habitat is improved.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $199.98 **Scenario Cost/Unit:** $199.98

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	1	$10.64
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.85	1	$15.85
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	$173.49	1	$173.49

Practice: 315 - Herbaceous Weed Control

Scenario: #6 - Chemical, Tree Establishment - Post-emergent Herbicide

Scenario Description:

Tree establishment in which weed control would be beneficial in order to set back the plant community succession, improve the ecological condition, and improve the heatlh and vigor of the stand. The practice entails the management of undesirable plants (including invasive and non-invasive species) with a post-emergent selective herbicide for the establishment of a tree planting on four acres. Broadcast or spot treatment application of a narrow band of herbicide (2-4 feet wide) along the tree row or around individual trees is an example of banding herbicides to control weeds. In order to receive payment, the landowner, at a minimum, must utilize and maintain Integrated Pest Management (IPM) principles including scouting, biological and/or low risk pesticides.

Before Situation:

Area consists of excessive stands of herbaceous weeds degrading the health and vigor of tree rows and timber establishments promoting undesirable plants, noxious and invasive species, and degrading wildlife habitat.

After Situation:

Herbaceous weeds are controlled with post-emergent herbicides to achieve the desired plant community based on species composition, structure, density, and canopy cover or height. Permits individual trees and timber stands to be planted to promote/improve soil health and condition, hydrology, plant health and vigor, and wildlife habitat.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 4

Scenario Cost: $202.99 **Scenario Cost/Unit:** $50.75

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	4	$23.44
Materials						
Herbicide, sulfosulfuron	2043	For the control of annual broad-leaved weeds and grass weeds in cereals. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$23.31	4	$93.24
Herbicide, Clopyrilad or Aminopyralid	332	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$3.77	4	$15.08
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	$71.23	1	$71.23

Practice: 315 - Herbaceous Weed Control

Scenario: #7 - Biological, Insects

Scenario Description:

Management of herbaceous plant species through the use of biological control agents (insects) on undesired, noxious, or invasive herbaceous species. Typical area is moderate rolling to gentle sloping, moderately deep to deep soils that have stands of herbaceous weed species that exceed the desirable ecological site condition or that are identified as noxious or invasive. This scenario is an alternative for traditional or organic producers.

Before Situation:

Area consist of herbaceous weed species that exceed the desirable ecological site condition degrading forage quality, promoting noxious and invasive species, increasing risk of soil erosion and degrading wildlife habitat.

After Situation:

Invasive herbaceous weed species are controlled using biological contols (insects) to 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: Acre

Scenario Typical Size: 80

Scenario Cost: $435.61 **Scenario Cost/Unit:** $5.45

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	$37.50	2	$75.00
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	$17.44	4	$69.76
Materials						
Stem Gall Fly (Urophora cardui)	302	Stem Gal Fly. Includes all support necessary to ensure adequate release of insects. Labor not included. Includes materials and shipping only.	Each	$1.06	105	$111.30
Stem Mining Weevil (Ceutorhynchus litura)	303	Stem Mining Weevil. Includes all support necessary to ensure adequate release of insects. Labor not included. Includes materials and shipping only.	Each	$1.71	105	$179.55

Practice: 316 - Animal Mortality Facility

Scenario: #1 - Incineration, Less than 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.
Incinerator installed to handle 150 lbs per day average mortality for a small poultry operation. 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: $11,220.21 **Scenario Cost/Unit:** $255.00

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	$146.94	4	$587.76
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.14	8	$17.12
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	$115.06	1	$115.06
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	1	$21.04
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	1	$17.44
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	4	$89.20

Materials

Fuel Tank, Anchored	1033	Fuel tank for operating incinerators and/or gasifiers. Materials only.	Gallon	$1.01	285	$287.85
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

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

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.
Incinerator installed to handle 700 lbs per day average mortality for a medium poultry or swine operation. 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: $12,995.29 **Scenario Cost/Unit:** $232.06

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$146.94	4	$587.76
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.14	8	$17.12
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	$115.06	1	$115.06
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	$17.44	1	$17.44
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	1	$21.04
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	$22.30	4	$89.20

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 316 - Animal Mortality Facility

Scenario: #3 - Incineration, More than 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. Cost for that option would be for an area of 4,000 ft2 @$4.50 or $18,000 vs. $24,000. 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.
Incinerator installed to handle a whole 1350 lb dairy cow on a 1,000 cow operation. 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: $14,840.95 **Scenario Cost/Unit:** $123.67

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	$2.14	8	$17.12
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	$146.94	4	$587.76
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	$115.06	1	$115.06
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	$17.44	1	$17.44
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	1	$21.04

Materials

Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	4	$89.20
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	$257.94	2	$515.88

Practice: 316 - Animal Mortality Facility

Scenario: #4 - Invessel Rotary Drum, less than 700 CF

Scenario Description:

This scenario consists of installing a horizontal rotary drum to compost smaller poultry and swine facility mortality. It can handle between 250 and 600 lbs per day of mortality plus equal or higher volumes of carbon material (i.e. wood chips). A secondary composting storage area is required to finish materials. Payment quantity based on interior volume of rotary composter in cubic feet of smallest drum that can process daily mortality as per manufacturers' recommendations. 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. Scenario is needed where the producer has a limited footprint for the installed practice.

Potential Associated Practices: Roofs and Covers (367), Waste Storage Facility (313), Fence (382), Critical Area Planting (342), Nutrient Management (590), Access Road (560), Structure for Water Control (587), 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:

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.
Installed a 5' diameter by 22' long rotary drum on two concrete pads that can process 325 lbs of mortality per day. Drum rotation moves and mixes mortality and wood chips. Site preparation includes topsoil removal, gravel pad, and concrete pads and slab at two locations plus small floor and walls to complete composting. Input material reduced by 40-60 percent and put into 4' high, three sided, 20'x 20' concrete bin with 10'x20 concrete pad for secondary composting. Carbon source is placed into a three sided 30' x 30' with 4' high walls. Area can be protected by adding Roofs and Covers (367) standard.

Scenario Feature Measure: Volume of Drum

Scenario Unit: Cubic Foot

Scenario Typical Size: 432

Scenario Cost: $36,363.02 **Scenario Cost/Unit:** $84.17

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$146.94	15	$2,204.10
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$319.94	6	$1,919.64
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	28	$111.16
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	$24.27	16	$388.32
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	8	$178.40
Composter, drum, 12 CY	1627	12 CY drum composter unit. Includes equipment, operation controls, and shipping. Labor not included.	Each	$31,418.94	1	$31,418.94
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	$71.23	2	$142.46

Practice: 316 - Animal Mortality Facility

Scenario: #5 - Invessel Rotary Drum, greater than or equal to 700 CF

Scenario Description:

This scenario consists of installing a horizontal rotary drum to compost larger poultry and swine facility mortality. It can handle between 600 and 1,000 lbs per day of mortality plus equal or higher volumes of carbon material (i.e. wood chips). A secondary composting storage area is required to finish materials. Payment quantity based on interior volume of rotary composter in cubic feet of smallest drum that can process daily mortality as per manufacturers' recommendations. 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. Scenario is needed where the producer has a limited footprint for the installed practice.

Potential Associated Practices: Roofs and Covers (367), Waste Storage Facility (313), Fence (382), Critical Area Planting (342), Nutrient Management (590), Access Road (560), Structure for Water Control (587), 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:

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.
Installed a 5' diameter by 54' long rotary drum on two concrete pads that can process 810 lbs of mortality per day. Drum rotation moves and mixes mortality and wood chips. Site preparation includes topsoil removal, gravel pad, concrete pads, slab at two locations plus concrete floor and walls to complete composting. Input material reduced by 40-60 percent and put into 4' high, three sided, 30'x 30' concrete bin with 10'x30' concrete pad for secondary composting. Area can be protected by adding Roofs and Covers (367) standard.

Scenario Feature Measure: Volume of Drum

Scenario Unit: Cubic Foot

Scenario Typical Size: 1,079

Scenario Cost: $71,494.13 **Scenario Cost/Unit:** $66.26

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	$146.94	30	$4,408.20
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	58	$230.26
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	$319.94	9	$2,879.46
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	$24.27	24	$582.48
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	8	$178.40
Composter, drum, 28 CY	1628	28 CY drum composter unit. Includes equipment, operation controls, and shipping. Labor not included.	Each	$62,699.45	1	$62,699.45
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 316 - Animal Mortality Facility

Scenario: #6 - Static pile, Earthen pad

Scenario Description:

This scenario consists of installing an impervious earthen pad to compost large animal mortalities, typically dairy cow mortality, 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 may not be desirable for sites with limited area, 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.

Potential Associated Practices: Pond Sealing or Lining, Bentonite Sealant (521C), Pond Sealing or Lining, Compacted Clay Treatment (521D), Pond Sealing or Lining, Soil Dispersant (521B), Fence (382), Critical Area Planting (342), Nutrient Management (590), Access Road (560), Structure for Water Control (378), 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, incineration, or interaction with predators. No plan was formulated for both normal and catastrophic mortality events.

After Situation:

Animal mortality is being done in a manner that prevents non-point source pollution of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources. Proper operation results in little to no odors, complete composting, and protection from predators to minimize pathogen survival or spreading. An overall plan covers normal and catastrophic mortality events.
Construct a 50' x 150' 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. 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' and recompacting.

Scenario Feature Measure: Pad Area

Scenario Unit: Square Foot

Scenario Typical Size: 7,500

Scenario Cost: $3,216.48 **Scenario Cost/Unit:** $0.43

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	$3.97	420	$1,667.40
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	$2.46	420	$1,033.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 316 - Animal Mortality Facility

Scenario: #7 - Static pile, Earthen pad with hydrant

Scenario Description:

This scenario consists of installing an impervious earthen pad to compost large animal mortalities, typically dairy cow mortality, 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. Water is added to maintain moisture content. Access is infrequent. This option may not be desirable for sites with limited area, 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.

Potential Associated Practices: Pond Sealing or Lining, Bentonite Sealant (521C), Pond Sealing or Lining, Compacted Clay Treatment (521D), Pond Sealing or Lining, Soil Dispersant (521B), Fence (382), Critical Area Planting (342), Nutrient Management (590), Access Road (560), Structure for Water Control (378), 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, incineration, or interaction with predators. No plan was formulated for both normal and catastrophic mortality events.

After Situation:

Animal mortality is being done in a manner that prevents non-point source pollution of excessive nutrients, organics, and pathogens being transported into surface and groundwater resources. Proper operation results in little to no odors, complete composting, and protection from predators to minimize pathogen survival or spreading. An overall plan covers normal and catastrophic mortality events. Construct a 50' x 150' compacted earth surface. A hydrant is installed at the site to allow for moisture content control. 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. 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' and recompacting.

Scenario Feature Measure: Pad Area

Scenario Unit: Square Foot

Scenario Typical Size: 7,500

Scenario Cost: $4,172.05 **Scenario Cost/Unit:** $0.56

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	$2.46	420	$1,033.20
Trenching, Earth, 12" x 60"	1459	Trenching, earth, 12" wide x 60" depth, includes equipment and labor for trenching, laying 3"-6" CPP drain line with envelope, and backfilling.	Foot	$1.88	200	$376.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	420	$1,667.40
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	$17.44	16	$279.04
Materials						
Freeze Proof Hydrant, > 3' Bury	2393	Freeze Proof Hydrant, more than 3 foot bury. Materials only.	Each	$88.53	1	$88.53
Pipe, PVC, 1 ½", SCH 40	975	Materials: - 1 1/2" - PVC - SCH 40 - ASTM D1785	Foot	$1.06	200	$212.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 316 - Animal Mortality Facility

Scenario: #8 - Static pile, Concrete Pad

Scenario Description:

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

Potential Associated Practices: Pond Sealing or Lining, Bentonite Sealant (521C), Pond Sealing or Lining, Compacted Clay Treatment (521D), 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), 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.
Construct a 60'x95' concrete surface to process mortality. 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: $16,208.98 **Scenario Cost/Unit:** $2.84

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	$3.97	110	$436.70
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	$2.14	220	$470.80
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	$146.94	90	$13,224.60
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	70	$1,561.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 316 - Animal Mortality Facility

Scenario: #9 - Static pile, Concrete Pad with hydrant

Scenario Description:

This scenario consists of installing a concrete pad over permeable soils, karst topography, frequently accessed sites or sites with regulatory requirements. Typically associated with large dairy (1,000 cows plus heifers) or beef animal mortality with an average daily mortality of 175 lbs/day. Area sized to compost animal mortality as a static pile or windrow with equipment around materials. Sufficient carbon based bulking material added to allow natural aeration and a proper C:N ratio. Water is added to maintain moisture content. 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.

Potential Associated Practices: Pond Sealing or Lining, Bentonite Sealant (521C), Pond Sealing or Lining, Compacted Clay Treatment (521D), 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), 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.
Construct a 60'x95' concrete surface to process mortality. Concrete 5" thick with light reinforcement. A hydrant is installed at the site to allow for moisture content control. 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: $17,164.55 **Scenario Cost/Unit:** $3.01

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	$146.94	90	$13,224.60
Trenching, Earth, 12" x 60"	1459	Trenching, earth, 12" wide x 60" depth, includes equipment and labor for trenching, laying 3"-6" CPP drain line with envelope, and backfilling.	Foot	$1.88	200	$376.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	110	$436.70
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	$2.14	220	$470.80
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	$17.44	16	$279.04
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	70	$1,561.00
Freeze Proof Hydrant, > 3' Bury	2393	Freeze Proof Hydrant, more than 3 foot bury. Materials only.	Each	$88.53	1	$88.53
Pipe, PVC, 1 ½", SCH 40	975	Materials: - 1 1/2" - PVC - SCH 40 - ASTM D1785	Foot	$1.06	200	$212.00

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 316 - Animal Mortality Facility

Scenario: #10 - Static pile, Wood Bin(s)

Scenario Description:

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

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

Before Situation:

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

After Situation:

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

Scenario Feature Measure: Total Bin Area

Scenario Unit: Square Foot

Scenario Typical Size: 720

Scenario Cost: $8,566.27 **Scenario Cost/Unit:** $11.90

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	$8.44	7	$59.08
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	$101.26	4	$405.04
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	7	$304.78
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	$146.94	14	$2,057.16
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	$319.94	3	$959.82
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	$2.14	47	$100.58
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	7	$147.28

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	$24.27	80	$1,941.60

Materials

Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.86	880	$756.80
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	$1.60	448	$716.80
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	11	$245.30

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$71.23	5	$356.15

Practice: 316 - Animal Mortality Facility

Scenario: #11 - Static pile, Wood Bin(s) with hydrant

Scenario Description:

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

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

Before Situation:

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

After Situation:

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

Scenario Feature Measure: Total Bin Area

Scenario Unit: Square Foot

Scenario Typical Size: 720

Scenario Cost: $9,521.84 **Scenario Cost/Unit:** $13.22

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	$2.14	47	$100.58
Trenching, Earth, 12" x 60"	1459	Trenching, earth, 12" wide x 60" depth, includes equipment and labor for trenching, laying 3"-6" CPP drain line with envelope, and backfilling.	Foot	$1.88	200	$376.00
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.44	7	$59.08
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	$319.94	3	$959.82
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	7	$304.78
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	$101.26	4	$405.04
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	$146.94	14	$2,057.16

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	$24.27	80	$1,941.60
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	$17.44	16	$279.04
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	7	$147.28

Materials

Pipe, PVC, 1 ½", SCH 40	975	Materials: - 1 1/2" - PVC - SCH 40 - ASTM D1785	Foot	$1.06	200	$212.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	11	$245.30
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.86	880	$756.80
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	$1.60	448	$716.80
Freeze Proof Hydrant, > 3' Bury	2393	Freeze Proof Hydrant, more than 3 foot bury. Materials only.	Each	$88.53	1	$88.53

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$71.23	5	$356.15

Practice: 316 - Animal Mortality Facility

Scenario: #12 - Static pile, Concrete Bin(s)

Scenario Description:

This scenario consists of installing a two or more of concrete bins, open on one end on a concrete pad to compost larger quantities of poultry or mature swine mortality in static pile(s) that have sufficient bulking material to allow natural aeration. Piles are turned to go through a second heat cycle prior to final land application. The roofed portion of the facility is addressed in Cover and Roofs (367). Size of facility based on daily mortality and sizing procedures accepted in particular state. Scenarios are needed to meet permit differences between states and sizes of operations (some states in the region do not approve wood walls).

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.
Install a 20' deep by 48' long pad with four bins with 8' high walls and one end open. Roofed portion is addressed under Roofs and Covers (367). Site preparation includes topsoil removal, installing 4" of gravel, installing concrete slab, and installing 8' high concrete walls. Piles are turned by moving to adjacent bin to go through a second heat cycle prior to final land application.

Scenario Feature Measure: Total Bin Area

Scenario Unit: Square Foot

Scenario Typical Size: 960

Scenario Cost: $14,722.50 **Scenario Cost/Unit:** $15.34

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	$319.94	30	$9,598.20
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	$146.94	28	$4,114.32
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	$2.14	85	$181.90
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	14	$312.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 316 - Animal Mortality Facility

Scenario: #13 - Static pile, Concrete Bin(s) with hydrant

Scenario Description:

This scenario consists of installing a two or more of concrete bins, open on one end on a concrete pad to compost larger quantities of poultry or mature swine mortality in static pile(s) that have sufficient bulking material to allow natural aeration. Piles are turned to go through a second heat cycle prior to final land application. Water is added to maintain moisture content. The roofed portion of the facility is addressed in Cover and Roofs (367). Size of facility based on daily mortality and sizing procedures accepted in particular state. Scenarios are needed to meet permit differences between states and sizes of operations (some states in the region do not approve wood walls).

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.
Install a 20' deep by 48' long pad with four bins with 8' high walls and one end open. Roofed portion is addressed under Roofs and Covers (367). Site preparation includes topsoil removal, installing 4" of gravel, installing concrete slab, and installing 8' high concrete walls. A hydrant is installed to aid in maintaining moisture content. Piles are turned by moving to adjacent bin to go through a second heat cycle prior to final land application.

Scenario Feature Measure: Total Bin Area

Scenario Unit: Square Foot

Scenario Typical Size: 960

Scenario Cost: $15,678.07 **Scenario Cost/Unit:** $16.33

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$146.94	28	$4,114.32
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	$2.14	85	$181.90
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	$319.94	30	$9,598.20
Trenching, Earth, 12" x 60"	1459	Trenching, earth, 12" wide x 60" depth, includes equipment and labor for trenching, laying 3"-6" CPP drain line with envelope, and backfilling.	Foot	$1.88	200	$376.00
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	$17.44	16	$279.04
Materials						

Materials

Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	14	$312.20
Freeze Proof Hydrant, > 3' Bury	2393	Freeze Proof Hydrant, more than 3 foot bury. Materials only.	Each	$88.53	1	$88.53
Pipe, PVC, 1 ½", SCH 40	975	Materials: - 1 1/2" - PVC - SCH 40 - ASTM D1785	Foot	$1.06	200	$212.00

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 317 - Composting Facility

Scenario: #1 - Composter, structure facility with concrete floor and walls

Scenario Description:

The composting facility, with concrete floor and walls between 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. This scenario is applicable when geological, soil, or climate conditions, or space limitations for structure footprint, or other site limitations make this scenario more suitable than a structure with wood bin walls on a concrete floor. All animal mortality composting shall be done using Practice Standard 316 - Animal Mortality Facility.

Potential Associated Practices: 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 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, litter 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 livestock operation. The typical composter is 42' x 14' with 5' high concrete walls. Strip top 1' of soil and roll compact same back into sub-floor. The bins are constructed on a 7" concrete slab used to store and stabilize manure, litter and other agricultural by-products from a four house complex on any farm.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 588

Scenario Cost: $5,960.78 **Scenario Cost/Unit:** $10.14

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	$3.97	32.7	$129.82
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	$319.94	8.6	$2,751.48
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$146.94	12.6	$1,851.44
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	10.9	$243.07
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	$492.48	2	$984.96

Practice: 317 - Composting Facility

Scenario: #2 - Composter, structure facility with concrete floor and wood walls

Scenario Description:

The composting facility, with concrete floor and treated lumber walls and between 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, available space for structure footprint, or other site limitations make this scenario more suitable than a structure with concrete bin walls on a concrete floor. All animal mortality composting shall be done using Practice Standard 316 - Animal Mortality
Facility.

Potential Associated Practices: 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 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 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 livestock operation. The typical facility is 24' x 40' with 4' high bins, 6-primary bins, and 4' constructed lumber sidewalls. Strip top 1' of soil and roll compact same back into sub-floor. The entire structure is constructed on a 7" concrete slab used to store and stabilize organic material.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 960

Scenario Cost: $9,803.42 **Scenario Cost/Unit:** $10.21

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	$43.54	5.75	$250.36
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	35.6	$141.33
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	$146.94	20.7	$3,041.66
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.44	5.75	$48.53
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	160	$2,790.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	5.75	$120.98
Materials						
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.86	928	$798.08

Materials

Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	17.8	$396.94
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	$1.60	552	$883.20

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	$492.48	2	$984.96
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	$173.49	2	$346.98

Practice: 327 - Conservation Cover

Scenario: #1 - Introduced Mix

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 wheat 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 provide limited cover for beneficial insects and wildlife but do not have diverse species mix. 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: $5,628.97 **Scenario Cost/Unit:** $112.58

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	50	$1,019.50
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	50	$293.00
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	50	$532.00
Materials						
Four Species Mix, Cool Season, Introduced Perennial (2 grasses, 2 legumes)	2317	Cool season grass and legume mix. Includes material and shipping only.	Acre	$49.65	50	$2,482.50
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	50	$781.50
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	$173.49	3	$520.47

Practice: 327 - Conservation Cover

Scenario: #2 - Native Mix

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 wheat 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 provide moderate cover for beneficial insects and wildlife with suitable diversity. 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: $10,375.47 **Scenario Cost/Unit:** $207.51

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	50	$532.00
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	50	$293.00
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	50	$1,019.50
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	50	$781.50
Three Species Mix, Cool Season, Native Perennial Grass	2316	Cool season, native grass mix. Includes material and shipping only.	Acre	$144.58	50	$7,229.00
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	$173.49	3	$520.47

Practice: 327 - Conservation Cover

Scenario: #3 - Native Mix with FI, Crop

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. Compensation is provided for lost income using crop production (corn-bean-wheat rotation) as the basis for forgone income.

Before Situation:

Crops such as corn, soybeans, or wheat 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 provide moderate cover for beneficial insects and wildlife with suitable diversity. This scenario does not apply to plantings for forage production or to critical area plantings. Habitat is left idle for at least one year to allow for establishment which justifies the forgone income payment.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 50

Scenario Cost: $22,740.28 **Scenario Cost/Unit:** $454.81

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	50	$1,019.50
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	50	$293.00
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	50	$532.00
Foregone Income						
FI, Corn Dryland	1959	Dryland Corn is Primary Crop	Acre	$313.09	16.6	$5,197.29
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$261.78	16.6	$4,345.55
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$168.98	16.7	$2,821.97
Materials						
Three Species Mix, Cool Season, Native Perennial Grass	2316	Cool season, native grass mix. Includes material and shipping only.	Acre	$144.58	50	$7,229.00
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	50	$781.50
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	$173.49	3	$520.47

Practice: 327 - Conservation Cover

Scenario: #4 - Native Mix with FI, Grass

Scenario Description:

This practice applies on land to currently being used for hayland or grazing by livestock but which needs an improved plant community established to improve resource conservation and associated wildlife habitat. This practice typically involves conversion from a hayed or grazed pasture or rangeland 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. Compensation is provided for lost income using grass hay (tons) as the basis for forgone income.

Before Situation:

Grass hayland (or pasture/rangeland) containing low species diversity, including aggressive sod-forming grasses that develop into monoculture stands (i.e. smooth brome, switchgrass, etc.). Haying or grazing is often intensive to remove majority of forage and provides for reduced structural habitat for resident and migratory wildlife species. Herbicide application may be common to control broadleaf plants including native forbs. Soil erosion occurs with ephemeral or classic gullies may be present, sediment may be moving offsite into surface water degrading water quality. The system provides little wildlife habitat.

After Situation:

Land covered with a more diverse native grass and forb plant community with varied structural stands has reduced soil erosion, reduced water/sediment runoff, and air quality is improved. Plants sown for conservation cover provide moderate cover for beneficial insects and wildlife with suitable diversity. This scenario does not apply to plantings for forage production or to critical area plantings. Habitat is left idle for at least one year to allow for establishment which justifies the forgone income payment.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 50

Scenario Cost: $13,478.97 **Scenario Cost/Unit:** $269.58

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	50	$532.00
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	50	$293.00
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	50	$1,019.50
Foregone Income						
FI, Hay, General Grass	2122	General Grass Hay is Primary Land Use	Ton	$41.38	75	$3,103.50
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	50	$781.50
Three Species Mix, Cool Season, Native Perennial Grass	2316	Cool season, native grass mix. Includes material and shipping only.	Acre	$144.58	50	$7,229.00
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	$173.49	3	$520.47

Practice: 327 - Conservation Cover

Scenario: #6 - Pollinator, Simple

Scenario Description:

Permanent vegetation, including mix of grasses, legume, forbs, established on any land needing permanent vegetative cover that provides habitat for pollinators. Mix is diverse (typically 20 species or more) for the needs of pollinators but readily available from commercial vendors. Typical practice size is variable depending on site, this scenario uses 10 ac as the typical size. FOR POLLINATOR HABITAT: Consideration is given to selecting plants that bloom sequentially throughout the growing season where feasible. For honeybee foraging habitat, species are selected which will be in bloom during the season of year when hives are in the area. 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 wheat 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 commonly available mix of native grasses, legume, and forbs. For Pollinator habitat: Plants that bloom sequentially throughout the growing season are established, where feasible. 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 provide excellent cover for beneficial insects and wildlife with optimal diversity of species, structure, etc. This scenario does not apply to critical area plantings.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $3,625.06 **Scenario Cost/Unit:** $362.51

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	10	$58.60
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	10	$106.40
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	10	$203.90
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$19.61	10	$196.10
Materials						
Three plus Species Mix, Warm Season, Native Perennial	2327	Native, warm season perennial grass. Includes material and shipping only.	Acre	$220.98	10	$2,209.80
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	10	$156.30
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	$173.49	4	$693.96

Practice: 327 - Conservation Cover

Scenario: #7 - Pollinator, Simple w FI, Crop

Scenario Description:

Permanent vegetation, including mix of grasses, legume, forbs, established on any land needing permanent vegetative cover that provides habitat for pollinators. Mix is diverse (typically 20 species or more) for the needs of pollinators but readily available from commercial vendors. Typical practice size is variable depending on site, this scenario uses 10 ac as the typical size. FOR POLLINATOR HABITAT: Consideration is given to selecting plants that bloom sequentially throughout the growing season where feasible. For honeybee foraging habitat, species are selected which will be in bloom during the season of year when hives are in the area. 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. Compensation is provided for lost income using crop production (corn-bean-wheat rotation) as the basis for forgone income.

Before Situation:

Crops such as corn, soybeans, or wheat 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 commonly available mix of native grasses, legume, and forbs. For Pollinator habitat: Plants that bloom sequentially throughout the growing season are established, where feasible. 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 provide excellent cover for beneficial insects and wildlife with optimal diversity of species, structure, etc. This scenario does not apply to critical area plantings. Habitat is left idle for at least one year to allow for establishment which justifies the forgone income payment.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $6,096.66 **Scenario Cost/Unit:** $609.67

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	10	$106.40
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	10	$58.60
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$19.61	10	$196.10
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	10	$203.90
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$168.98	3.4	$574.53
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$261.78	3.3	$863.87
FI, Corn Dryland	1959	Dryland Corn is Primary Crop	Acre	$313.09	3.3	$1,033.20
Materials						
Three plus Species Mix, Warm Season, Native Perennial	2327	Native, warm season perennial grass. Includes material and shipping only.	Acre	$220.98	10	$2,209.80
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	10	$156.30
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	$173.49	4	$693.96

Practice: 327 - Conservation Cover

Scenario: #8 - Pollinator, Simple w FI , Grass

Scenario Description:

Permanent vegetation, including mix of grasses, legume, forbs, established on any land needing permanent vegetative cover that provides habitat for pollinators. Mix is diverse (typically 20 species or more) for the needs of pollinators but readily available from commercial vendors. Typical practice size is variable depending on site, this scenario uses 10 ac as the typical size. FOR POLLINATOR HABITAT: Consideration is given to selecting plants that bloom sequentially throughout the growing season where feasible. For honeybee foraging habitat, species are selected which will be in bloom during the season of year when hives are in the area. 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 hayland or pasture/rangeland. Compensation is provided for lost income using grass hay (tons) as the basis for forgone income.

Before Situation:

Grass hayland (or pasture/rangeland) containing low species diversity, including aggressive sod-forming grasses that develop into monoculture stands (i.e. smooth brome, switchgrass, etc.). Haying or grazing is often intensive to remove majority of forage and provides for reduced structural habitat for resident and migratory wildlife species. Herbicide application may be common to control broadleaf plants including native forbs. Soil erosion occurs with ephemeral or classic gullies may be present, sediment may be moving offsite into surface water degrading water quality. The system provides little wildlife habitat.

After Situation:

Land covered with a more diverse native grass and forb plant community with varied structural stands has reduced soil erosion, reduced water/sediment runoff, and air quality is improved. Plants sown for conservation cover provide moderate cover for beneficial insects and wildlife with suitable diversity. This scenario does not apply to plantings for forage production or to critical area plantings. Habitat is left idle for at least one year to allow for establishment which justifies the forgone income payment.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $4,245.76 **Scenario Cost/Unit:** $424.58

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	10	$106.40
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	10	$58.60
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$19.61	10	$196.10
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	10	$203.90
Foregone Income						
FI, Hay, General Grass	2122	General Grass Hay is Primary Land Use	Ton	$41.38	15	$620.70
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	10	$156.30
Three 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
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	$173.49	4	$693.96

Practice: 327 - Conservation Cover

Scenario: #9 - Pollinator, Moderate

Scenario Description:

Permanent vegetation, including mix of grasses, legume, forbs, established on any land needing permanent vegetative cover that provides habitat for pollinators. Mix contains significant diversity (typically 50 species or more) and may consist of locally harvested seed for the needs of pollinators and not all species are readily available from commercial vendors. Typical practice size is variable depending on site, this scenario uses 10 ac as the typical size. FOR POLLINATOR HABITAT: Consideration is given to selecting plants that bloom sequentially throughout the growing season where feasible. For honeybee foraging habitat, species are selected which will be in bloom during the season of year when hives are in the area. 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 wheat 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 significantly diverse mix of native grasses, legume, and forbs. For Pollinator habitat: Plants that bloom sequentially throughout the growing season are established, where feasible. 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 provide excellent cover for beneficial insects and wildlife with optimal diversity of species, structure, etc. This scenario does not apply to critical area plantings.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $7,284.26 **Scenario Cost/Unit:** $728.43

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	10	$106.40
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	10	$58.60
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$19.61	10	$196.10
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	10	$203.90
Materials						
Three Species Mix, Native Forb	2333	Native forb mix. Includes material and shipping only.	Acre	$586.90	10	$5,869.00
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
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	$173.49	4	$693.96

Practice: 327 - Conservation Cover

Scenario: #10 - Pollinator, Moderate w FI, Crop

Scenario Description:

Permanent vegetation, including mix of grasses, legume, forbs, established on any land needing permanent vegetative cover that provides habitat for pollinators. Mix contains significant diversity (typically 50 species or more) and may consist of locally harvested seed for the needs of pollinators and not all species are readily available from commercial vendors. Typical practice size is variable depending on site, this scenario uses 10 ac as the typical size. FOR POLLINATOR HABITAT: Consideration is given to selecting plants that bloom sequentially throughout the growing season where feasible. For honeybee foraging habitat, species are selected which will be in bloom during the season of year when hives are in the area. 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. Compensation is provided for lost income using crop production (corn-bean-wheat rotation) as the basis for forgone income.

Before Situation:

Crops such as corn, soybeans, or wheat 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 significantly diverse mix of native grasses, legume, and forbs. For Pollinator habitat: Plants that bloom sequentially throughout the growing season are established, where feasible. 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 provide excellent cover for beneficial insects and wildlife with optimal diversity of species, structure, etc. This scenario does not apply to critical area plantings. Habitat is left idle for at least one year to allow for establishment which justifies the forgone income payment.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $9,755.86 **Scenario Cost/Unit:** $975.59

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	10	$58.60
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$19.61	10	$196.10
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	10	$203.90
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	10	$106.40
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$168.98	3.4	$574.53
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$261.78	3.3	$863.87
FI, Corn Dryland	1959	Dryland Corn is Primary Crop	Acre	$313.09	3.3	$1,033.20
Materials						
Three Species Mix, Native Forb	2333	Native forb mix. Includes material and shipping only.	Acre	$586.90	10	$5,869.00
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
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	$173.49	4	$693.96

Practice: 327 - Conservation Cover

Scenario: #11 - Pollinator, Moderate w FI, Grass

Scenario Description:

Permanent vegetation, including mix of grasses, legume, forbs, established on any land needing permanent vegetative cover that provides habitat for pollinators. Mix contains significant diversity (typically 50 species or more) and may consist of locally harvested seed for the needs of pollinators and not all species are readily available from commercial vendors. Typical practice size is variable depending on site, this scenario uses 10 ac as the typical size. FOR POLLINATOR HABITAT: Consideration is given to selecting plants that bloom sequentially throughout the growing season where feasible. For honeybee foraging habitat, species are selected which will be in bloom during the season of year when hives are in the area. 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 hayland or pasture/rangeland. Compensation is provided for lost income using grass hay (tons) as the basis for forgone income.

Before Situation:

Grass hayland (or pasture/rangeland) containing low species diversity, including aggressive sod-forming grasses that develop into monoculture stands (i.e. smooth brome, switchgrass, etc.). Haying or grazing is often intensive to remove majority of forage and provides for reduced structural habitat for resident and migratory wildlife species. Herbicide application may be common to control broadleaf plants including native forbs. Soil erosion occurs with ephemeral or classic gullies may be present, sediment may be moving offsite into surface water degrading water quality. The system provides little wildlife habitat.

After Situation:

Land covered with a more diverse native grass and forb plant community with varied structural stands has reduced soil erosion, reduced water/sediment runoff, and air quality is improved. Plants sown for conservation cover provide moderate cover for beneficial insects and wildlife with suitable diversity. This scenario does not apply to plantings for forage production or to critical area plantings. Habitat is left idle for at least one year to allow for establishment which justifies the forgone income payment.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $7,904.96 **Scenario Cost/Unit:** $790.50

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	$10.64	10	$106.40
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	10	$203.90
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	10	$58.60
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$19.61	10	$196.10
Foregone Income						
FI, Hay, General Grass	2122	General Grass Hay is Primary Land Use	Ton	$41.38	15	$620.70
Materials						
Three Species Mix, Native Forb	2333	Native forb mix. Includes material and shipping only.	Acre	$586.90	10	$5,869.00
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
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	$173.49	4	$693.96

Practice: 327 - Conservation Cover

Scenario: #12 - Pollinator, Complex

Scenario Description:

Permanent vegetation, including mix of grasses, legume, forbs, established on any land needing permanent vegetative cover that provides habitat for pollinators. Mix is considered a 'specialty mix' required for unique sites including wet meadows, rare prairie communities, etc. and contains significant diversity (typically 50 species or more) which may consist of locally harvested seed for the needs of pollinators and most species are not readily available from commercial vendors. Typical practice size is variable depending on site, this scenario uses 10 ac as the typical size. FOR POLLINATOR HABITAT: Consideration is given to selecting plants that bloom sequentially throughout the growing season where feasible. For honeybee foraging habitat, species are selected which will be in bloom during the season of year when hives are in the area. 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 will provide quality wildlife habitat. Practice applicable on cropland, odd areas, corners, etc.

Before Situation:

Site may consist of marginal cropland not well suited to production or existing hayland, pasture or rangeland sites which are intensively managed for forage production along with possible herbicide applications where restoration of unique plant communities is possible. These areas may be annually cultivated, hayed or grazed which does not allow the native plant community to persist. Resource concerns may include soil erosion, degraded water quality, and inadequate wildlife habitat.

After Situation:

Land covered with permanent pollinator habitat including a significantly diverse 'specialty mix' of native grasses, legume, and forbs which are not commercially available. For Pollinator habitat: Plants that bloom sequentially throughout the growing season are established, where feasible. 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 provide excellent cover for beneficial insects and wildlife with optimal diversity of species, structure, etc. This scenario does not apply to critical area plantings.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $11,281.46 **Scenario Cost/Unit:** $1,128.15

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	10	$203.90
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$19.61	10	$196.10
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	10	$58.60
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	10	$106.40
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	10	$156.30
Six Species Mix, Native Forb	2334	Native forb mix. Includes material and shipping only.	Acre	$986.62	10	$9,866.20
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	$173.49	4	$693.96

Practice: 328 - Conservation Crop Rotation

Scenario: #1 - Crop Rotation

Scenario Description:

In this region this practice may be 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 6) Manage plant pests (weeds, insects, and diseases) 7) Provide food for domestic livestock and 8) 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 160 acre cropland farm. No foregone income is included as the newly added crop will not reduce net crop return in the rotation. Costs represent typical situations for conventional (non-organic) producers. A minimum of one additional crop will be added to an existing crop rotation.

Before Situation:

The rotation consists primarily of a two crop rotation - small grain and row crop or fallow. An additional crop is added to improve soil health and address erosion, soil quality, and pest management resource concerns.

After Situation:

A minimum 3 crop rotation is established that requires a minimum of at least one additional high residue and/or perennial crop. The 3 crop minimum rotation reduces erosion, improves soil quality, breaks pest cycles, and provides for additional wildlife needs.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 160

Scenario Cost: $2,103.00 **Scenario Cost/Unit:** $13.14

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$35.05	60	$2,103.00

Practice: 328 - Conservation Crop Rotation

Scenario: #2 - Crop Rotation, High Value Crop (FI)

Scenario Description:

In this region this practice may be 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 6) Manage plant pests (weeds, insects, and diseases) 7) Provide food for domestic livestock and 8) 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 160 acre dryland cropland farm where the predominace of crops in the existing rotation are high value crops (e.g. corn or soybeans). Foregone income is included due to lost crop yield and income by adding an additional lesser value crop into the existing rotation. Cost represents typical situations for conventional (non-organic) producers. A minimum of one additional lesser value crop (e.g. wheat, sorghum, sunflowers) will be added to an existing higher value crop rotation (e.g. soybeans and corn).

Before Situation:

The dryland crop rotation consists primarily of a two crop rotation of high value row crops (e.g. soybeans and corn). An additional lower value crop (e.g. wheat, sorghum, sunflowers) is added to the rotation to improve soil health, reduce erosion, and break pest/disease cycles.

After Situation:

A minimum 3 crop rotation is established that requires at least one additional high residue and/or perennial crops added to an existing crop rotation. The 3 crop minimum rotation reduces erosion, improves soil quality, breaks pest cycles, and provides for additional wildlife needs.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 160

Scenario Cost: $8,499.57 **Scenario Cost/Unit:** $53.12

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	$313.09	80	$25,047.20
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$261.78	80	$20,942.40
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$168.98	-54	($9,124.92)
FI, Corn Dryland	1959	Dryland Corn is Primary Crop	Acre	$313.09	-53	($16,593.77)
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$261.78	-53	($13,874.34)
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	$35.05	60	$2,103.00

Practice: 328 - Conservation Crop Rotation

Scenario: #3 - Irrigated to Dryland Rotation-High Value Crops (FI)

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 acre cropland farm. There is foregone income involved with this conversion from irrigated to dryland farming due to lower yields without irrigation. Cost represents typical situations for conventional (non-organic) producers converting from irrigated cropping to dryland farming. Typical crops grown under irrigation will include one small grain (e.g. wheat) and one row crop (e.g. corn) in rotation.

Before Situation:

The existing rotation consists of growing one row crop and one small grain in rotation that received a significant (more than half) of the required water through irrigation. The existing water demands are impacting the area's groundwater 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 controlling wind and water erosion. Corn yields will be expected to be reduced from 150 to 80 bu/acre, and wheat yields will be expected to be reduced from 80 to 40 bu/ac.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 120

Scenario Cost: $12,106.00 **Scenario Cost/Unit:** $100.88

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Foregone Income						
FI, Corn Irrigated	1960	Irrigated Corn is Primary Crop	Acre	$401.04	60	$24,062.40
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$168.98	-60	($10,138.80)
FI, Wheat Irrigated	1964	Irrigated Wheat is Primary Crop	Acre	$259.43	60	$15,565.80
FI, Corn Dryland	1959	Dryland Corn is Primary Crop	Acre	$313.09	-60	($18,785.40)
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	$35.05	40	$1,402.00

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: $1,919.50 **Scenario Cost/Unit:** $19.20

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	$20.39	50	$1,019.50
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	$18.00	50	$900.00

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

Scenario: #2 - Organic No-Till/Strip-Till

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 20 acres of organic 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 are 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 organic 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:

Organically grown crops such as various vegetable and fruit crops (along with organically produced 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 an organic crop field (typical 20 acre) 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: Area planted

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $383.90 **Scenario Cost/Unit:** $19.20

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	$18.00	10	$180.00
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	10	$203.90

Practice: 338 - Prescribed Burning

Scenario: #1 - Herbaceous Fuel, Small Acreage

Scenario Description:

Applying a prescribed burn according to a designed burn plan and NRCS Prescribed Burning (338) standard and specifications in order to control undesirable species, improve wildlife habitat, improve plant productivity and/or quality, facilitate grazing distribution and maintain ecological processes. This scenario is based on a burn area of <160 acres and applies under the following conditions: where the terrain of the majority of the area to be burned <15% slopes with herbaceous and/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 the cost of the 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: 80

Scenario Cost: $1,773.75 **Scenario Cost/Unit:** $22.17

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$44.18	1	$44.18
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	8	$300.00
Water tank, portable	1602	Portable water tank transported in a pick up truck. Typically with 200 gallon capacity includes tank with pump, hose and sprayer. Does not include the pickup truck. Equipment only.	Hour	$2.60	8	$20.80
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.91	8	$247.28
Trailer, water tank	1598	Mobile 5,000 gal water tank mounted on a trailer. Equipment only. Does not include towing equipment.	Hour	$20.21	8	$161.68
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$35.05	7	$245.35
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	$17.44	24	$418.56
Materials						
Fuel, ignition fuel mixture	1596	Mixture of gasoline and diesel for ignition of prescribed burns. Materials only.	Gallon	$3.99	5	$19.95
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	$71.23	2	$142.46
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	$173.49	1	$173.49

Practice: 338 - Prescribed Burning

Scenario: #2 - Herbaceous Fuel - Standard

Scenario Description:

Applying a prescribed burn according to a 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 the following conditions: where the terrain of the majority of the area to be burned <15% slopes with herbaceous and/or low volatile herbaceous fuels with limited 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: $2,760.73 **Scenario Cost/Unit:** $8.63

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$44.18	1	$44.18
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	16	$600.00
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.91	16	$494.56
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	$2.60	8	$20.80
Trailer, water tank	1598	Mobile 5,000 gal water tank mounted on a trailer. Equipment only. Does not include towing equipment.	Hour	$20.21	8	$161.68
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	34	$592.96
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	$35.05	14	$490.70
Materials						
Fuel, ignition fuel mixture	1596	Mixture of gasoline and diesel for ignition of prescribed burns. Materials only.	Gallon	$3.99	10	$39.90
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	$173.49	1	$173.49
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	$71.23	2	$142.46

Practice: 340 - Cover Crop

Scenario: #1 - Cover Crop, Single Species

Scenario Description:

Typically a cool season small grain such as rye or wheat (1-2 additional species may be included) will be planted as a cover crop just prior to or following fall harvest of a row crop, such as corn or soybeans, and will be followed by a spring row crop that will utilize the residue as a mulch. This scenario assumes that the cover crop will be seeded with a no-till drill immediately after harvest or aerial applied/broadcast in late summer to early fall. The cover crop should be allowed to generate as much biomass as possible prior to termination and will be terminated using an approved chemical or mechanical method following NRCS cover crop termination guidelines.

Before Situation:

Row crops such as corn and soybeans are harvested in mid-late fall. Fields that are disked immediately following harvest or those used to produce a low residue crop such as soybeans or silage may have less than 30% residue resulting in bare soil being exposed to wind and/or water erosion 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 and long periods of bare soil.

After Situation:

After harvest of row crop, fields are planted with a small grain cover crop such as rye or wheat. The average field size is 40 acres. The cover crop is seeded with a no-till drill or broadcast into standing crops. The cover crop provides soil cover by late fall, throughout the winter, and into the early spring. Runoff and erosion are reduced and no rills are visible on the soil surface in the spring. Wind erosion is reduced by standing residues. The cover crop is terminated using an approved chemical or mechanical method prior to spring planting as late as feasible to maximize plant biomass production. Over time, soil health is improved due to the additional biomass, ground cover, soil infiltration, and plant diversity introduced into the cropping system. Cover crop residues left on the surface may maximize weed control by increasing allelopathic and mulching effects.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $3,246.80 **Scenario Cost/Unit:** $81.17

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	40	$234.40
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	40	$815.60
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	40	$625.20
One Species, Cool Season, Annual Grass or Legume	2311	Cool season annual grass or legume. Includes material and shipping only.	Acre	$39.29	40	$1,571.60

Practice: 340 - Cover Crop

Scenario: #2 - Cover Crop, Multiple Species

Scenario Description:

Typically a small grain or small grain-legume mix with three or more species (may also use forage sorghum, radishes, turnips, buckwheat, etc) will be planted as a cover crop immediately after harvest of small grain crop or broadcast into a standing row crop at early senescence to allow 6-8 weeks of growth prior to the first killing frost. Late seeded mixes must include a cereal grain that will overwinter. This scenario assumes that seed will be planted with a no-till drill, aerial applied, or broadcast into standing crops. The cover crop should be allowed to generate as much biomass as possible without delaying planting of the following crop. If the cover crop overwinters it will be terminated using an approved chemical or mechanical method following NRCS cover crop termination guidelines.

Before Situation:

Row crops such as corn and soybeans are harvested in mid-late fall. Fields that are disked immediately following harvest or those used to produce a low residue crop such as soybeans or silage may have less than 30% residue resulting in bare soil being exposed to wind and/or water erosion during the fall, winter, and early spring. Over the winter residue degrades and sediment/nutrient runoff from fields increase. 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 and long periods of bare soil.

After Situation:

After harvest of row crop, fields are planted with a small grain-legume mix cover crop, typically rye and clover. The average field size is 40 acres. The cover crop is seeded with a no-till drill. The cover crop provides soil cover by late fall, throughout the winter, and into the early spring. Runoff and erosion are reduced and no rills are visible on the soil surface in the spring. Wind erosion is reduced by standing residues. If the cover crop overwinters, it is terminated using an approved chemical or mechanical method prior to spring planting as late as feasible to maximize plant biomass production. Over time, soil health is improved due to the additional biomass, ground cover, soil infiltration, and plant diversity introduced to the cropping system. Cover crop residues left on the surface may maximize weed control by increasing allelopathic and mulching effects.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $3,686.40 **Scenario Cost/Unit:** $92.16

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	40	$815.60
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	40	$234.40
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	40	$2,011.20
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	40	$625.20

Practice: 340 - Cover Crop

Scenario: #4 - Organic Cover Crop

Scenario Description:

Typically a small grain or small grain-legume mix (may also use forage sorghum, radishes, turnips, buckwheat, etc.) will be planted as a cover crop following harvest of an organically grown crop, and will be followed by an organically grown crop that will utilize the residue as a mulch. This scenario assumes that seed will be planted with a no-till drill. The cover crop should be allowed to generate as much biomass as possible without delaying planting of the following crop. If the cover crop overwinters it will be terminated using a mechanical kill method (mowing, rolling, undercutting, etc.) prior to planting the subsequent crop. This scenario REQUIRES use of Certified Organic Seed. Nonorganically produced, untreated seeds may be used when an equivalent organically produced variety is not available.

Before Situation:

Organically grown crops such as various vegetable and fruit crops (along with organically produced row crops) are grown and harvested in mid-late fall. Fields are disked immediately following harvest. Residue amounts after harvest average 30% or less, resulting in bare soil being exposed to wind and/or water erosion 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.

After Situation:

After harvest of an organic crop, fields are planted with a small grain-legume mix cover crop, typically rye and clover. The average field size is 40 acres. The cover crop is seeded with a no-till drill. No additional fertilizer is applied with the cover crop. The cover crop provides soil cover by late fall, throughout the winter, and into the early spring. Runoff and erosion are reduced and no rills are visible on the soil surface in the spring. Wind erosion is reduced by standing residues. If the cover crop overwinters, it is terminated using a mechanical kill method (mowing, rolling, undercutting, etc.) prior to spring planting as late as feasible to maximize plant biomass production. Over time, soil health is improved due to the additional biomass, ground cover, and plant diversity introduced to the cropping system. Cover crop residues left on the surface may maximize weed control by increasing allelopathic and mulching effects.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $4,928.40 **Scenario Cost/Unit:** $123.21

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	40	$815.60
Mechanical weed control, Vegetation termination	957	Mechanical operations, Includes: Roller/crimper, mower, shredder, etc. Includes equipment, power unit and labor costs.	Acre	$19.61	40	$784.40
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	40	$3,328.40

Practice: 342 - Critical Area Planting

Scenario: #1 - Introduced Grass, Light 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 light tillage implements, grass/legume seed, companion crop, and fertilizer and lime 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, along with an application of 2 tons of lime. 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: $308.44 **Scenario Cost/Unit:** $308.44

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	$20.39	1	$20.39
Cultipacking	1100	Includes equipment, power unit and labor costs.	Acre	$8.09	1	$8.09
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	2	$21.28
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.50	1	$6.50
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	$0.66	60	$39.60
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.51	60	$30.60
Lime, ENM	75	Fertilizer: Limestone Spread on field.	Ton	$58.25	2	$116.50
Three Species Mix, Cool Season, Introduced Perennial Grass	2315	Cool season, introduced grass mix. Includes material and shipping only.	Acre	$46.58	1	$46.58
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	$0.63	30	$18.90

Practice: 342 - Critical Area Planting

Scenario: #2 - Native Grass, Light 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 light tillage implements, native grass seed, and fertilizer and lime 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, 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 60 lbs of phosphate and 60 lbs of potash, along with an application of 2 tons of lime. 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: $337.53 **Scenario Cost/Unit:** $337.53

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.50	1	$6.50
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	2	$21.28
Cultipacking	1100	Includes equipment, power unit and labor costs.	Acre	$8.09	1	$8.09
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	1	$20.39
Materials						
Two Species Mix, Warm Season, Native Perennial Grass	2325	Native, warm season perennial grass. Includes material and shipping only.	Acre	$94.57	1	$94.57
Lime, ENM	75	Fertilizer: Limestone Spread on field.	Ton	$58.25	2	$116.50
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.51	60	$30.60
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	$0.66	60	$39.60

Practice: 342 - Critical Area Planting

Scenario: #3 - Introduced Grass, 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 and lime 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, along with an application of 2 tons of lime. 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: $937.82 **Scenario Cost/Unit:** $937.82

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.50	1	$6.50
Cultipacking	1100	Includes equipment, power unit and labor costs.	Acre	$8.09	1	$8.09
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	2	$21.28
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	1	$20.39
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.80	4	$271.20
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	$25.06	4	$100.24
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	$0.66	60	$39.60
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	$0.63	30	$18.90
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.51	60	$30.60
Three Species Mix, Cool Season, Introduced Perennial Grass	2315	Cool season, introduced grass mix. Includes material and shipping only.	Acre	$46.58	1	$46.58
Lime, ENM	75	Fertilizer: Limestone Spread on field.	Ton	$58.25	2	$116.50
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 342 - Critical Area Planting

Scenario: #4 - Native Grass, 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 and lime 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, along with an application of 2 tons of lime. 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: $966.91 **Scenario Cost/Unit:** $966.91

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	1	$20.39
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.50	1	$6.50
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	2	$21.28
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.80	4	$271.20
Cultipacking	1100	Includes equipment, power unit and labor costs.	Acre	$8.09	1	$8.09
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	$25.06	4	$100.24
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	$0.66	60	$39.60
Two Species Mix, Warm Season, Native Perennial Grass	2325	Native, warm season perennial grass. Includes material and shipping only.	Acre	$94.57	1	$94.57
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.51	60	$30.60
Lime, ENM	75	Fertilizer: Limestone Spread on field.	Ton	$58.25	2	$116.50
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 342 - Critical Area Planting

Scenario: #7 - Live Woody Cuttings

Scenario Description:

Establishment of permanent woody vegetation by hand planting live stakes on a site that is void or nearly void of vegetation due to a natural occurrence or a newly constructed conservation practice. Costs include harvesting, preparation, transport, storage, and hand planting with light hand tillage implements. There is no cost included for the woody materials which would be harvested from local native stands.

Before Situation:

Areas along stream channel banks or recently restored or rehabilitated wetland 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. The exposed areas will be subject to wind erosion, sheet and rill erosion, or erosion from flowing water or wave action. Runoff from the area flows into streams, water courses or other water bodies causing degradation to the receiving waters.

After Situation:

This typical 0.3 acre critical area is stabilized by light hand tillage and individual planting of live woody stakes on a 3' by 3' grid spacing. The woody stakes chosen for this typical scenario are willow, however other woody materials which will regenerate from cuttings may be utilized such as cottonwood or dogwood. The size of this typical area to be stabilized would require approximately 1450 live stakes.

Scenario Feature Measure: Area Planted

Scenario Unit: Acre

Scenario Typical Size: 0

Scenario Cost: $4,198.50 **Scenario Cost/Unit:** #Div/0!

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	200	$3,488.00
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	1450	$710.50

Practice: 342 - Critical Area Planting

Scenario: #8 - Bareroot Seedlings

Scenario Description:

Establishment of permanent woody vegetation by hand planting bareroot tree or shrub seedlings on a site that is void or nearly void of vegetation due to a natural occurrence or a newly constructed conservation practice. Costs includes purchase of the plant stock, transport, storage, and hand planting with light hand tillage implements.

Before Situation:

Areas along stream channel banks or recently restored or rehabilitated wetland 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. The exposed areas will be subject to wind erosion, sheet and rill erosion, or erosion from flowing water or wave action. Runoff from the area flows into streams, water courses or other water bodies causing degradation to the receiving waters.

After Situation:

This typical 0.3 acre critical area is stabilized by light hand tillage and individual planting of bareroot tree or shrubs at a spacing of 10' within row and 10' between rows. The bareroot seedlings chosen for this typical scenario are one half shrub and one half tree species. The size of this typical area to be stabilized would require approximately 150 bareroot seedlings.

Scenario Feature Measure: Area Planted

Scenario Unit: Acre

Scenario Typical Size: 0

Scenario Cost: $1,776.00 **Scenario Cost/Unit:** #Div/0!

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	75	$1,308.00
Materials						
Shrub, seedling or transplant, potted, 1 qt.	1524	Potted shrub, 1 quart. Includes materials and shipping only.	Each	$3.12	150	$468.00

Practice: 342 - Critical Area Planting

Scenario: #9 - Organic, 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 and lime 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, along with an application of 2 tons of lime. 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: $941.96 **Scenario Cost/Unit:** $941.96

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.80	4	$271.20
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	2	$21.28
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.50	1	$6.50
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	1	$20.39
Cultipacking	1100	Includes equipment, power unit and labor costs.	Acre	$8.09	1	$8.09
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	$25.06	4	$100.24
Materials						
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.51	60	$30.60
Lime, ENM	75	Fertilizer: Limestone Spread on field.	Ton	$58.25	2	$116.50
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
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	$0.66	60	$39.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 345 - Residue and Tillage Management, Reduced Till

Scenario: #1 - Mulch till-Basic

Scenario Description:

Mulch-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,planted crops, and for planting perennial crops. All residue shall be distributed uniformly on the soil surface throughout the critical wind erosion period. All residue shall be uniformly distributed over the entire field and not burned or removed. During these periods, intensive tillage has led to excessive soil loss, often above the Soil Loss Tolerance (T), due to the loss of critical crop or weed residue. The RUSLE2 model will be used to review the farming operation and determine if enough residue is being retained throughout the rotation to keep soil loss below T. The producer will then remove operations, or select alternate operations, to reduce erosion below T as needed.

Before Situation:

Row crops such as corn, soybeans, etc. 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 are 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.

After Situation:

Mulch tillage applies to all cropland and other lands where crops are planned. It applies to stubble mulching on summer fallowed land and to tillage for annually and perennial planted crops. It also includes some planting operations such as utilizing a hoe drill, air seeder and no-till drill that disturb a large percentage of soil surface during the planting operation. Tillage occurs after crop harvest. In warmer areas, weeds or cover crops grow throughout the winter months. The residue that remains on the soil surface provides soil cover during late fall, through winter, and into the early spring. Runoff and erosion are reduced and no rills are visible on the soil surface in the spring. Wind erosion is reduced by standing residues. Winter weeds or the cover crop is terminated with tillage, a roller-crimper, shredding, or a combination of these methods prior to spring planting as late as feasible. Over time, soil health is improved due to 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: $1,919.50 **Scenario Cost/Unit:** $19.20

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	$18.00	50	$900.00
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	50	$1,019.50

Practice: 348 - Dam Diversion

Scenario: #1 - Earthfill

Scenario Description:

An earthen embankment 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, waterspreading, livestock water, fire control, municipal or industrial uses, develop renewable energy systems, recreation, or 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 or 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 3000 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 or water-spreading system designed to facilitate the conservation use of soil and water resources, or diversion of water from an unstable watercourse to a stable watercourse as needed. The water supply available is adequate for the purpose for which it is to be diverted. Adverse environmental impacts resulting from the installation of the practice must be overcome. The sheet pile structure provides beneficial uses for irrigation, livestock water, fire control, municipal or industrial uses, renewable energy systems, recreation, or to divert periodic damaging flows from one watercourse to another watercourse thereby reducing the damage potential of the flows. Any needed vegetation of disturbed areas must use Critical Area Planting (342). Other associated practices such as Channel Vegetation (322), Stream Habitat Improvement and Management (395), Channel Stabilization (584) will be as appropriate. Any needed head gates or flap gates to control the quantity of water being diverted must use Structure for Water Control (587).

Scenario Feature Measure: Volume of Earth Fill

Scenario Unit: Cubic Yard

Scenario Typical Size: 3,000

Scenario Cost: $9,148.84 **Scenario Cost/Unit:** $3.05

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Scraper, Self Propelled, 14 CY	2306	Self propelled earthmoving scraper with 14 CY capacity. Does not include labor.	Hour	$259.52	24	$6,228.48
Motor Grader, 150 HP	1781	Motor Grader or Maintainer, 150 hp. Typical of equipment with HP in range of 130-170. Equipment cost, does not include labor.	Hour	$100.50	6	$603.00
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	400	$344.00
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	$24.27	4	$97.08
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	8	$139.52
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$25.06	30	$751.80
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	$492.48	2	$984.96

Practice: 351 - Water Well Decommissioning

Scenario: #1 - Shallow, Greater than 15 in. dia.

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. Install fill material (gravel, earth, concrete, and/or bentonite) consisting of 80% Gravel, 10% Cement or Bentonite, and 10% Earthfill.

Before Situation:

Shallow well or hand dug well that is greater than 15" diameter and 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. Resource Concern - Water Quality Degradation

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 Foot

Scenario Typical Size: 20

Scenario Cost: $670.10 **Scenario Cost/Unit:** $33.51

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	3	$169.47
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	3	$15.66
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	$25.06	3	$75.18
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	$17.44	2	$34.88
Materials						
Chlorine	1335	Liquid chlorine bleach. Includes materials only.	Gallon	$2.79	1	$2.79
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	$24.59	2.9	$71.31
Concrete mix, bag	1226	Pre-mixed dry concrete mix in 60 pound bag. Materials only.	Each	$3.65	3	$10.95
Bentonite	41	Bentonite, includes materials (50# bag)	Each	$10.64	3	$31.92
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 351 - Water Well Decommissioning

Scenario: #2 - Shallow, less than 15 in. dia.

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. Install fill material (gravel, earth, concrete, and/or bentonite) consisting of 60% Gravel, 20% Concrete or Bentonite, and 20% Earthfill.

Before Situation:

Shallow well or hand dug well that is less than 15" diameter and less than 80 feet deep. Assume 12" 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. Resource Concern - Water Quality Degradation

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 Foot

Scenario Typical Size: 80

Scenario Cost: $560.44 **Scenario Cost/Unit:** $7.01

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	$5.22	0.6	$3.13
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	2	$112.98
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	$25.06	2	$50.12
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	$17.44	2	$34.88
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	1.4	$30.80
Bentonite	41	Bentonite, includes materials (50# bag)	Each	$10.64	5	$53.20
Chlorine	1335	Liquid chlorine bleach. Includes materials only.	Gallon	$2.79	1	$2.79
Concrete mix, bag	1226	Pre-mixed dry concrete mix in 60 pound bag. Materials only.	Each	$3.65	4	$14.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 351 - Water Well Decommissioning

Scenario: #3 - Drilled, less than 300 feet

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 with surface casing that is approximately 250 feet deep. Typically will be a well of less than 6" in diameter, or an artesian well which will require grout pumped and well filled from bottom up. Resource Concern - Water Quality Degradation

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 Foot

Scenario Typical Size: 250

Scenario Cost: $3,783.89 **Scenario Cost/Unit:** $15.14

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	4	$59.12
Rotary Drill Rig with Operator	1595	Rotary drill rig including equipment and power unit costs and labor.	Hour	$179.74	10	$1,797.40
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	2	$112.98
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	5	$26.10
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	$24.27	4	$97.08
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	2	$34.88
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$25.06	2	$50.12
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	$604.19	1.8	$1,087.54
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 351 - Water Well Decommissioning

Scenario: #4 - Drilled, between 300 and 1,000 feet

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. Resource Concern - Water Quality Degradation

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 Foot

Scenario Typical Size: 500

Scenario Cost: $6,627.51 **Scenario Cost/Unit:** $13.26

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	$179.74	20	$3,594.80
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	5	$26.10
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	2	$112.98
Grout pump	1334	Grout pump with tremie pipe. Equipment and power unit costs. Labor not included.	Hour	$14.78	8	$118.24
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$25.06	2	$50.12
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	$17.44	2	$34.88
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	8	$194.16
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	$604.19	3.7	$2,235.50
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 351 - Water Well Decommissioning

Scenario: #5 - Drilled, greater than 1,000 feet

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 3" diameter casing. Resource Concern - Water Quality Degradation

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 Foot

Scenario Typical Size: 1,500

Scenario Cost: $10,015.52 **Scenario Cost/Unit:** $6.68

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	$5.22	5	$26.10
Rotary Drill Rig with Operator	1595	Rotary drill rig including equipment and power unit costs and labor.	Hour	$179.74	40	$7,189.60
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	2	$112.98
Grout pump	1334	Grout pump with tremie pipe. Equipment and power unit costs. Labor not included.	Hour	$14.78	16	$236.48
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	$25.06	4	$100.24
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	$17.44	4	$69.76
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	16	$388.32
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	$604.19	2.7	$1,631.31
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	$257.94	1	$257.94

Practice: 356 - Dike

Scenario: #2 - Protective dike 6 feet high or less

Scenario Description:

Construction of a barrier 6' or less in height, constructed of an earthen embankment, to control water level. Embankment structure to provide adequate freeboard, allowance for settlement, and foundation and embankment stability. Payment includes stripping prior to fill placement, excavation of a core trench, and earthfill for embankment. Associated practices include, but are not limited to: PS327 Conservation Cover, PS656 Constructed Wetland, PS342 Critical Area Planting, PS378 Ponds, PS382 Fence, PS464 Irrigation Land Levelling, PS500 Obstruction Removal, PS528 Prescribed Grazing, PS587 Structure for Water Control, PS620 Underground Outlet, PS645 Upland Wildlife Management, PS658 Wetland Creation, PS659 Wetland Enhancement, PS657 Wetland Restoration, PS644 Wetland Wildlife Habitat Management.

Before Situation:

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

After Situation:

Water level controlled by a stable earthen structure 6' or less in height. Potential hazard to public safety, land or property mitigated; environmental benefit provided.

Scenario Feature Measure: Length of constructed dike

Scenario Unit: Foot

Scenario Typical Size: 1,000

Scenario Cost: $29,324.91 **Scenario Cost/Unit:** $29.32

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	444	$381.84
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.63	1222	$4,435.86
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	5925	$23,522.25
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	$492.48	2	$984.96

Practice: 356 - Dike

Scenario: #3 - Protective Dike >6 feet high

Scenario Description:

Construction of a barrier > 6' in height, constructed of an earthen embankment, to control water level. Embankment structure to provide adequate freeboard, allowance for settlement, and foundation and embankment stability. Payment includes stripping prior to fill placement, excavation of a core trench, and earthfill for embankment. Associated practices include, but are not limited to: PS327 Conservation Cover, PS656 Constructed Wetland, PS342 Critical Area Planting, PS378 Ponds, PS382 Fence, PS464 Irrigation Land Levelling, PS500 Obstruction Removal, PS528 Prescribed Grazing, PS587 Structure for Water Control, PS620 Underground Outlet, PS645 Upland Wildlife Management, PS658 Wetland Creation, PS659 Wetland Enhancement, PS657 Wetland Restoration, PS644 Wetland Wildlife Habitat Management.

Before Situation:

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

After Situation:

Water level controlled by a stable earthen structure > 6' in height. Potential hazard to public safety, land or property mitigated; environmental benefit provided.

Scenario Feature Measure: Length of constructed dike

Scenario Unit: Foot

Scenario Typical Size: 1,000

Scenario Cost: $43,339.37 **Scenario Cost/Unit:** $43.34

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.63	1222	$4,435.86
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	9407	$37,345.79
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	666	$572.76
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	2	$984.96

Practice: 359 - Waste Treatment Lagoon

Scenario: #1 - Embankment 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), Roofs and Covers (367), and Solid/Liquid Waste Separation Facility (632).

Before Situation:

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

After Situation:

A waste treatment lagoon constructed from on-site material provides an environmentally safe facility for storing manure and other agricultural waste by-products. This facility provides the landowner a means of storing and treating waste until it can be utilized in a proper manner in accordance with a nutrient management plan.
Typical design size: Design Volume is 455,616 ft3; 100' X 240' (bottom); 3:1 inside and outside side slopes; storage design depth = 12'. Earthwork quantities based on 60% excavated depth and 40% fill depth, or excavated material is balanced with the required compacted fill. This scenario does not include any additional efforts required for constructing a compacted clay lining in the lagoon. This would be contracted under 521D Pond Sealing or Lining-Compacted Clay Treatment.

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 455,616

Scenario Cost: $43,227.33 **Scenario Cost/Unit:** $0.09

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	$3.97	1130	$4,486.10
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	1130	$971.80
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.63	10125	$36,753.75
Materials						
Structural steel tubing, 2" diameter	1120	Structural steel tubing, 2" diameter, 1/8" wall thickness, materials only	Foot	$3.84	8	$30.72
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	2	$984.96

Practice: 359 - Waste Treatment Lagoon

Scenario: #2 - Excavated 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), Roofs and Covers (367), and Solid/Liquid Waste Separation Facility (632).

Before Situation:

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

After Situation:

A waste treatment lagoon constructed from on-site material provides an environmentally safe facility for storing manure and other agricultural waste by-products. This facility provides the landowner a means of storing and treating waste until it can be utilized in a proper manner in accordance with a nutrient management plan.
Typical design size: Design Volume is 455,616 ft3; 100' X 240' (bottom); 3:1 inside and outside side slopes; storage design depth = 12'. Earthwork quantities based on 85% excavated depth and 15% fill depth. This scenario does not include any additional efforts required for constructing a compacted clay lining in the lagoon. This would be contracted under 521D Pond Sealing or Lining-Compacted Clay Treatment.

Scenario Feature Measure: Design Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 455,616

Scenario Cost: $58,538.67 **Scenario Cost/Unit:** $0.13

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	$3.97	1130	$4,486.10
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	1130	$971.80
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.63	14343	$52,065.09
Materials						
Structural steel tubing, 2" diameter	1120	Structural steel tubing, 2" diameter, 1/8" wall thickness, materials only	Foot	$3.84	8	$30.72
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	2	$984.96

Practice: 360 - Waste Facility Closure

Scenario: #1 - Decomissioning of Concrete Waste Storage Structure

Scenario Description:

This practice scenario includes the decomissioning of a concrete storage and/or treatment structure or impoundment. 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. This practice scenario does not include payment for the removal and land application of the manure, wastewater, slurry and/or sludge; however, all manure wastes shall be removed and properly land applied in accordance with Nutrient Management (590) prior to decomissioning of the structure. 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. The structure may or may not contain manure, wastewater, slurry and/or sludge. It poses a safety hazard for humans and livestock and is a threat to environmentally sustainability by the potential for impacts to water and air quality.

After Situation:

This scenario assumes a concrete waste storage structure with a volume of 48000 cubic feet (200' x 30' x 8') with 8" thick walls. The volume of earthwork (earthfill and/or excavation, final grading) required is approximately 75% of the storage volume. Decomissioning of a concrete waste storage structure will consist of collapsing the concrete sidewalls to 20% of their original height and filling the storage structure with earthfill. The concrete may be disposed off site if necessary. All manure and wastewater nutrient material shall be removed and land applied in accordance with Nutrient Management (590) prior to fill. After collapsing the side walls the remaining void will be filled with earthen material from a borrow source. The disturbed areas shall be vegetated in accordance with Critical Area Planting (342) or planted to crops in accordance with Nutrient Management (590). Removing and properly utilizing the manure and waste water from the impoundment, demolition of any above grade concrete and the fill in of the concrete waste structure will address water quality degradation, air quality impacts and safety hazards The site may also become available for another use.

Scenario Feature Measure: Cubic Feet of storage to be decomissioned

Scenario Unit: Cubic Foot

Scenario Typical Size: 48,000

Scenario Cost: $9,269.53 **Scenario Cost/Unit:** $0.19

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	1400	$5,558.00
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	$115.06	8	$920.48
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$16.55	73	$1,208.15
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	$25.06	8	$200.48
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	$17.44	8	$139.52
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	2	$984.96

Practice: 360 - Waste Facility Closure

Scenario: #2 - Earthen Waste Impoundment Closure

Scenario Description:

This practice scenario includes the decommissioning of an earthen storage and/or treatment structure or impoundment (embankment or excavated type) include any basins intended for sediment removal. 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. This practice scenario does not include payment for the removal and land application of the manure, wastewater, slurry and/or sludge; however, all manure wastes shall be removed and properly land applied in accordance with Nutrient Management (590) prior to decomissioning of the structure. Associated practices: Nutrient Management (590), Critical Area Planting (342)

Before Situation:

The existing manure, runoff and/or wastewaste water lagoon, storage pond or pit is no longer functioning correctly or is not being used for its intended purpose. The structure may or may not contain manure, wastewater, slurry and/or sludge. It poses a safety hazard for humans and livestock and is a threat to environmentally sustainability by the potential for impacts to water and air quality.

After Situation:

This scenario assumes a waste storage pond with total storage volume of 100,000 cubic feet over a footprint of 12150 square feet. 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 75% of the storage volume. The volume of earthwork will include 60% as excavation and 40% as compacted earthfill. An additional excavation of 450 cubic yards is assumed to remove contaminated soil below original design over the entire footprint of pond. 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. This practice scenario does not include payment for the removal and land application of the manure, wastewater, slurry and/or sludge; however, all manure wastes shall be removed and properly land applied in accordance with Nutrient Management (590) prior to decomissioning of the structure. 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) or planted to crops in accordance to Nutrient Management (590). 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 and earthfill of the structure. The site will also become available for another use.

Scenario Feature Measure: Storage Volume

Scenario Unit: Cubic Foot

Scenario Typical Size: 100,000

Scenario Cost: $10,576.19 **Scenario Cost/Unit:** $0.11

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	12150	$3,523.50
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.26	1600	$5,216.00
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	$115.06	8	$920.48
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	$17.44	10	$174.40
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	$25.06	8	$200.48
Materials						
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	5	$48.85
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	$492.48	1	$492.48

Practice: 362 - Diversion

Scenario: #1 - Diversion

Scenario Description:

An earthen channel constructed across long slopes with supporting ridge on lower side, to divert runoff away from farmsteads, gullies, critical erosion areas, construction areas or other sensitive areas. Outlet may be waterway, underground outlet. or other suitable outlet. Typical diversion is, 2300 feet long and requires 1 CY excavation per LF. Channel my be level or gradient and ridge may be vegetated or farmed. The quantity of excavation and fill is balanced.

Before Situation:

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

After Situation:

Diversion is 2300 feet long installed using a dozer and/or scraper. Storm water runoff is diverted away from the area to be protected. Associated practices are Critical Area Planting (342), Grassed Waterway (412), Underground Outlet (620), Mulching (484), and Subsurface Drainage (606).

Scenario Feature Measure: Diversion Excavated Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 2,300

Scenario Cost: $7,644.68 **Scenario Cost/Unit:** $3.32

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Motor Grader, 150 HP	1781	Motor Grader or Maintainer, 150 hp. Typical of equipment with HP in range of 130-170. Equipment cost, does not include labor.	Hour	$100.50	4	$402.00
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	710	$610.60
Scraper, Self Propelled, 14 CY	2306	Self propelled earthmoving scraper with 14 CY capacity. Does not include labor.	Hour	$259.52	19	$4,930.88
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	$35.05	2	$70.10
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$25.06	23	$576.38
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	4	$69.76
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	2	$984.96

Practice: 366 - Anaerobic Digester

Scenario: #1 - Small Plug Flow less than 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 by-products 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. This situation poses an environmental 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: $643,908.33 **Scenario Cost/Unit:** $707.59

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						
Plug Flow, Small (less than 1,000 animal units)	2478	Concrete plug flow anaerobic digester which includes poured walls, floor and top, reception and mixing tanks, piping installed in and/or around the digester for circulating heated liquid to maintain the necessary temperatures for efficient digester operat	Each	##########	1	$642,998.32
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94
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	$71.23	1	$71.23
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	1	$492.48

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 by-products 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. This situation poses an environmental 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: $881,449.68 **Scenario Cost/Unit:** $503.69

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	2	$88.36
Equipment/Installation						
Plug Flow, Medium (between 1,000 and 2,000 animal units)	2479	Concrete plug flow anaerobic digester which includes poured walls, floor and top, reception and mixing tanks, piping installed in and/or around the digester for circulating heated liquid to maintain the necessary temperatures for efficient digester operat	Each	##########	1	$880,281.73
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	$492.48	1	$492.48
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	$71.23	1	$71.23
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 366 - Anaerobic Digester

Scenario: #3 - Large Plug Flow greater than 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 by-products 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. This situation poses an environmental 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: $1,318,896.11 **Scenario Cost/Unit:** $336.45

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						
Plug Flow, Large (more than 2,000 animal units)	2480	Concrete plug flow anaerobic digester which includes poured walls, floor and top, reception and mixing tanks, piping installed in and/or around the digester for circulating heated liquid to maintain the necessary temperatures for efficient digester operat	Each	##########	1	##########
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	$492.48	1	$492.48
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	$71.23	1	$71.23
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	3	$773.82

Practice: 366 - Anaerobic Digester

Scenario: #4 - Small Complete Mix less than 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 by-products 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. This situation poses an environmental 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: $738,676.03 **Scenario Cost/Unit:** $710.95

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						
Complete Mix, Small (less than 1,000 animal units)	2481	A complete mix flow anaerobic digester includes the containment facility, agitation or stirring equipment, and any necessary reception and mixing tanks, Piping installed in and/or around the digester for circulating heated liquid to maintain the necessary	Each	##########	1	$737,766.02
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	$492.48	1	$492.48
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94
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	$71.23	1	$71.23

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 by-products 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. This situation poses an environmental 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: $1,288,842.64 **Scenario Cost/Unit:** $681.93

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$44.18	2	$88.36
Equipment/Installation						
Complete Mix, Medium (between 1,000 and 2,500 animal units)	2482	A complete mix flow anaerobic digester includes the containment facility, agitation or stirring equipment, and any necessary reception and mixing tanks, Piping installed in and/or around the digester for circulating heated liquid to maintain the necessary	Each	##########	1	##########
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	$71.23	1	$71.23
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	1	$492.48
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 366 - Anaerobic Digester

Scenario: #6 - Large Complete Mix greater than 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 by-products 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. This situation poses an environmental 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: $1,496,927.19 **Scenario Cost/Unit:** $464.88

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$44.18	2	$88.36
Equipment/Installation						
Complete Mix, Large (more than 2,500 animal units)	2483	A complete mix flow anaerobic digester includes the containment facility, agitation or stirring equipment, and any necessary reception and mixing tanks, Piping installed in and/or around the digester for circulating heated liquid to maintain the necessary	Each	##########	1	##########
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	$492.48	1	$492.48
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	3	$773.82
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	$71.23	1	$71.23

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 by-products 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. This situation poses an environmental threat of excessive nutrients, organics, and pathogens being transported into surface and ground waters, in addition to the use of excessive amounts of fertilizers. The treatment of manure and other agricultural by-products is desired in order to manage odors, and/or reduce pathogens.

After Situation:

Manure and other agricultural by-products are being treated such that odors are managed and/or pathogens are reduced. Effluent from the digester is disposed of or utilized in a proper manner in accordance with a nutrient management plan.
A covered lagoon/holding pond typically has a fexible top installed over an earthen storage/treatment facility for the purpose of capturing the biogas.
Typical Design Scenario: 1,000 animal units (715 - 1,400 lbs dairy cows).

Scenario Feature Measure: Animals Units Contributing to Digester

Scenario Unit: Animal Unit

Scenario Typical Size: 1,000

Scenario Cost: $107,373.35 **Scenario Cost/Unit:** $107.37

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
Equipment/Installation						
Covered Lagoon (not including the lagoon or the associated cover)	2484	Piping and collection system for biogas, controls for operating the digester system, flare excess gas to convert from methane to carbon dioxide Includes material, labor, and equipment.	Each	##########	1	$107,000.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94
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	$71.23	1	$71.23

Practice: 367 - Roofs and Covers

Scenario: #1 - Hoop Structure 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 9,000 square feet (36' X 250') 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: 9,000

Scenario Cost: $56,908.34 **Scenario Cost/Unit:** $6.32

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Roof, Hoop Truss Arch Structure, 30-60' wide	1668	Hoop Truss Arch Structure with fabric cover - 30' to 60' width, includes materials, equipment, and installation. Does not include foundation preparation.	Square Foot	$6.25	9000	$56,250.00
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	$71.23	2	$142.46
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 367 - Roofs and Covers

Scenario: #2 - Timber or Steel Sheet Roof

Scenario Description:

A timber framed structure without enclosing sidewalls 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 5,000 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: Area under roof

Scenario Unit: Square Foot

Scenario Typical Size: 5,000

Scenario Cost: $27,400.40 **Scenario Cost/Unit:** $5.48

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Roof, Post Frame Building, 30' to 60' wide	1676	Post Frame Building, no sides, - 30' to 60' width. Building sites with expected snow loads up to 30 lbs per square foot and wind exposure in semi protected areas (wooded or terrain with numerous closely spaced obstructions). Includes materials, shipping	Square Foot	$5.40	5000	$27,000.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94
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	$71.23	2	$142.46

Practice: 367 - Roofs and Covers

Scenario: #3 - Flexible Membrane Cover Only

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. This scenario does not include the flare 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 50,000 SF 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). Precipitation is excluded from the animal waste storage or treatment lagoon

Scenario Feature Measure: Surface of Membrane

Scenario Unit: Square Foot

Scenario Typical Size: 50,000

Scenario Cost: $49,301.52 **Scenario Cost/Unit:** $0.99

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	60	$2,612.40
Trencher, 8"	936	Equipment and power unit costs. Labor not included.	Hour	$90.68	60	$5,440.80
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	120	$2,524.80
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	$17.44	200	$3,488.00
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	$24.27	80	$1,941.60
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	5555.6	$32,778.04
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 367 - Roofs and Covers

Scenario: #4 - Flex Membrane w/Flare

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. This scenario includes the flare 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 50,000 SF 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). This scenario includes the flare to convert methane to carbon dioxide.

Scenario Feature Measure: Surface of Membrane

Scenario Unit: Square Foot

Scenario Typical Size: 50,000

Scenario Cost: $101,798.00 **Scenario Cost/Unit:** $2.04

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	60	$2,612.40
Trencher, 8"	936	Equipment and power unit costs. Labor not included.	Hour	$90.68	60	$5,440.80
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	$17.44	200	$3,488.00
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	120	$2,524.80
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	$24.27	80	$1,941.60
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
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Yard	$5.90	5555.6	$32,778.04
Covered Lagoon Gas Collection System	1664	Piping and collection system for biogas. Includes labor and equipment.	Each	$39,705.31	1	$39,705.31
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 371 - Air Filtration and Scrubbing

Scenario: #1 - Biofilter

Scenario Description:

Porous filter media is utilized to filter the exhaust from animal confinement facilities to allow microbial activity to reduce objectionable odors. The typical installation is a horizontal media bed supported by a treated lumber substructure to allow airflow to be directed beneath and then up through the media. Vertical biofilters may also be utilized. The filter media is a combination of wood chips to maintain porosity and compost to provide the microorganisms for the air filtering activity. A typical mix ratio would be 80% wood chips and 20% compost. Ventilation system component alterations that may be required to facilitate the biofilter application are not included in the cost computation. Payment includes materials, equipment, and labor costs for installing the biofilter. A stabilized area around the biofilter is not included and must be addressed through the associated practice of Heavy Use Area Protection (561), if needed. Resource concern: Air – Objectionable Odors

Before Situation:

The animal confinement facility has an uncontrolled airflow that is causing objectionable odors.

After Situation:

A 32' X 200" horizontal media bed, 20" thick is supported by a treated lumber substructure to allow airflow to be directed beneath and then up through the media is installed adjacent to a swine production facility. Exhaust from the facility is directed to flow through the biofilter media to reduce objectionable odors. Maintainace of the media bed will be required on a 3-5 year cycle to maintain effectiveness.

Associated practices include Heavy Use Area Protection (561), Amendments for Treatment of Agricultural Waste (591), Windbreak (380), Waste Storage Facility (313), Composting Facility (317), and CAP-Comprehensive Air Quality Management Plan (126).

Scenario Feature Measure: Biofilter Media Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 395

Scenario Cost: $19,555.35 **Scenario Cost/Unit:** $49.51

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	$125.42	2	$250.84
Aggregate, Wood Chips	1098	Includes materials, equipment and labor	Cubic yard	$21.24	316	$6,711.84
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	$25.06	2	$50.12
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	$17.44	24	$418.56
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	20	$1,292.20
Post, Wood, Untreated, 8-9" X 8'	1078	Wood Post, End 8-9" X 8', Untreated. Includes materials and shipping only.	Each	$44.18	30	$1,325.40
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.86	9550	$8,213.00
Plywood, 3/4 inch, treated	2363	Treated 4' x 8' sheets of 3/4 inch exterior grade plywood	Each	$37.33	30	$1,119.90
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	$173.49	1	$173.49

Practice: 374 - Farmstead Energy Improvement

Scenario: #1 - Ventilation - Exhaust

Scenario Description:

Replacement of a conventional exhaust fan with high volume, low speed, efficient exhaust fan. Fans being installed should be models previously tested by BESS Lab or the Air Movement and Control Association and be in top 20 percentile of fans tested. Practice certification will be through receipts and pictures from the applicant. Typical scenario includes the replacement of a 48" fan.

Before Situation:

Inefficient ventilation in an agricultural building.

After Situation:

High-efficiency ventilation system which reduces energy use. The new ventilation equipment will provide suitable air quality and reduce overall power requirements (kW) compared to the existing ventilation system as evidenced in an energy audit. Associated practices/activities: may include 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $1,329.57 **Scenario Cost/Unit:** $1,329.57

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	$24.27	3	$72.81
Materials						
Fan, exhaust, 48" High Efficiency	1187	48 inch high efficiency exhaust fan, controls, wiring, and associated appurtenances. Materials only.	Each	$1,256.76	1	$1,256.76

Practice: 374 - Farmstead Energy Improvement

Scenario: #2 - Ventilation - HAF

Scenario Description:

A system of fans are installed to create a horizontal air circulation pattern; the new system promotes efficient heat and moisture distribution. In a typical 10,000 square foot greenhouse, 10 HAF fans are needed. Fan performance meets Energy Audit efficiency criteria as tested by AMCA or BESS Labs.

Before Situation:

Inefficent air circulation system in a greenhouse.

After Situation:

High-efficiency air circulation system which reduces energy use. The new equipment will provide suitable air quality and reduce overall power requirements (kW) compared to the existing system as evidenced in an energy audit. Associated practices/activities: may include 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $194.09 **Scenario Cost/Unit:** $194.09

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	2	$48.54
Materials						
Fan, HAF, 1/10 to 1/15 HP	1189	High efficiency Horizontal Air Flow (HAF) fan, controls, wiring, and associated appurtenances. Materials only.	Each	$145.55	1	$145.55

Practice: 374 - Farmstead Energy Improvement

Scenario: #3 - Plate Cooler-Small

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: $4,755.18 **Scenario Cost/Unit:** $4,755.18

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	8	$194.16
Materials						
Plate Cooler, ≤ 499 gal/hr capacity	1176	Stainless Steel, dual pass plate cooler with < 499 gallon/hour capacity. Includes materials and shipping only.	Each	$4,561.02	1	$4,561.02

Practice: 374 - Farmstead Energy Improvement

Scenario: #4 - 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: $6,513.13 **Scenario Cost/Unit:** $6,513.13

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	$24.27	8	$194.16
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: #5 - 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: $2,692.32 **Scenario Cost/Unit:** $2,692.32

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	$24.27	4	$97.08
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: #6 - 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: Horsepower

Scenario Typical Size: 50

Scenario Cost: $11,444.66 **Scenario Cost/Unit:** $228.89

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	8	$194.16
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: #7 - 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: $1,368.34 **Scenario Cost/Unit:** $1,368.34

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	$24.27	8	$194.16
Materials						
Switches and Controls, programmable controller	1193	Programmable logic controller (with or without wireless telecommunications) commonly used to control pumps and irrigation systems	Each	$153.22	1	$153.22
Switches and Controls, temp sensors	1192	Temperature and soil moisture sensors installed as part of an electronic monitoring (with or without wireless telecommunications) commonly used to control pumps and irrigation systems	Each	$605.73	1	$605.73
Switches and Controls, Wi-Fi system and software	1194	Software with built-in cellular or Wi-Fi communication commonly used to control pumps and irrigation systems	Each	$415.23	1	$415.23

Practice: 374 - Farmstead Energy Improvement

Scenario: #8 - 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: $22,848.20 **Scenario Cost/Unit:** $152.32

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	$24.27	16	$388.32
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: #9 - 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: $6,099.51 **Scenario Cost/Unit:** $121.99

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	$24.27	8	$194.16
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: #10 - 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: $836.38 **Scenario Cost/Unit:** $167.28

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	4	$97.08
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: #11 - 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: $549.99 **Scenario Cost/Unit:** $549.99

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	$24.27	4	$97.08
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: #12 - 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: $8,765.40 **Scenario Cost/Unit:** $1,460.90

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	$24.27	16	$388.32
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: #13 - 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: $6,808.32 **Scenario Cost/Unit:** $9.08

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	$24.27	16	$388.32
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: #14 - 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: $2,074.18 **Scenario Cost/Unit:** $148.16

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	$24.27	24	$582.48
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: #15 - Grain Dryer

Scenario Description:

A replacement continuous dryer rated for an appropriatle rated bushel/per hour capacity for the operation that includes a microcomputer-based control system that adjusts the amount of time the crop remains in the dryer in order to achieve a consistent and accurate moisture content in the dried product. Alternate types of replacement dryers which reduce energy use are acceptable as evidenced by the energy audit. The typical operation requires a rated capacity of 860 bushels per hour.

Before Situation:

Wet crop is loaded in the top of a horizontal, continuous dryer. Dried crop is augured from the bottom of the dryer. The heated air from the unit's burners passes from the burner plenum through the grain. An on-farm energy audit has identified inefficient manual control of the dryer where the operator controls the plenum temperature and the discharge auger speed to achieve the desired final moisture content. Moisture content is based on measurement of grain leaving the dryer. The plenum temperature setting depends on the moisture content of crop with a typical value of 220 F. The burner cycles on and off, automatically, as necessary to maintain the plenum temperature selected by the operator.

After Situation:

Energy use is reduced through installation of a more efficient continuous dryer that uses a microcomputer-based controller to reduce overdrying and total time of operation. Associated practices/activities may include: 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Rated capacity of the dryer

Scenario Unit: Bushel per Hour

Scenario Typical Size: 860

Scenario Cost: $77,881.20 **Scenario Cost/Unit:** $90.56

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	16	$388.32
Materials						
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, 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, 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, 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: 378 - Pond

Scenario: #1 - Excavated Pond

Scenario Description:

A low-hazard water impoundment structure on agricultural lands to maintain or improve water quality and to provide water for livestock, fish and wildlife, recreation, fire control, developing renewable energy systems and other related uses. Pond is created solely by excavation and impounds less than 3 feet against the embankment or spoil. Excavated material is spoiled, not placed in a designed embankment. Earthen spillway is constructed as needed. The resource concerns addressed include inadequate livestock water, excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition.

Before Situation:

Area exists where water could naturally pool or run off to create a pond for livestock, wildlife, fire control or developing renewable energy systems, and other related uses, and to maintain or improve water quality. Failure of the pond will not result in loss of life; damage to homes, commercial or industrial buildings, main highways, or railroads; or in interruption of the use or service of public utilities.

After Situation:

The typical pond is constructed by excavating 3000 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: 3,000

Scenario Cost: $7,838.76 **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	$2.14	3000	$6,420.00
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$125.42	6	$752.52
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	$25.06	6	$150.36
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 378 - Pond

Scenario: #3 - Embankment Pond, No Principal Spillway

Scenario Description:

An earthen embankment dam without a principal spillway pipe. A low flow tube of 6 inches or less to reduce saturation of the auxiliary spillway is installed, anti-seep collars or sand diaphragms are not required. A low-hazard water impoundment structure on agricultural land to maintain or improve water quality and to provide water for livestock, fish and wildlife, recreation, fire control, developing renewable energy systems and other related uses. An earthen embankment will be constructed with a principle spillway conduit and earthen auxiliary spillway, as designed. The resource concerns addressed include inadequate livestock water, excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition. Cost estimate is based upon a typical amount of earthfill of 2,000 cubic yards, and 80 feet of pipe 6" PVC pipe. Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.

Before Situation:

Area exists where water could naturally pool or run off to create a pond for livestock, wildlife, fire control or developing renewable energy systems, and other related uses, and to maintain or improve water quality. Failure of the embankment will not result in loss of life or damages of any kind.

After Situation:

The typical pond is constructed by excavating the pool area, constructing the auxiliary spillway, preparing the foundation as designed, and creating an embankment. The product of the storage times the effective height of the dam is less than 3,000. The effective height of the dam is 35 feet or less. The earthen auxiliary spillway will be constructed as designed. No principle spillway pipe will be used. Vegetation will be completed under critical area planting (342). Other associated practices include 382, 516, 521A, 533, 614, 587, 396.

Scenario Feature Measure: Cubic Yards of Earthfill

Scenario Unit: Cubic Yard

Scenario Typical Size: 2,000

Scenario Cost: $9,910.07 **Scenario Cost/Unit:** $4.96

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	$2.14	100	$214.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	2000	$7,940.00
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	$115.06	5	$575.30
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	$24.27	5	$121.35
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	$17.44	1	$17.44
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	$25.06	5	$125.30
Materials						
Pipe, PVC, 6", SDR 26	990	Materials: - 6" - PVC - SDR 26 160 psi - ASTM D2241	Foot	$5.01	80	$400.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 378 - Pond

Scenario: #4 - Embankment Pond with less than 24" Pipe

Scenario Description:

An earthen embankment dam with a principle spillway pipe less than 24 inches, anti-seep collars or sand diaphragm, and excavated plunge pool basin. A low-hazard water impoundment structure on agricultural land to maintain or improve water quality and to provide water for livestock, fish and wildlife, recreation, fire control, developing renewable energy systems and other related uses. An earthen embankment will be constructed with a principle spillway conduit and earthen auxiliary spillway, as designed. The resource concerns addressed include inadequate livestock water, excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition. Cost estimate is based upon a typical amount of earthfill of 4000 cubic yards, 90 feet of 18" PVC, pipe with a canopy inlet, and 3 cubic yard sand diaphragm. Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.

Before Situation:

Area exists where water could naturally pool or run off to create a pond for livestock, wildlife, fire control or developing renewable energy systems, and other related uses, and to maintain or improve water quality. Failure of the embankment will not result in loss of life or damages of any kind.

After Situation:

The typical pond is constructed by excavating the pool area, constructing the auxiliary spillway, preparing the foundation as designed, and creating an embankment. The product of the storage times the effective height of the dam is less than 3,000. The effective height of the dam is 35 feet or less. The earthen auxiliary spillway will be constructed as designed, and a 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: Cubic Yards of Earthfill

Scenario Unit: Cubic Yard

Scenario Typical Size: 4,000

Scenario Cost: $22,661.08 **Scenario Cost/Unit:** $5.67

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	$115.06	10	$1,150.60
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	4000	$15,880.00
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	29	$151.38
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	$24.27	18	$436.86
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	9	$156.96
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	$25.06	10	$250.60
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.00	22	$1,166.00
Pipe, PVC, 18", SCH 40	1373	Materials: - 18" - PVC - SCH 40 - ASTM D1785	Foot	$30.12	90	$2,710.80
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	11	$242.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 378 - Pond

Scenario: #5 - Embankment Pond with greater than or equal to 24" Pipe

Scenario Description:

An earthen embankment dam with a principle spillway pipe greater than or equal to 24 inches, anti-seep collars or sand diaphragm, and excavated plunge pool basin. A low-hazard water impoundment structure on agricultural land to maintain or improve water quality and to provide water for livestock, fish and wildlife, recreation, fire control, developing renewable energy systems and other related uses. An earthen embankment will be constructed with a principle spillway conduit and earthen auxiliary spillway, as designed. The resource concerns addressed include inadequate livestock water, excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition. Cost estimate is based upon a typical amount of earthfill of 10,000 cubic yards,corrugated metal drop inlet principle spillway with a 11 ft riser and 100 ft barrel, and 82 Square feet of anti-seep collars. Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.

Before Situation:

Area exists where water could naturally pool or run off to create a pond for livestock, wildlife, fire control or developing renewable energy systems, and other related uses, and to maintain or improve water quality. Failure of the embankment will not result in loss of life or damages of any kind.

After Situation:

The typical pond is constructed by excavating the pool area, constructing the auxiliary spillway, preparing the foundation as designed, and creating an embankment. The product of the storage times the effective height of the dam is less than 3,000. The effective height of the dam is 35 feet or less. The earthen auxiliary spillway will be constructed as designed, and a 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: Cubic Yards of Earthfill

Scenario Unit: Cubic Yard

Scenario Typical Size: 10,000

Scenario Cost: $50,423.32 **Scenario Cost/Unit:** $5.04

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	$319.94	2	$639.88
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	$101.26	1	$101.26
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	10000	$39,700.00
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	129	$673.38
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	$115.06	13	$1,495.78
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	$24.27	36	$873.72
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	$25.06	13	$325.78
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	$17.44	18	$313.92

Materials

Materials

Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.00	46	$2,438.00
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	11	$242.00
Pipe, CMP, 30", 12 Gauge	1824	30" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$33.56	12	$402.72
Pipe, CMP, 24", 12 Gauge	1417	24" Corrugated Metal Pipe, Galvanized, Uncoated, 12 gage. Material cost only.	Foot	$27.01	100	$2,701.00

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #1 - Hand Planted, Bare Root

Scenario Description:

Single 600 foot row of bare root shrubs, conifers, hardwoods, or combination for wind protection, wildlife habitat, or snow management. Shrubs will be planted with a spacing of 4 to 6 feet and hardwoods/conifers 8 to 12 feet apart. The scenario will include 1/3 shrubs, 1/3 hardwoods, and 1/3 conifers based on feet of trees. 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 minimize soil erosion, or to manage snow deposition. Additional wildlife food and cover.

Scenario Feature Measure: Number of trees

Scenario Unit: Each

Scenario Typical Size: 80

Scenario Cost: $155.86 **Scenario Cost/Unit:** $1.95

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
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	1	$37.50
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	$17.44	3	$52.32
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	40	$18.80
Wire flags	1586	Small vinyl flags attached to wire stakes, typically, 36" in length, for marking tree rows	Each	$0.09	20	$1.80
Tree, conifer, seedling, bare root, 1-1	1513	Bare root conifer trees, 1-1 (2 years old). Includes materials and shipping only.	Each	$0.42	20	$8.40
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.69	20	$13.80

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #5 - Trees, machine planted

Scenario Description:

Tree planting consisting of 2500 feet of trees for wind protection, energy conservation, wildlife habitat, air quality, snow management or to provide a visual screen. The planting may consist of shrubs, hardwood trees, conifers, or a combination. Trees and shrubs planted with a tree planting machine. Shrubs will be planted with a spacing of 4 to 6 feet and hardwoods/conifers 8 to 12 feet apart in the row with rows 16 feet apart. The scenario will include 1/4 shrubs, 1/2 hardwoods, and 1/4 conifers based on feet of trees. 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 minimize 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 planted windbreak

Scenario Unit: Feet

Scenario Typical Size: 2,500

Scenario Cost: $673.30 **Scenario Cost/Unit:** $0.27

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	3	$19.80
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.65	3	$70.95
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	4	$150.00
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	$17.44	10	$174.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	3	$63.12
Materials						
Wire flags	1586	Small vinyl flags attached to wire stakes, typically, 36" in length, for marking tree rows	Each	$0.09	100	$9.00
Tree, conifer, seedling, bare root, 1-1	1513	Bare root conifer trees, 1-1 (2 years old). Includes materials and shipping only.	Each	$0.42	63	$26.46
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.69	125	$86.25
Shrub, seedling or transplant, bare root, 6-18"	1506	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.47	156	$73.32

Practice: 380 - Windbreak/Shelterbelt Establishment

Scenario: #6 - Trees, machine planted, wildlife protection

Scenario Description:

Tree planting consisting of 2500 feet of trees for wind protection, energy conservation, wildlife habitat, air quality, snow management or to provide a visual screen. The planting may consist of shrubs, hardwood trees, conifers, or a combination. Trees and shrubs planted with a tree planting machine. Shrubs will be planted with a spacing of 4 to 6 feet and hardwoods/conifers 8 to 12 feet apart in the row with rows 16 feet apart. The scenario will include 1/4 shrubs, 1/2 hardwoods, and 1/4 conifers based on feet of trees. 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 minimize 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 planted windbreak

Scenario Unit: Feet

Scenario Typical Size: 2,500

Scenario Cost: $1,998.90 **Scenario Cost/Unit:** $0.80

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	$23.65	3	$70.95
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
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	4	$150.00
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	3	$63.12
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	$17.44	14	$244.16
Materials						
Tree, conifer, seedling, bare root, 1-1	1513	Bare root conifer trees, 1-1 (2 years old). Includes materials and shipping only.	Each	$0.42	63	$26.46
Tree shelter, solid tube type, 4" x 60"	1567	4" x 60" tree tube for protection from animal damage. Materials only.	Each	$5.07	188	$953.16
Cable ties, plastic	1575	Plastic cable ties (typ. 8-12") to assist in securing items. Materials only.	Each	$0.05	188	$9.40
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	188	$293.28
Wire flags	1586	Small vinyl flags attached to wire stakes, typically, 36" in length, for marking tree rows	Each	$0.09	100	$9.00
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.69	125	$86.25
Shrub, seedling or transplant, bare root, 6-18"	1506	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.47	156	$73.32

Practice: 382 - Fence

Scenario: #1 - Barbed Wire, Multi-strand

Scenario Description:

Multi-strand, Barbed Wire - Installation of fence will allow for implementation of a grazing management plan 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. The fence is typically 4 strands over 3/4 of a mile (3,960 ft).

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, as a result of over grazing/improper distribution, increases the opportunity for the encroachment of noxious and invasive weeds.

After Situation:

Installation of interior fencing will allow for implementation of a grazing management plan that allows adequate rest and recovery periods, protection of sensitive areas, 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: 3,960

Scenario Cost: $6,784.57 **Scenario Cost/Unit:** $1.71

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	$8.44	15	$126.60
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	15	$562.50
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.65	21	$496.65
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	21	$441.84
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	90	$1,569.60
Materials						
Wire, Barbed, Galvanized, 12.5 Gauge, 1,320' roll	1	Galvanized 12.5 gauge, 1,320' roll. Includes materials and shipping only.	Each	$70.53	12	$846.36
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	80	$496.00
Post, Wood, CCA treated, 5" x 8'	11	Wood Post, End 5" X 8', CCA Treated. Includes materials and shipping only.	Each	$11.16	10	$111.60
Post, Wood, CCA treated, 4" x 8'	10	Wood Post, Line 4" X 8', CCA Treated. Includes materials and shipping only.	Each	$7.99	7	$55.93
Fence, Wire Assembly, Barbed Wire	30	Brace pins, battens, clips, staples. Includes materials and shipping only.	Foot	$0.16	5280	$844.80
Post, Steel T, 1.33 lbs, 6'	15	Steel Post, Studded 6' - 1.33 lb. Includes materials and shipping only.	Each	$6.62	160	$1,059.20
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	$173.49	1	$173.49

Practice: 382 - Fence

Scenario: #2 - Barbed Wire, Multi-strand with Fence Markers

Scenario Description:

Multi-strand, Barbed Wire - Installation of fence will allow for implementation of a grazing management plan that allows for an adequate rest and recovery period, protection of sensitive areas, improved water quality, and reduction of noxious and invasive weeds. Constructed using fencing materials rather than a pre-manufactured gate. The fence is typically 4 strands with wildlife markers, over 3/4 of a mile (3,960 ft).

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, as a result of over grazing/improper distribution, increases the opportunity for the encroachment of noxious and invasive weeds.

After Situation:

Installation of interior fencing will allow for implementation of a grazing management plan that allows for an adequate rest and recovery period, protection of sensitive areas, 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. The after condition includes markers placed on the fence to protect and deter wildlife, primarily protected wildlife include Sage grouse, Lesser Prairie Chicken, etc.

Scenario Feature Measure: Length of Fence

Scenario Unit: Feet

Scenario Typical Size: 3,960

Scenario Cost: $7,136.25 **Scenario Cost/Unit:** $1.80

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	$8.44	15	$126.60
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.65	21	$496.65
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	15	$562.50
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	21	$441.84
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	92	$1,604.48
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	80	$496.00
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	7920	$316.80
Fence, Wire Assembly, Barbed Wire	30	Brace pins, battens, clips, staples. Includes materials and shipping only.	Foot	$0.16	5280	$844.80
Post, Steel T, 1.33 lbs, 6'	15	Steel Post, Studded 6' - 1.33 lb. Includes materials and shipping only.	Each	$6.62	160	$1,059.20
Post, Wood, CCA treated, 4" x 8'	10	Wood Post, Line 4" X 8', CCA Treated. Includes materials and shipping only.	Each	$7.99	7	$55.93
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	12	$846.36
Post, Wood, CCA treated, 5" x 8'	11	Wood Post, End 5" X 8', CCA Treated. Includes materials and shipping only.	Each	$11.16	10	$111.60
Mobilization						

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$173.49	1	$173.49

Practice: 382 - Fence

Scenario: #5 - Woven Wire

Scenario Description:

Woven - Installation of fence will allow for implementation of a grazing management plan that promotes adequate rest and recovery periods, protection of sensitive areas, 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. Includes 32" woven wire with 2 strands of barbed wire.

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 vegetation, as a result of over grazing/improper distribution, increases the opportunity for the encroachment of noxious and invasive weeds. cover increases opportunity for encroachment of noxious and invasive weeds.

After Situation:

Installation of interior fencing will allow for implementation of a rotational grazing plan that promotes adequate rest and recovery periods, protection of sensitive areas, 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. Fence will be installed with wildlife friendly considerations.

Scenario Feature Measure: Length of Fence

Scenario Unit: Feet

Scenario Typical Size: 3,960

Scenario Cost: $6,330.12 **Scenario Cost/Unit:** $1.60

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	$8.44	5	$42.20
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	5	$187.50
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.65	6	$141.90
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	$17.44	30	$523.20
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	6	$126.24
Materials						
Post, Wood, CCA treated, 5" x 8'	11	Wood Post, End 5" X 8', CCA Treated. Includes materials and shipping only.	Each	$11.16	10	$111.60
Fence, Wire Assembly, Woven Wire	35	Brace pins, twist sticks, staples. Includes materials and shipping only.	Foot	$0.12	3960	$475.20
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	6	$423.18
Wire, Woven, Galvanized, 12.5 Gauge, 32"	3	Galvanized 12.5 gauge, 32" - 330' roll. Includes materials and shipping only.	Each	$174.34	12	$2,092.08
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	80	$496.00
Post, Wood, CCA treated, 4" x 8'	10	Wood Post, Line 4" X 8', CCA Treated. Includes materials and shipping only.	Each	$7.99	7	$55.93
Post, Steel T, 1.33 lbs, 6'	15	Steel Post, Studded 6' - 1.33 lb. Includes materials and shipping only.	Each	$6.62	160	$1,059.20
Fence, Wire Assembly, Barbed Wire	30	Brace pins, battens, clips, staples. Includes materials and shipping only.	Foot	$0.16	2640	$422.40
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	$173.49	1	$173.49

Practice: 382 - Fence

Scenario: #6 - Woven Wire, with fence markers

Scenario Description:

Woven - Installation of fence will allow for implementation of a grazing management plan that promotes an adequate rest and recovery period, protection of sensitive areas, 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. Includes 32" woven wire with 2 strands of barbed wire.

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, as a result of over grazing/improper distribution, increases opportunity for encroachment of noxious and invasive weeds.

After Situation:

Installation of interior fencing will allow for implementation of a rotational grazing plan that promotes an adequate rest and recovery period, protection of sensitive areas, 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. Fence will be installed with wildlife friendly considerations. The after condition includes markers placed on the fence to protect and deter wildlife, primarily protected wildlife include Sage grouse, Lesser Prairie Chicken, etc.

Scenario Feature Measure: Length of Fence

Scenario Unit: Feet

Scenario Typical Size: 3,960

Scenario Cost: $6,681.80 **Scenario Cost/Unit:** $1.69

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	$23.65	6	$141.90
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	5	$187.50
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.44	5	$42.20
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	6	$126.24
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	$17.44	32	$558.08
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	7	$55.93
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	6	$423.18
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	80	$496.00
Post, Wood, CCA treated, 5" x 8'	11	Wood Post, End 5" X 8', CCA Treated. Includes materials and shipping only.	Each	$11.16	10	$111.60
Post, Steel T, 1.33 lbs, 6'	15	Steel Post, Studded 6' - 1.33 lb. Includes materials and shipping only.	Each	$6.62	160	$1,059.20
Fence, Wire Assembly, Barbed Wire	30	Brace pins, battens, clips, staples. Includes materials and shipping only.	Foot	$0.16	2640	$422.40
Fence, Wire Assembly, Woven Wire	35	Brace pins, twist sticks, staples. Includes materials and shipping only.	Foot	$0.12	3960	$475.20
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	7920	$316.80

Materials

Wire, Woven, Galvanized, 12.5 Gauge, 32"	3	Galvanized 12.5 gauge, 32" - 330' roll. Includes materials and shipping only.	Each	$174.34	12	$2,092.08

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$173.49	1	$173.49

Practice: 382 - Fence

Scenario: #7 - Electric, high tensile with energizer

Scenario Description:

Electric - Installation of fence will allow for implementation of a grazing management plan that allows for an adequate rest and recovery period, protection of sensitive areas, improved water quality, reduction of noxious and invasive weeds. Includes 3 strands of high tensile wire with energizer.

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, as a result of over grazing/improper distribution, increases opportunity for encroachment of noxious and invasive weeds.

After Situation:

Installation of interior fencing will allow for implementation of grazing management that allows for an adequate rest and recovery period, protection of sensitive areas, improved water quality, reduction of noxious and invasive weeds. Fence includes posts, wire, fasteners, gates, fence charger, etc. Two to three strand wire is commonly installed. Fence will be installed with wildlife friendly considerations.

Scenario Feature Measure: Length of Fence

Scenario Unit: Feet

Scenario Typical Size: 2,640

Scenario Cost: $2,778.99 **Scenario Cost/Unit:** $1.05

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	10	$375.00
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.65	6	$141.90
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.44	4	$33.76
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	$17.44	40	$697.60
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	6	$126.24
Materials						
Post, Wood, CCA treated, 5" x 8'	11	Wood Post, End 5" X 8', CCA Treated. Includes materials and shipping only.	Each	$11.16	8	$89.28
Post, Steel T, 1.33 lbs, 6'	15	Steel Post, Studded 6' - 1.33 lb. Includes materials and shipping only.	Each	$6.62	35	$231.70
Electric, Ground Rod Clamps	21	Electric, Ground Rod Clamps for electric fence. Includes materials and shipping only.	Each	$1.79	2	$3.58
Electric, Energizer, 6 joule	29	Electric, Energizer, 6 joule for electric fence. Includes materials and shipping only.	Each	$321.21	1	$321.21
Fence, Wire Assembly, High Tensile, Electric, 3 Strand	34	Brace pins, springs, strainers, battens, clips, crimp sleeves, staples, insulators, wrap around sleeves. Includes materials and shipping only.	Foot	$0.12	2640	$316.80
Electric, Ground Rods	20	Electric, Ground Rod for electric fence. Includes materials and shipping only.	Each	$10.41	1	$10.41
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
Wire, High Tensile, 12.5 Gauge, 4,000' roll	2	High Tensile 12.5 gauge, 4,000' roll. Includes materials and shipping only.	Each	$113.03	2	$226.06
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	$173.49	1	$173.49

Practice: 382 - Fence

Scenario: #8 - Electric, high tensile with energizer and fence markers

Scenario Description:

Electric - Installation of fence will allow for implementation of grazing management that allows for an adequate rest and recovery period, protection of sensitive areas, improved water quality, reduction of noxious and invasive weeds. Includes 3 strands of high-tensile wire with energizer.

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, as a result of over grazing/improper distribution, increases opportunity for encroachment of noxious and invasive weeds.

After Situation:

Installation of interior fencing will allow for implementation of grazing management that allows for an adequate rest and recovery period, protection of sensitive areas, 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. The after condition includes markers placed on the fence to protect and deter wildlife, protected wildlife species include Sage grouse, Lesser Prairie Chicken, etc.

Scenario Feature Measure: Length of Fence

Scenario Unit: Feet

Scenario Typical Size: 2,640

Scenario Cost: $3,025.07 **Scenario Cost/Unit:** $1.15

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	$8.44	4	$33.76
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	10	$375.00
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.65	6	$141.90
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	6	$126.24
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	$17.44	42	$732.48
Materials						
Electric, Ground Rods	20	Electric, Ground Rod for electric fence. Includes materials and shipping only.	Each	$10.41	1	$10.41
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
Wire, High Tensile, 12.5 Gauge, 4,000' roll	2	High Tensile 12.5 gauge, 4,000' roll. Includes materials and shipping only.	Each	$113.03	2	$226.06
Post, Wood, CCA treated, 5" x 8'	11	Wood Post, End 5" X 8', CCA Treated. Includes materials and shipping only.	Each	$11.16	8	$89.28
Electric, Energizer, 6 joule	29	Electric, Energizer, 6 joule for electric fence. Includes materials and shipping only.	Each	$321.21	1	$321.21
Post, Steel T, 1.33 lbs, 6'	15	Steel Post, Studded 6' - 1.33 lb. Includes materials and shipping only.	Each	$6.62	35	$231.70
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	5280	$211.20
Fence, Wire Assembly, High Tensile, Electric, 3 Strand	34	Brace pins, springs, strainers, battens, clips, crimp sleeves, staples, insulators, wrap around sleeves. Includes materials and shipping only.	Foot	$0.12	2640	$316.80

Materials

Electric, Ground Rod Clamps	21	Electric, Ground Rod Clamps for electric fence. Includes materials and shipping only.	Each	$1.79	2	$3.58

Mobilization

Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$173.49	1	$173.49

Practice: 382 - Fence

Scenario: #9 - Protective Fence

Scenario Description:

A barrier (fence) implemented on an NRCS constructed waste storage system site per an approved engineering design. Permanently installed fence built to (1) keep humans away from waste ponds & lagoons, (2) to protect sensitive areas (riparian areas, wetlands, springs, etc.) from heavy livestock pressure, (3) to protect newly installed conservation practices where vulnerable to livestock damage. 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, or area with newly installed conservation practices that may cause detrimental effects to animal/human health and wildlife habitat. Resource concerns affected are plant health and vigor, wildlife habitat, compaction of soils, runoff of sediment or water quality degradation due to increased 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. Improved livestock control and access to water, or other sensitive areas, will promote safety for livestock/humans, improve health and vigor of sensitive species, limit soil erosion, and improve soil condition.

Scenario Feature Measure: Length of Fence

Scenario Unit: Feet

Scenario Typical Size: 1,320

Scenario Cost: $2,498.70 **Scenario Cost/Unit:** $1.89

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	$23.65	7	$165.55
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	5	$187.50
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.44	6	$50.64
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	$17.44	30	$523.20
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	7	$147.28
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	30	$186.00
Fence, Wire Assembly, Barbed Wire	30	Brace pins, battens, clips, staples. Includes materials and shipping only.	Foot	$0.16	1760	$281.60
Post, Steel T, 1.33 lbs, 6'	15	Steel Post, Studded 6' - 1.33 lb. Includes materials and shipping only.	Each	$6.62	55	$364.10
Post, Wood, CCA treated, 4" x 8'	10	Wood Post, Line 4" X 8', CCA Treated. Includes materials and shipping only.	Each	$7.99	6	$47.94
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
Post, Wood, CCA treated, 5" x 8'	11	Wood Post, End 5" X 8', CCA Treated. Includes materials and shipping only.	Each	$11.16	8	$89.28
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$173.49	1	$173.49

Practice: 382 - Fence

Scenario: #10 - Confinement

Scenario Description:

Installation of a confinement fence is needed to addresses resource concerns associated with livestock feeding operations. The fence will provide protection of sensitive areas, improve water quality, and reduce of noxious and invasive weeds. Resource Concerns: Water Quality, Plant Condition.

Before Situation:

Livestock feeding operation requires relocation to address water quality concerns. The site has conditions with the potential to negatively impact water quality in the designated area. These potential adverse effects will be addressed by moving the livestock facility away from the area(s) of concern.

After Situation:

Installation of fence reduces water quality and plant condition resource concerns associated with livestock facilities. The fence would typically be 150' wide x 200' long (700 lf) with two gates, installed by a fencing contractor. 8 ft tall woven wire fence with 6" diameter posts spaced at 8 ft increments. 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: 700

Scenario Cost: $3,745.75 **Scenario Cost/Unit:** $5.35

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	6	$225.00
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.65	10	$236.50
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.44	10	$84.40
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	16	$336.64
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	20	$348.80
Materials						
Gate, Game, 8' High X 16'	1086	16' Wide Game Gate (8' Tall). Includes materials and shipping only.	Each	$416.15	2	$832.30
Post, Wood, Untreated, 8-9" X 8'	1078	Wood Post, End 8-9" X 8', Untreated. Includes materials and shipping only.	Each	$44.18	8	$353.44
Post, Steel T, 1.33 lbs, 6'	15	Steel Post, Studded 6' - 1.33 lb. Includes materials and shipping only.	Each	$6.62	88	$582.56
Wire, Woven, Galvanized, 12.5 Gauge, 32"	3	Galvanized 12.5 gauge, 32" - 330' roll. Includes materials and shipping only.	Each	$174.34	3	$523.02
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
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	$173.49	1	$173.49

Practice: 383 - Fuel Break

Scenario: #1 - Fuel Break

Scenario Description:

Fuel Break installation requires tree thinning, treating woody residue, pruning, and mowing. Thinning treatment and pruning is done by hand, 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. 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: $6,277.39 **Scenario Cost/Unit:** $1,569.35

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Mower, Bush Hog	940	Equipment and power unit costs. Labor not included.	Hour	$51.24	8	$409.92
Pruning tool, pole saw	1319	Gasoline powered pole chainsaw. Labor not included.	Hour	$8.03	8	$64.24
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$125.42	10	$1,254.20
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	8	$300.00
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$57.30	8	$458.40
Pruning tools, hand tools	1318	Pruning tools, hand tools, shears, loppers, pole saw, handsaw. Material costs only. Labor not included.	Hour	$4.77	8	$38.16
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.35	80	$508.00
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	8	$168.32
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$25.06	10	$250.60
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	$35.05	20	$701.00
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	$17.44	80	$1,395.20
Materials						
Herbicide, Triclopyor	338	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$42.30	4	$169.20

Materials

Tree Marking Paint	313	Trees to be cut through tree marking are physically identified through the application of paint on the tree. Typically one quart of paint is used to mark one acre of trees. Includes materials and shipping only.	Acre	$6.43	4	$25.72

Mobilization

Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been i	Dollar	$1.03	100	$103.00
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94
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	$173.49	1	$173.49

Practice: 386 - Field Border

Scenario: #1 - Herbaceous, Standard, (FI)

Scenario Description:

A strip of permanent herbaceous vegetation (native, warm-season) 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 chemical seedbed prep and planting of grass. 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 species (native, warm-season) 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. Herbaceous 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: $558.56 **Scenario Cost/Unit:** $558.56

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	1	$5.86
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	1	$20.39
Foregone Income						
FI, Corn Dryland	1959	Dryland Corn is Primary Crop	Acre	$313.09	0.33	$103.32
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$261.78	0.33	$86.39
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$168.98	0.34	$57.45
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	$24.27	2	$48.54
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: #3 - Herbaceous, Pollinator, (FI)

Scenario Description:

A strip of permanent herbaceous 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 chemical seedbed prep and planting of pollinator friendly herbaceous species. The area of the field border is taken out of production. Seed mix of SPECIES IS CHOSEN TO SPECIFICALLY BENEFIT WILDLIFE (ex: big game spp, Sage grouse, Lesser Prairie Chicken, others) or POLLINATORS (eg. inclusion of 5-10 forb species) based on range conditions. FOR POLLINATOR HABITAT: Consideration is given to selecting plants that bloom sequentially throughout the growing season where feasible. For honeybee foraging habitat, species are selected which will be in bloom during the season of year when hives are in the area.

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: $466.91 **Scenario Cost/Unit:** $466.91

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	1	$5.86
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	1	$20.39
Foregone Income						
FI, Corn Dryland	1959	Dryland Corn is Primary Crop	Acre	$313.09	0.33	$103.32
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$261.78	0.33	$86.39
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$168.98	0.34	$57.45
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	$24.27	2	$48.54
Materials						
Native or Non-Native Grass and Forb Mix, for Wildlife (including pollinators) or Ecosystem Restoration	2502	Native or Non-Native Grass and Forb Mix, including specialized species. Includes material and shipping only.	Acre	$129.33	1	$129.33
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 - Herbaceous, Pollinator, Natives only (FI)

Scenario Description:

A strip of permanent herbaceous 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 chemical seedbed prep and planting of pollinator friendly herbaceous species. The area of the field border is taken out of production. Seed mix of PREDOMINANTLY NATIVE SPECIES IS CHOSEN TO SPECIFICALLY BENEFIT WILDLIFE (ex: big game spp, Sage grouse, Lesser Prairie Chicken, others) or POLLINATORS (eg. inclusion of 5-10 forb species). FOR POLLINATOR HABITAT: Consideration is given to selecting plants that bloom sequentially throughout the growing season where feasible. For honeybee foraging habitat, species are selected which will be in bloom during the season of year when hives are in the area.

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: $598.87 **Scenario Cost/Unit:** $598.87

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	1	$5.86
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	1	$20.39
Foregone Income						
FI, Corn Dryland	1959	Dryland Corn is Primary Crop	Acre	$313.09	0.33	$103.32
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$261.78	0.33	$86.39
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$168.98	0.34	$57.45
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	$24.27	2	$48.54
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: #6 - Herbaceous, Organic (FI)

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 mechanical seedbed prep and planting of organic herbaceous species (where available). 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 herbaceous species 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: $715.91 **Scenario Cost/Unit:** $715.91

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Site Preparation, Mechanical	944	Aerator, rolling drum chopper, etc. Includes equipment, power unit and labor costs.	Acre	$66.69	1	$66.69
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	1	$20.39
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.85	1	$15.85
Foregone Income						
FI, Organic, Corn Dryland	2232	Organic Dryland Corn is Primary Crop	Acre	$346.97	0.33	$114.50
FI, Organic, Soybeans Dryland	2234	Organic Dryland Soybeans is Primary Crop	Acre	$312.41	0.33	$103.10
FI, Organic, Wheat Dryland	2236	Organic Dryland Wheat is Primary Crop	Acre	$188.09	0.34	$63.95
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	$24.27	2	$48.54
Materials						
Untreated Conventional Seed, Three plus Species Mix, Warm Season Perennial Grass	2344	Untreated conventional wWarm season perennial grass mix. May contain seed that are not available as certified organic. Includes material and shipping only.	Acre	$282.89	1	$282.89

Practice: 390 - Riparian Herbaceous Cover

Scenario: #1 - Native Species

Scenario Description:

Native Species: 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 (550), 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). 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 native 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.

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 concern(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. 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 ensure long term survival and ecological succession. The quality and quantity of the riparian zone components are managed to support the species that depend on it for habitat as well as the functions it performs for stabilizing the streambank and/or shoreline, dissipating stream energy and trapping sediment, and improving and/or maintaining water quality. These functions include: stream temperature moderation through shading, recruitment of non-woody organic matter, habitat for terrestrial insects and other riparian dependent species, streambank integrity, and filtration of contaminants from surface run-off into the stream.

Scenario Feature Measure: Acres of Riparian Herbaceous Cover

Scenario Unit: Acre

Scenario Typical Size: 5

Scenario Cost: $662.88 **Scenario Cost/Unit:** $132.58

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	5	$101.95
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	5	$53.20
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	$17.44	2	$34.88
Materials						
Two Species Mix, Warm Season, Native Perennial Grass	2325	Native, warm season perennial grass. Includes material and shipping only.	Acre	$94.57	5	$472.85

Practice: 390 - Riparian Herbaceous Cover

Scenario: #2 - Native Species with foregone income

Scenario Description:

Native Species: 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 (550), 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). The typical setting for this scenario is 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 native 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. All grazing will be deferred during plant establishment which will consist of a minimum of one year, and in many cases longer. Typically there is no haying, and the only clipping during establishment will be for removal of weeds.

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 concern(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. 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 ensure long term survival and ecological succession. The quality and quantity of the riparian zone components are managed to support the species that depend on it for habitat as well as the functions it performs for stabilizing the streambank and/or shoreline, dissipating stream energy and trapping sediment, and improving and/or maintaining water quality. These functions include: stream temperature moderation through shading, recruitment of non-woody organic matter, habitat for terrestrial insects and other riparian dependent species, streambank integrity, and filtration of contaminants from surface run-off into the stream. All grazing will be deferred during plant establishment which will consist of a minimum of one year, and in many cases longer. Typically there is no haying, and the only clipping during establishment will be for removal of weeds.

Scenario Feature Measure: Acres of Riparian Herbaceous Cover

Scenario Unit: Acre

Scenario Typical Size: 5

Scenario Cost: $778.58 **Scenario Cost/Unit:** $155.72

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	5	$101.95
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	5	$53.20
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$23.14	5	$115.70
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	$17.44	2	$34.88
Materials						
Two Species Mix, Warm Season, Native Perennial Grass	2325	Native, warm season perennial grass. Includes material and shipping only.	Acre	$94.57	5	$472.85

Practice: 390 - Riparian Herbaceous Cover

Scenario: #3 - Native Species, Pollinator Planting

Scenario Description:

Native Species: 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 (550), 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). 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 native 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.

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 concern(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. 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 ensure long term survival and ecological succession. The quality and quantity of the riparian zone components are managed to support the species that depend on it for habitat as well as the functions it performs for stabilizing the streambank and/or shoreline, dissipating stream energy and trapping sediment, and improving and/or maintaining water quality. These functions include: stream temperature moderation through shading, recruitment of non-woody organic matter, habitat for terrestrial insects and other riparian dependent species, streambank integrity, and filtration of contaminants from surface run-off into the stream.

Scenario Feature Measure: Acres of Riparian Herbaceous Cover

Scenario Unit: Acre

Scenario Typical Size: 5

Scenario Cost: $2,597.01 **Scenario Cost/Unit:** $519.40

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	5	$53.20
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	5	$101.95
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	2	$34.88
Materials						
Three Species Mix, Cool Season, Native Perennial Grass	2316	Cool season, native grass mix. Includes material and shipping only.	Acre	$144.58	3	$433.74
Six Species Mix, Native Forb	2334	Native forb mix. Includes material and shipping only.	Acre	$986.62	2	$1,973.24

Practice: 390 - Riparian Herbaceous Cover

Scenario: #4 - Native Species, Pollinator Planting, Forgone Income

Scenario Description:

Native Species: 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 (550), 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). 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 native 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. All grazing will be deferred during plant establishment which will consist of a minimum of one year, and in many cases longer. Typically there is no haying, and the only clipping during establishment will be for removal of weeds.

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 concern(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. 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 ensure long term survival and ecological succession. The quality and quantity of the riparian zone components are managed to support the species that depend on it for habitat as well as the functions it performs for stabilizing the streambank and/or shoreline, dissipating stream energy and trapping sediment, and improving and/or maintaining water quality. These functions include: stream temperature moderation through shading, recruitment of non-woody organic matter, habitat for terrestrial insects and other riparian dependent species, streambank integrity, and filtration of contaminants from surface run-off into the stream. All grazing will be deferred during plant establishment which will consist of a minimum of one year, and in many cases longer. Typically there is no haying, and the only clipping during establishment will be for removal of weeds.

Scenario Feature Measure: Acres of Riparian Herbaceous Cover

Scenario Unit: Acre

Scenario Typical Size: 5

Scenario Cost: $2,712.71 **Scenario Cost/Unit:** $542.54

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	5	$101.95
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	5	$53.20
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$23.14	5	$115.70
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	$17.44	2	$34.88
Materials						
Six Species Mix, Native Forb	2334	Native forb mix. Includes material and shipping only.	Acre	$986.62	2	$1,973.24

Materials

Three Species Mix, Cool Season, Native Perennial Grass	2316	Cool season, native grass mix. Includes material and shipping only.	Acre	$144.58	3	$433.74

Practice: 391 - Riparian Forest Buffer

Scenario: #2 - Bare-root, machine planted (FI)

Scenario Description:

Establish a buffer of trees and/or shrubs into a suitably prepared site to restore riparian plant communities and provide other 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 in rows. Area will be planted using 3 rows and will use each of the woody plant types. Spacing between plants in each row: shrubs will be 6' , evergreen tree spacing will be 12', and deciduous tree spacing will be 15'. Tree rows will be 15' apart. A total tree row length of 3000'. 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 water temperature; Degraded Plant Condition - inadequate structure and composition; and Inadequate Habitat for Fish and Wildlife - habitat degradation.

Before Situation:

Typical sites include former riparian forests and habitat used for forage, cropland, speculation property, or other nonforest condition which contains undesirable amounts or types of vegetation. Active bank erosion is depositing sediment, nutrients and organics in the riparian area. Water temperature is high due to lack of shade. Habitat is not desirable for wildlife.

After Situation:

A buffer of trees and shrubs will be established along the riparian corridor which will provide stability, filtration, shade, and desirable habitat to address the above mentioned resource concerns.

Scenario Feature Measure: Area of planting

Scenario Unit: Acre

Scenario Typical Size: 3

Scenario Cost: $4,021.64 **Scenario Cost/Unit:** $1,340.55

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	10	$66.00
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.91	4	$123.64
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.65	10	$236.50
Foregone Income						
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$261.78	1	$261.78
FI, Corn Irrigated	1960	Irrigated Corn is Primary Crop	Acre	$401.04	1	$401.04
FI, Corn Dryland	1959	Dryland Corn is Primary Crop	Acre	$313.09	1	$313.09
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	10	$210.40
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	$17.44	30	$523.20
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	250	$270.00
Tree shelter, solid tube type, 4" x 36"	1565	4" x 36" tree tube for protection from animal damage. Materials only.	Each	$3.19	200	$638.00
Tree, conifer, seedling, bare root, 1-1	1513	Bare root conifer trees, 1-1 (2 years old). Includes materials and shipping only.	Each	$0.42	250	$105.00
Tree, hardwood, seedling or transplant, bare root, 16-36"	1510	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.72	200	$144.00
Shrub, seedling or transplant, bare root, 18"-36"	1507	Bare root hardwood trees 18-36" tall. Includes materials and shipping only.	Each	$0.58	500	$290.00

Materials

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	450	$265.50

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	$173.49	1	$173.49

Practice: 391 - Riparian Forest Buffer

Scenario: #3 - Small container, machine planted (FI)

Scenario Description:

Establish a buffer of trees and/or shrubs into a suitably prepared site to restore riparian plant communities and other 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 containerized shrubs, evergreen, and deciduous trees in rows. Area will be planted using 3 rows. Spacing between plants in-rows: shrub spacing will be 6' , evergreen tree spacing will be 12', and deciduous tree spacing will be 15'. Tree rows will be 15' apart. Tree row is a total length of 3000'. Tree shelters will be placed on 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 water 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: $6,610.88 **Scenario Cost/Unit:** $2,203.63

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.91	8	$247.28
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.65	20	$473.00
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	20	$132.00
Foregone Income						
FI, Corn Dryland	1959	Dryland Corn is Primary Crop	Acre	$313.09	1	$313.09
FI, Corn Irrigated	1960	Irrigated Corn is Primary Crop	Acre	$401.04	1	$401.04
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$261.78	1	$261.78
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	60	$1,046.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	20	$420.80
Materials						
Tree shelter, solid tube type, 4" x 36"	1565	4" x 36" tree tube for protection from animal damage. Materials only.	Each	$3.19	200	$638.00
Tree shelter, solid tube type, 4" x 48"	1566	4" x 48" tree tube for protection from animal damage. Materials only.	Each	$4.10	250	$1,025.00
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	950	$570.00
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	450	$909.00
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	$173.49	1	$173.49

Practice: 393 - Filter Strip

Scenario: #1 - Native (FI)

Scenario Description:

A strip or area of native herbaceous vegetation situated between cropland, grazing land, or disturbed land and sensitive areas. Practice includes chemical seedbed prep and planting of native species. The area of the filter strip is taken out of production.

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 chemical seedbed preparation, soil admendments (nutrients), and seeding. Species selected shall be able to withstand partial burial by sediment and tolerant of herbicides used on contribution area while protecting environmentally-sensitive areas. The area of the filter strip is taken out of production.

Scenario Feature Measure: number of acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $367.27 **Scenario Cost/Unit:** $367.27

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	$20.39	1	$20.39
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	1	$5.86
Foregone Income						
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$261.78	0.3	$78.53
FI, Corn Dryland	1959	Dryland Corn is Primary Crop	Acre	$313.09	0.4	$125.24
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$168.98	0.3	$50.69
Materials						
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	1	$70.93
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	1	$15.63

Practice: 393 - Filter Strip

Scenario: #2 - Introduced (FI)

Scenario Description:

A strip or area of herbaceous vegetation situated between cropland, grazing land, or disturbed land and sensitive areas. Practice includes chemical seedbed prep, soil admendments (nutrients), and planting of approved species. The area of the filter strip is taken out of production.

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 mostly introduced herbaceous species. The filter strip will have adequate width to filter the planned pollutants. The practice includes chemical seedbed preparation, soil admendments (nutrients), and seeding. Species selected shall be able to withstand partial burial by sediment and tolerant of herbicides used on contribution area while protecting environmentally-sensitive areas. The area of the filter strip is taken out of production.

Scenario Feature Measure: Number of acres

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $361.16 **Scenario Cost/Unit:** $361.16

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	1	$5.86
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	1	$20.39
Foregone Income						
FI, Corn Dryland	1959	Dryland Corn is Primary Crop	Acre	$313.09	0.4	$125.24
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$168.98	0.3	$50.69
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$261.78	0.3	$78.53
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	$0.66	20	$13.20
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
One Species, Cool Season, Introduced Perennial Grass	2313	Introduced, cool season perennial grass. Includes material and shipping only.	Acre	$32.72	1	$32.72
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	$0.63	30	$18.90

Practice: 394 - Firebreak

Scenario: #6 - Constructed, tree clearing

Scenario Description:

Installation of a short vegetative firebreak a minimum width of 50' on the upwind side of unit and 100' on the downwind side of unit around an entire 160 acre field/farm using mechanical trees shears, chainsaws, and bush hog mowers. Vegetation is reduced in height but not down to bare mineral soil. 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. Typical slopes are between 5 and 45%. 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.

After Situation:

The property is adequately protected from wildfire or can be safely prescribe burned.

Scenario Feature Measure: Length of firebreak

Scenario Unit: Feet

Scenario Typical Size: 10,560

Scenario Cost: $9,357.78 **Scenario Cost/Unit:** $0.89

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	$51.24	10	$512.40
Mechanical cutter, chopper	943	Masticator, flail shredder, hydro axe, brush cutter, etc. Equipment and power unit costs. Labor not included.	Hour	$129.56	40	$5,182.40
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.35	20	$127.00
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	20	$870.80
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	70	$1,472.80
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	$17.44	24	$418.56
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	3	$773.82

Practice: 410 - Grade Stabilization Structure

Scenario: #1 - Embankment, No PS

Scenario Description:

An earthen embankment dam without a principal spillway pipe. A low flow tube of 6 inches or less to reduce saturation of the auxiliary spillway is installed, 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. 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: $9,919.67 **Scenario Cost/Unit:** $4.96

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	$3.97	2000	$7,940.00
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	$115.06	5	$575.30
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	260	$223.60
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	$24.27	5	$121.35
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	$17.44	1	$17.44
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	$25.06	5	$125.30
Materials						
Pipe, PVC, 6", SDR 26	990	Materials: - 6" - PVC - SDR 26 160 psi - ASTM D2241	Foot	$5.01	80	$400.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 410 - Grade Stabilization Structure

Scenario: #2 - Embankment, Pipe <24"

Scenario Description:

An earthen embankment dam with a principle spillway pipe less than 24 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 4000 cubic yards, 90 feet of 18" PVC, 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: 4,000

Scenario Cost: $22,661.08 **Scenario Cost/Unit:** $5.67

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	$5.22	29	$151.38
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	4000	$15,880.00
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	$115.06	10	$1,150.60
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	$24.27	18	$436.86
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	9	$156.96
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	$25.06	10	$250.60
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.00	22	$1,166.00
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	11	$242.00
Pipe, PVC, 18", SCH 40	1373	Materials: - 18" - PVC - SCH 40 - ASTM D1785	Foot	$30.12	90	$2,710.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 410 - Grade Stabilization Structure

Scenario: #3 - Embankment, Pipe >=24"

Scenario Description:

An earthen embankment dam with a principle spillway pipe equal to or greater than 24 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 10,000 cubic yards,corrugated metal drop inlet principle spillway with a 11 ft riser and 100 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: 10,000

Scenario Cost: $50,449.12 **Scenario Cost/Unit:** $5.04

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	$101.26	1	$101.26
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	10000	$39,700.00
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	$319.94	2	$639.88
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	$115.06	13	$1,495.78
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	129	$673.38
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$25.06	13	$325.78
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	$17.44	18	$313.92
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	$24.27	36	$873.72
Materials						
Pipe, CMP, 30", 12 Gauge	1824	30" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$33.56	12	$402.72

Materials

Pipe, CMP, 24", 12 Gauge	1417	24" Corrugated Metal Pipe, Galvanized, Uncoated, 12 gage. Material cost only.	Foot	$27.01	100	$2,701.00
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.86	30	$25.80
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	11	$242.00
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.00	46	$2,438.00

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 410 - Grade Stabilization Structure

Scenario: #4 - Pipe Drop, Plastic

Scenario Description:

A pipe drop (ie: riser and barrel) grade stabilization structure designed and constructed using plastic pipe without anti-seep collars. This is typically an 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 2000 CY structure with a 6 ft high 24" (2') PVC riser with a 40 ft long barrel (2' x 3.14 x 40' = 251 SF). Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.

Before Situation:

The operator presently has gullies forming and/or worsening on the farmland and impacting the useable area and the downstream water quality. Erosion from the gullies is allowing soil and possibly nutrients to be transported to downstream receiving waters degrading water quality and causing soil loss.

After Situation:

Area is stabilized. The advancement and/or formation of gullies is stopped, soil from gullies no longer leaves the farm, useable farm area is increased, sedimentation and other pollution hazards are decreased, and water quality downstream is protected. Any needed re-vegetation of disturbed areas use Critical Area Planting (342). Other associated practices such as; Pond (378), Dam (402), Fence (382), Channel Bed Stabilization (584), Dike (356), Grassed Waterway (412), Structure for Water Control (587), and Irrigation Canal or Lateral (320) will use the corresponding Standard(s) as appropriate.

Scenario Feature Measure: Riser Weir Length x Barrel Length

Scenario Unit: Square Foot

Scenario Typical Size: 251

Scenario Cost: $12,537.13 **Scenario Cost/Unit:** $49.95

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	$5.22	20	$104.40
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	2000	$7,940.00
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	$319.94	1	$319.94
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	$115.06	2	$230.12
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	$25.06	2	$50.12
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	$17.44	9	$156.96
Materials						
Pipe, PVC, 18", SCH 40	1373	Materials: - 18" - PVC - SCH 40 - ASTM D1785	Foot	$30.12	40	$1,204.80
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	7	$154.00
Pipe, PVC, 24", SCH 40	2046	Materials: - 24" - PVC - SCH 40 - ASTM D1785	Foot	$39.00	6	$234.00

Materials

Coupling, PVC, Tee, 24x18, SCH 40	1374	Materials: - Tee, 24"x18" - PVC - SCH 40 - ASTM D1785	Each	$1,626.91	1	$1,626.91

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 410 - Grade Stabilization Structure

Scenario: #5 - Pipe Drop, CMP

Scenario Description:

A 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 corrugated metal pipe drop structure with a 30", 12' tall riser and a 100' long 24" barrel (Riser Weir length x Barrel Length = 2.5ft x 3.14 x 100ft = 785). Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.

Before Situation:

The operator presently has gullies forming and/or worsening on the farmland and impacting the useable area and the downstream water quality. Erosion from the gullies is allowing soil and possibly nutrients to be transported to downstream receiving waters degrading water quality and causing soil loss.

After Situation:

Area is stabilized. The advancement and/or formation of gullies is stopped, soil from gullies no longer leaves the farm, useable farm area is increased, sedimentation and other pollution hazards are decreased, and water quality downstream is protected. Any needed re-vegetation of disturbed areas use Critical Area Planting (342). Other associated practices such as; Pond (378), Dam (402), Fence (382), Channel Bed Stabilization (584), Dike (356), Grassed Waterway (412), Structure for Water Control (587), and Irrigation Canal or Lateral (320) will use the corresponding Standard(s) as appropriate.

Scenario Feature Measure: Riser Weir Length x Barrel Length

Scenario Unit: Square Foot

Scenario Typical Size: 785

Scenario Cost: $15,171.28 **Scenario Cost/Unit:** $19.33

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	$3.97	1500	$5,955.00
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	$115.06	13	$1,495.78
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	129	$673.38
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	$101.26	1	$101.26
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	$319.94	2	$639.88
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	$17.44	59	$1,028.96
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	$24.27	42	$1,019.34
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$25.06	13	$325.78

Materials

Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	11	$242.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	1	$22.30
Pipe, CMP, 30", 12 Gauge	1824	30" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$33.56	12	$402.72
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	$1.60	30	$48.00
Pipe, CMP, 24", 12 Gauge	1417	24" Corrugated Metal Pipe, Galvanized, Uncoated, 12 gage. Material cost only.	Foot	$27.01	100	$2,701.00

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 410 - Grade Stabilization Structure

Scenario: #6 - Concrete Box Drop

Scenario Description:

A Straight, semicircular, or Box Drop structure composed of 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 wall structure with a drop of 4 ft and weir length of 6 ft wide and is 6 ft deep with 3 ft above the crest. The unit of payment measurement is defined as cubic yards of concrete. 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: Cubic Yards of Concrete

Scenario Unit: Cubic Yard

Scenario Typical Size: 11

Scenario Cost: $8,868.20 **Scenario Cost/Unit:** $806.20

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	$2.24	46	$103.04
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	800	$3,176.00
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	$319.94	11	$3,519.34
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	$115.06	5	$575.30
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	$25.06	5	$125.30
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	$24.27	12	$291.24
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	$17.44	6	$104.64
Materials						
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$20.89	14	$292.46
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	7.5	$165.00
Mobilization						

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 410 - Grade Stabilization Structure

Scenario: #7 - Sheet Pile Weir Drop

Scenario Description:

A Straight structure composed of sheet pile metal 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 structure with a crest of 30 ft. The unit of payment measurement is defined as the area of sheet piling in square 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), Subsurface Drain (606), and Underground Outlet (620) will use the corresponding Standard(s) as appropriate.

Scenario Feature Measure: Area of Sheet piling

Scenario Unit: Square Foot

Scenario Typical Size: 350

Scenario Cost: $18,332.46 **Scenario Cost/Unit:** $52.38

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	$2.14	500	$1,070.00
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	$24.95	350	$8,732.50
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	1500	$5,955.00
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.00	30	$1,590.00
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	$492.48	2	$984.96

Practice: 410 - Grade Stabilization Structure

Scenario: #10 - Modular Concrete Block Drop

Scenario Description:

A drop structure constructed of precast modular blocks, typically 2'x2'x4, 2.5'x2.5'x5', or 2'x2'x6'. These structures are used to stabilize 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 concrete block structure with a drop of 5 feet and a weir width of 12 feet with a stepped slope of 2:1 (H:V), for a total of 67 modular blocks. The unit of payment measurement is defined as the volume of concrete blocks in cubic yards. 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: Volume of Blocks

Scenario Unit: Cubic Yard

Scenario Typical Size: 60

Scenario Cost: $9,091.64 **Scenario Cost/Unit:** $151.53

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	$3.97	400	$1,588.00
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	$2.14	180	$385.20
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	$17.44	4	$69.76
Materials						
Block, pre-cast concrete, modular	1496	Pre-cast concrete blocks, typically 2ft x 2ft x 6ft , includes installation and delivery.	Cubic Yard	$104.74	60	$6,284.40
Geotextile, non-woven, heavy weight	1210	Non-woven greater than 8 ounce/square yard geotextile with staple anchoring. Materials and shipping only.	Square Yard	$4.01	40	$160.40
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	4	$88.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 410 - Grade Stabilization Structure

Scenario: #11 - Rock Chute

Scenario Description:

A trapezoidal structure constructed of rock riprap with a geotextile base. 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 rock chute with a vertical drop of 6.5 feet and a width of 12'. The unit of payment measurement is defined as the volume of rock used in the chute in cubic yards. 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: Volume of Rock

Scenario Unit: Cubic Yard

Scenario Typical Size: 144

Scenario Cost: $8,031.82 **Scenario Cost/Unit:** $55.78

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.14	50	$107.00
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	$17.44	2	$34.88
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.00	144	$7,632.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 410 - Grade Stabilization Structure

Scenario: #12 - Tied Concrete Block Mat

Scenario Description:

A drop structure placed in a water course constructed of concrete blocks joined by cable or other means to form a flexible mat. These structures are used to stabilize the grade and control erosion in natural or artificial channels, prevent the formation/advancement of gullies, and enhance water quality and reduce pollution hazards. These are generally applied in areas where the concentration and flow velocity of water require structures to stabilize the grade, and vegetation alone will not protect the structure from erosion. The typical structure is 16' wide and removes 5' of grade in the channel with a 4:1 outlet slope. The unit of payment is the area of matting installed and includes inlet and outlet transition areas and side slopes. All associated earthwork and materials are included in the cost. Required re-vegetation of disturbed areas will use Critical Area Planting (342) or other appropriate seeding practices. Resource concerns addressed: gully erosion, concentrated flow erosion, degraded water quality due to suspended solids.

Before Situation:

The operator currently has gullies forming and/or advancing into crop or pasture land which negatively impacts the land use and downstream water quality. Erosion from the gullies results in soil loss and allows soil and nutrients to be transported to downstream receiving waters, degrading water quality.

After Situation:

The advancement of and/or formation of gullies is stopped, and soil from gullies no longer leaves the field. Land use is restored or maintained and sedimentation and other pollution hazards are decreased, and downstream water quality is protected. Other associated practices include: Pond (378), Dam (402), Fence (382), Channel Bed Stabilization (584), Dike (366), Grassed waterway (412), Structure for Water Control (587), Subsurface Drain (606), and Underground Outlet (620).

Scenario Feature Measure: Square Feet of Mat.

Scenario Unit: Square Foot

Scenario Typical Size: 1,350

Scenario Cost: $7,911.84 **Scenario Cost/Unit:** $5.86

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	$115.06	4	$460.24
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	$17.44	3	$52.32
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$25.06	4	$100.24
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	$35.05	1	$35.05
Materials						
Articulated block	1906	Articulated precast concrete blocks with a typical thickness of 4.5 inches. Includes materials only.	Square Foot	$5.25	1350	$7,087.50
Pipe, HDPE, 6", CPT, Single Wall	1242	Pipe, Corrugated Plastic Tubing, Single Wall, 6" diameter - ASTM F405. Material cost only.	Foot	$1.12	100	$112.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	0.25	$64.49

Practice: 412 - Grassed Waterway

Scenario: #1 - Waterway, less than 25 ft2

Scenario Description:

Typical practice is 1500 ' long, 12' bottom, 8:1 side slopes, 1.1' depth. 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 will be completed under the Critical Area Planting (342) Practice Standard with seeding area up to 20% greater than waterway area to account for buffer area along the waterway. Costs include excavation and associated work to construct the overall shape and grade of the waterway. This scenario would apply to Grassed Waterways with a design cross sectional area less than 25 square feet per lineal foot of 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/or poor cropping techniques. Grassed waterway is also commonly installed to covey runoff from concentrated flows, terrarces, diversions, or water control structures or similar practices to a suitable, stable outlet.

After Situation:

Installed grassed waterway is 1500 ' long, 12' bottom, 8:1 side slopes, 1.1' depth. The practice is installed using a dozer and/or scraper, with final grading with motor grader. 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: $4,179.23 **Scenario Cost/Unit:** $4,179.23

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.63	954	$3,463.02
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	411	$353.46
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	$17.44	4	$69.76
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$35.05	1	$35.05
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 412 - Grassed Waterway

Scenario: #2 - Waterway, 25 to 50 ft2

Scenario Description:

Typical practice is 1500 ' long, 12' bottom, 8:1 side slopes, 1.5' depth. 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 will be completed under the Critical Area Planting (342) Practice Standard with seeding area up to 20% greater than waterway area to account for buffer area along the waterway. Costs include excavation and associated work to construct the overall shape and grade of the waterway. This scenario would apply to Grassed Waterways with a design cross sectional area greater than 25 square feet up to 50 square feet per lineal foot of 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/or poor cropping techniques. Grassed waterway is also commonly installed to covey runoff from concentrated flows, terrarces, diversions, or water control structures or similar practices to a suitable, stable outlet.

After Situation:

Installed grassed waterway is 1500 ' long, 12' bottom, 8:1 side slopes, 1.5' depth. The practice is installed using a dozer and/or scraper, with final grading with motor grader. 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: $6,342.56 **Scenario Cost/Unit:** $6,342.56

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	500	$430.00
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	$3.63	1500	$5,445.00
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	$35.05	2	$70.10
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	$17.44	8	$139.52
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 412 - Grassed Waterway

Scenario: #3 - Waterway, 50 to 100 ft2

Scenario Description:

Typical practice is 2000 ' long, 40' bottom, 6:1 side slopes, 1.6' depth. 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 will be completed under the Critical Area Planting (342) Practice Standard with seeding area up to 20% greater than waterway area to account for buffer area along the waterway. Costs include excavation and associated work to construct the overall shape and grade of the waterway. This scenario would apply to Grassed Waterways with a design cross sectional area from 51 square feet up to 100 square feet per lineal foot of 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/or poor cropping techniques. Grassed waterway is also commonly installed to covey runoff from concentrated flows, terrarces, diversions, or water control structures or similar practices to a suitable, stable outlet.

After Situation:

Installed grassed waterway is 2000 ' long, 40' bottom, 6:1 side slopes, 1.8' depth. The practice is installed using a dozer and/or scraper, with final grading with motor grader. 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: 3

Scenario Cost: $17,807.43 **Scenario Cost/Unit:** $5,935.81

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.63	4411	$16,011.93
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	1096	$942.56
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	$35.05	12	$420.60
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	$17.44	10	$174.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 412 - Grassed Waterway

Scenario: #5 - Waterway with Side Dikes or Checks

Scenario Description:

Typical practice is 2000 ' long, 40' bottom, 6:1 side slopes, 1.6' depth. 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 or side dikes 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 will be completed under the Critical Area Planting (342) Practice Standard with seeding area up to 20% greater than waterway area to account for buffer area along the waterway. 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 covey runoff from concentrated flows, terrarces, diversions, or water control structures or similar practices to a suitable, stable outlet.

After Situation:

Installed grassed waterway is 2000 ' long, 40' bottom, 6:1 side slopes, 1.8' depth. Fabric checks are installed every 100 feet along the length of the waterway. The practice is installed using a dozer and/or scraper, with final grading with motor grader. 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: 3

Scenario Cost: $18,402.82 **Scenario Cost/Unit:** $6,134.27

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	$2.14	32	$68.48
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	27	$140.94
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	1096	$942.56
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.63	4411	$16,011.93
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	$35.05	12	$420.60
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	$17.44	10	$174.40
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	125	$141.25
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	$173.49	1	$173.49

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	$71.23	1	$71.23
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 430 - Irrigation Pipeline

Scenario: #1 - PVC, by the pound

Scenario Description:

Description: Below ground installation of PVC pipeline. Typical practice sizes range from 6-inch to 12-inch. Construct 1,300 feet of 6-inch, pressure rating 80 psi (SDR 51), PVC plastic irrigation pipe (PIP) with appurtenances, installed below ground with a minimum of 2.5 feet of ground cover. The unit is weight of pipe in pounds. 1,300 feet of 6-inch, SDR 51 PVC PIP weighs 1.49 lb/ft, or a total of 1,937 pounds. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, dog-legs (risers), and inline valves. 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

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, 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: 1,937

Scenario Cost: $6,791.78 **Scenario Cost/Unit:** $3.51

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	$37.50	8	$300.00
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.26	1300	$1,638.00
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	$101.26	1	$101.26
Portable Welder	1407	Portable field welder. Equipment only. Labor not included.	Hour	$20.31	8	$162.48
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	$17.44	16	$279.04
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	$24.27	8	$194.16
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	$1.50	1937	$2,905.50
Pipe, steel, smooth wall, galvanized, weight priced	1381	Steel manufactured into galvanized smooth wall pipe	Pound	$1.66	220	$365.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 430 - Irrigation Pipeline

Scenario: #2 - PVC, 8-in by the foot

Scenario Description:

Description: Below ground installation of PVC pipeline. Construct 1,300 feet of 8-inch, pressure rating 100 psi (SDR 41), PVC plastic irrigation pipe (PIP) with appurtenances, installed below ground with a minimum of 2.5 feet of ground cover. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, dog-legs (risers), and inline valves. 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

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: Length of pipe

Scenario Unit: Linear Foot

Scenario Typical Size: 1,300

Scenario Cost: $10,287.78 **Scenario Cost/Unit:** $7.91

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	$20.31	8	$162.48
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.26	1300	$1,638.00
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	$101.26	1	$101.26
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	8	$300.00
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	$17.44	16	$279.04
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	$24.27	8	$194.16
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	$1.50	4157	$6,235.50
Pipe, steel, smooth wall, galvanized, weight priced	1381	Steel manufactured into galvanized smooth wall pipe	Pound	$1.66	320	$531.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 430 - Irrigation Pipeline

Scenario: #3 - PVC, 10-in by the foot

Scenario Description:

Description: Below ground installation of PVC pipeline. Construct 1,300 feet of 10-inch, pressure rating 80 psi (SDR 51), PVC plastic irrigation pipe (PIP) with appurtenances, installed below ground with a minimum of 2.5 feet of ground cover. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, dog-legs (risers), and inline valves. 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

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: Length of pipe

Scenario Unit: Linear Foot

Scenario Typical Size: 1,300

Scenario Cost: $14,057.68 **Scenario Cost/Unit:** $10.81

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	$2.85	1300	$3,705.00
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	$101.26	1	$101.26
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	8	$300.00
Portable Welder	1407	Portable field welder. Equipment only. Labor not included.	Hour	$20.31	8	$162.48
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	$24.27	8	$194.16
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	16	$279.04
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	$1.50	5248	$7,872.00
Pipe, steel, smooth wall, galvanized, weight priced	1381	Steel manufactured into galvanized smooth wall pipe	Pound	$1.66	360	$597.60
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
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 436 - Irrigation Reservoir

Scenario: #1 - Embankment Dam

Scenario Description:

The reservoir, created by an embankment built across a natural depression, with an 18" diameter principal spillway outlet through the embankment, is controlled by a canal-style gate. Outlet structure is constructed with watertight plasatic pipe appropriate for this use, commonly PVC pipe. 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: $22,665.55 **Scenario Cost/Unit:** $5.04

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	$3.97	4500	$17,865.00
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	$17.44	16	$279.04
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	$35.05	8	$280.40
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
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	$7.29	20	$145.80
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	$11.24	136	$1,528.64
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
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	2	$984.96

Practice: 441 - Irrigation System, Microirrigation

Scenario: #1 - SDI (Subsurface Drip Irrigation)

Scenario Description:

A subsurface drip irrigation system (SDI) with a lateral spacing of 40 inches. This buried drip irrigation system utilizes a thin wall tape with inline emitters at a uniform spacing for the system laterals. The dripperline or tape is normally installed by being plowed in approx. 10-18 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 (functional used meter is usually available for an existing well, so meter cost is excluded), backflow prevention device, automated control box or timer, the thin wall dripperline 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. 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 Measurement, 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 (thin wall 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: $103,096.33 **Scenario Cost/Unit:** $1,718.27

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, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.26	6800	$8,568.00
Materials						
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	824108	$74,169.72
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	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	2	$9,879.78

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	$1.50	4856	$7,284.00

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	$173.49	1	$173.49

Practice: 442 - Sprinkler System

Scenario: #1 - Gravity to Pivot Conversion

Scenario Description:

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.

The new irrigation system applies water efficiently and uniformly 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: $97,693.38 **Scenario Cost/Unit:** $75.15

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Irrigation, Center pivot system with appurtenances, variable cost portion	318	Variable cost portion of the center pivot system with appurtenances. This portion includes the following items: pivot point, pipe, towers, pad, controls, sprinklers, installation.	Foot	$69.98	1300	$90,974.00
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
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94
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	$71.23	1	$71.23

Practice: 442 - Sprinkler System

Scenario: #3 - System Renovation, Renozzle

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 or energy conservation. A typical scenario assumes a 1300 LF span, 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 is irrigating cropland that is being irrigated using a system in which all nozzles are operating above 35 psi on the mainline pipe. 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 (<=35 psi). 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 sprinklers reduce the energy used by the pump when the pump is modified to match lower pressure requirements.

Scenario Feature Measure: Length of Lateral Retrofitted

Scenario Unit: Linear Feet

Scenario Typical Size: 1,300

Scenario Cost: $16,282.23 **Scenario Cost/Unit:** $12.52

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
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	$12.47	1300	$16,211.00
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	$71.23	1	$71.23

Practice: 442 - Sprinkler System

Scenario: #4 - Gravity to Pivot Conversion with VRI

Scenario Description:

Upgrading existing irrigation system with a more uniform and efficient (vendor provided and installed modular system) Center Pivot system for the purpose of protecting water quality and utilizing water effectively. Integrating variable application technology onto a center pivot system for precision zone placement of water along the length of the system for water savings. A variable application over the field based either 1) EM mapping and a grid system, 2) previous year(s) harvest yield maps or 3) soil properties, or combination of each. This scenario is a new system to replace an existing gravity system, with the proper components, nozzles, and pressure regulating devices, along with other needed components for installation of a VRI system for more effective utilization of water.

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), and protection of wetland areas enrolled in conservation program and other environmentally sensititve areas.

Associated Practices: Irrigation Pipeline (430), Pumping Plant (533), Irrigation Water Management (449), Wetland Restoration (657), Wetland Enhancement (658) Wetland Creation (659)

Before Situation:

Flood 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 and receiving stream. Additional energy input needed to apply suffiecint water to entire field. Irrigated induced erosion is excessive. 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.

After Situation:

A new Center Pivot or Linear Move sprinkler system with a span of 1300 linear feet and a modular VRI system which increases irrigation efficiency and uniformity utilizing a modern center pivot system resulting in water savings. 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 Center Pivot or Lateral Move

Scenario Unit: Foot

Scenario Typical Size: 1,300

Scenario Cost: $117,107.91 **Scenario Cost/Unit:** $90.08

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Valve, Variable Rate	2456	Valves required for controlling flow at individual drop nozzles.	Each	$102.72	120	$12,326.40
Nodes, Expansion, Variable Rate Irrigation	2464	Expansion Nodes that provide both power and control signals to valves.	Each	$610.24	4	$2,440.96
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
Valve, Pressure Regulating	2452	Valve installed between pump and pivot to reduce flow as pressure increases.	Each	$1,541.67	1	$1,541.67
Global Position System	2454	GPS installed on the irrigation system to transmit location in the field back to the controller.	Each	$2,312.50	1	$2,312.50
Tubing	2455	Valve tubing used to neumatically control variable rate valves.	Foot	$0.61	1300	$793.00
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

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	$71.23	1	$71.23
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 442 - Sprinkler System

Scenario: #5 - VRI System Retrofit Zone

Scenario Description:

Integrating variable application technology onto a center pivot system for precision zone placement of water along the length of the system for water savings. A variable application over the field based either 1) EM mapping and a grid system, 2) previous year(s) harvest yield maps or 3) soil properties, or combination of each. This scenario is to renovate a previously irrigation system with proper modular components and pressure regulating devices, with GPS for field location and new control panel to update existing panel, along with other needed components to install a VRI system for more effective utilization of water.

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), and protection of wetland areas enrolled in conservation program and other environemental sesititve areas.

Associated Practices: Irrigation Pipeline (430), Pumping Plant (533), Irrigation Water Management (449), Wetland Restoration (657), Wetland Enhancement (658) Wetland Creation (659)

Before Situation:

A center pivot or lateral move system has low pressure sprinklers. 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 has modular VRI components added to the system which increases irrigation efficiency and uniformity utilizing a modern center pivot system resulting in water savings. 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 Center Pivot or Laterial with VRI Components for system renovation

Scenario Unit: Foot

Scenario Typical Size: 1,300

Scenario Cost: $24,153.35 **Scenario Cost/Unit:** $18.58

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Aerial lift, telescoping bucket	1893	Aerial lift, bucket truck or cherry picker, typical 40' boom. Equipment only.	Hour	$46.87	24	$1,124.88
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	$24.27	24	$582.48
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	$17.44	24	$418.56
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	24	$504.96
Materials						
Nodes, Expansion, Variable Rate Irrigation	2464	Expansion Nodes that provide both power and control signals to valves.	Each	$610.24	4	$2,440.96
Global Position System	2454	GPS installed on the irrigation system to transmit location in the field back to the controller.	Each	$2,312.50	1	$2,312.50
Valve, Pressure Regulating	2452	Valve installed between pump and pivot to reduce flow as pressure increases.	Each	$1,541.67	1	$1,541.67
Valve, Variable Rate	2456	Valves required for controlling flow at individual drop nozzles.	Each	$102.72	120	$12,326.40

Materials

Tubing	2455	Valve tubing used to neumatically control variable rate valves.	Foot	$0.61	1300	$793.00
Pivot Conversion to Variable Rate Irrigation	2450	Control panel with controllers, communication system, sensors, monitoring equipment, etc. Required on all variable rate irrigation system conversions regardless of length	Each	$1,850.00	1	$1,850.00

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 442 - Sprinkler System

Scenario: #6 - VRI System Retrofit Speed

Scenario Description:

Integrating variable application technology onto a center pivot system for precision zone placement of water along the length of the system for water savings. A variable application over the field based either 1) EM mapping and a grid system, 2) previous year(s) harvest yield maps or 3) soil properties, or combination of each. This scenario is to renovate a previous irrigation system with GPS for field location and new control panel to update existing panel, for a speed control VRI system for more effective utilization of water. Scenario requires that existing irrigation system meets Conservation Practice Standard 442 for uniformity and efficiency, if not, then system renozzling required.

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 low pressure sprinklers. 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 has modular VRI components added to the system which increases irrigation efficiency and uniformity utilizing a modern center pivot system resulting in water savings. 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 Center Pivot or Laterial with VRI Components for system renovation

Scenario Unit: foot

Scenario Typical Size: 1,300

Scenario Cost: $4,162.50 **Scenario Cost/Unit:** $3.20

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Materials						
Pivot Conversion to Variable Rate Irrigation	2450	Control panel with controllers, communication system, sensors, monitoring equipment, etc. Required on all variable rate irrigation system conversions regardless of length	Each	$1,850.00	1	$1,850.00
Global Position System	2454	GPS installed on the irrigation system to transmit location in the field back to the controller.	Each	$2,312.50	1	$2,312.50

Practice: 449 - Irrigation Water Management

Scenario: #1 - IWM, Basic Technique

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, 449- Irrigation Water Management, 587-Structure for water Control.

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: Acres under irrigation

Scenario Unit: Acre

Scenario Typical Size: 125

Scenario Cost: $559.44 **Scenario Cost/Unit:** $4.48

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	$17.44	16	$279.04
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	$35.05	8	$280.40

Practice: 449 - Irrigation Water Management

Scenario: #2 - IWM, Intermediate Technique, 1st year

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. This scenario includes purchasing 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. This scenario is intended to be used as a one-time payment for the first year in multiple year IWM contracts. Typical Scenario involves installation of sensors at a single location in a 125 acre field of sprinkler irrigated cropland. Producer periodically monitors soil moisture sensors during the growing season.

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, 590-Nutrient Management, 442-Irrigation System, Sprinkler, and Irrigation System, Microirrigation 441.

Before Situation:

Producer uses feel method to estimate soil moisture for scheduling irrigation in the field.

After Situation:

Producer has installed at least three sensors at each monitoring site to a depth of three 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 management and reduced energy use.

Scenario Feature Measure: Number of measuring sites

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $1,308.94 **Scenario Cost/Unit:** $1,308.94

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	$17.44	12	$209.28
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$35.05	8	$280.40
Materials						
Soil Moisture Sensor	1456	Soil moisture resistance sensor W/10' cables. Equipment only.	Each	$35.46	3	$106.38
Data Logger	1453	Data Logger W/Graphic Output for water management. Materials only.	Each	$570.42	1	$570.42
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	$71.23	2	$142.46

Practice: 449 - Irrigation Water Management

Scenario: #3 - IWM, Intermediate Technique, Subsequent Years

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. This scenario includes the installation of soil moisture sensors and a data logger(s) to log continuous soil moisture data that can be downloaded to a personal computer and associated graphing software. This scenario is intended to be used as a subsequent payment for multiple year IWM contracts after the monitoring equipment was purchased or is already available. Typical Scenario involves installation of sensors at a single location in a 125 acre field of sprinkler irrigated cropland. Producer periodically monitors soil moisture sensors during the growing season.

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, 590-Nutrient Management, 442-Irrigation System, Sprinkler, and Irrigation System, Microirrigation 441.

Before Situation:

Producer uses feel method to estimate soil moisture for scheduling irrigation in the field.

After Situation:

Producer has installed at least three sensors at each monitoring site to a depth of three 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 management and reduced energy use.

Scenario Feature Measure: Acres under irrigation

Scenario Unit: Acre

Scenario Typical Size: 125

Scenario Cost: $632.14 **Scenario Cost/Unit:** $5.06

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	$35.05	8	$280.40
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	$17.44	12	$209.28
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$71.23	2	$142.46

Practice: 464 - Irrigation Land Leveling

Scenario: #1 - Land Leveling

Scenario Description:

This is scenario will level a typical 30 acres of irrigated crop land surface to enhance uniform flow of surface water to improve irrigation efficiency using self-propelled scraper equipment and land plane equipment. The typical volume of earth moved is 450 cubic yards per acre.

Resource Concern: Excess/Insufficient - Inefficient Use of Irrigation Water

Associated Conservation Practices: 433 - Irrigation System, Surface and Subsurface; 607 - Surface Drain, Field Ditch; 388 - Irrigation Field Ditch; 449 - Irrigation Water Management; or 587 - Structure for Water Control.

Before Situation:

Irregular field surface reduces uniformity of surface application and thus irrigation efficiency by localized ponding and/or excess runoff/runon.

After Situation:

Cropland will be reshaped to provide uniform distribution of irrigation water in order to promote irrigation efficiencies.

Scenario Feature Measure: Volume of Earth Moved

Scenario Unit: Cubic Yard

Scenario Typical Size: 13,500

Scenario Cost: $37,016.02 **Scenario Cost/Unit:** $2.74

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Scraper, Self Propelled, 14 CY	2306	Self propelled earthmoving scraper with 14 CY capacity. Does not include labor.	Hour	$259.52	112	$29,066.24
Motor Grader, 150 HP	1781	Motor Grader or Maintainer, 150 hp. Typical of equipment with HP in range of 130-170. Equipment cost, does not include labor.	Hour	$100.50	10	$1,005.00
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	3375	$2,902.50
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	$25.06	122	$3,057.32
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	$492.48	2	$984.96

Practice: 468 - Lined Waterway or Outlet

Scenario: #1 - Turf Reinforced Matting, Moderate Stress

Scenario Description:

Install approximately 46' long trapezoidal (or similar parabolic shape) waterway, with 20' wide bottom, 1.1' depth, and 4:1 side slopes, lined with Turf Reinforced Matting (TRM). The profile includes a 4' long level approach apron, a 32' long section at 12.5% grade (4' drop), and a 10' long level exit apron depressed 1' below outlet channel grade. Ideally, all TRM is placed on an excavated surface, typically immediately upstream of a headcut. Excess excavation is spread in the immediate area. TRM is installed on the bottom and side slopes of the waterway to prevent scour and aid in waterway establishment. Costs include excavation to channel grade, earthfill in transverse approach berm and side berms, earthwork to blend aprons to existing ground, spreading of excess material, and furnishing and installing TRM. TRM is installed by laborers. Required TRM has a moderate allowable stress of less than 12 pounds per square foot in the fully vegetated condtion. Unit cost for TRM is assumed to include a surcharge for anhorage and overlap, typically 1' at upstream end, 0.5' at downstream end, side terminations, and 0.5' overlaps; such associated additional quantities are generally not part of the measured quantity for payment.

Before Situation:

Excessive soil erosion and sedimentation are a result of ephemeral or classic gully erosion. Velocities are generally too high or saturated soil conditions make it difficult to establish a grassed waterway without a lining material.

After Situation:

The TRM lined waterway provides a surface capable of withstanding moderate flow velocity and stress to maintain a stable channel configuration. The measured quantity for payment excludes amounts necessary for terminal anchorage and overlap. Associated practices are Grassed Waterway (412), Subsurface Drain (606), Underground Outlet (620), Structure for Water Control (587), and Critical Area Seeding (342).

Scenario Feature Measure: Square Foot of Waterway

Scenario Unit: Square Foot

Scenario Typical Size: 1,340

Scenario Cost: $2,351.27 **Scenario Cost/Unit:** $1.75

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	$3.97	60	$238.20
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.26	60	$195.60
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	$2.14	118	$252.52
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	$35.05	8	$280.40
Materials						
Turf reinforcement mat	1212	Synthetic turf reinforcement mat with staple anchoring. Includes materials, equipment and labor.	Square Yard	$5.83	149	$868.67
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 468 - Lined Waterway or Outlet

Scenario: #2 - Turf Reinforced Matting, High Stress

Scenario Description:

Install approximately 54' long trapezoidal (or similar parabolic shape) waterway, with 30' wide bottom, 1.3' depth, and 4:1 side slopes, lined with Turf Reinforced Matting (TRM). The profile includes a 4' long level approach apron, a 40' long section at 12.5% grade (5' drop), and a 10' long level exit apron depressed 1' below outlet channel grade. Ideally, all TRM is placed on an excavated surface, typically immediately upstream of a headcut. Excess excavation is spread in the immediate area. TRM is installed on the bottom and side slopes of the waterway to prevent scour and aid in waterway establishment. Costs include excavation to channel grade, earthfill in transverse approach berm and side berms, earthwork to blend aprons to existing ground, spreading of excess material, and furnishing and installing TRM. TRM is installed by laborers. Required TRM has a relatively high allowable stress of at least 12 pounds per square foot in the fully vegetated condtion. Unit cost for TRM is assumed to include a surcharge for anhorage and overlap, typically 1' at upstream end, 0.5' at downstream end, side terminations, and 0.5' overlaps; such associated additional quantities are generally not part of the measured quantity for payment.

Before Situation:

Excessive soil erosion and sedimentation are a result of ephemeral or classic gully erosion. Velocities are generally too high or saturated soil conditions make it difficult to establish a grassed waterway without a lining material.

After Situation:

The TRM lined waterway provides a surface capable of withstanding high flow velocity and stress to maintain a stable channel configuration. The measured quantity for payment excludes amounts necessary for terminal anchorage and overlap. Associated practices are Grassed Waterway (412), Subsurface Drain (606), Underground Outlet (620), Structure for Water Control (587), and Critical Area Seeding (342).

Scenario Feature Measure: Square Foot of Waterway

Scenario Unit: Square Foot

Scenario Typical Size: 2,215

Scenario Cost: $4,919.90 **Scenario Cost/Unit:** $2.22

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	$2.14	234	$500.76
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	90	$357.30
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.26	146	$475.96
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	$35.05	16	$560.80
Materials						
Mat, Turf Reinforcement, High Stress	2584	High stress resistant synthetic turf reinforcement mat, High Stress (14 psf vegetated) Used Vmax™ P550™ Permanent TRM for pricing. Includes shipping.	Square Yard	$10.20	246	$2,509.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 468 - Lined Waterway or Outlet

Scenario: #3 - Rock Lined, 12 in

Scenario Description:

Install 300 ' long by 15' wide by 1.5' deep with 2:1 side slopes trapezoidal or parabolic shaped waterway lined with 12" thick riprap (D100 = 9", Velocity ~ 8 ft/sec). 1/2 the channel is excavated, before excavation for riprap. Excess excavation is spoiled in the immediate area. Riprap is installed over 100% of the width of the waterway to prevent scour. Cost include excavation, spoiling of excess material, geotextile underlayment and installing 9" Rock Riprap. Lined waterway width is measured from top of bank to top of bank. (9'+3.35'+3.35') x 300' = 4710 Square Feet

Before Situation:

Excessive sedimentation and soil erosion as a result of ephemeral or classic gully erosion. Velocities are generally too high or saturated soil conditions make it difficult to establish a grassed waterway.

After Situation:

Rock lined waterway is 300 ' long by 15' wide by 1.5' deep with 2:1 sideslopes. Waterway is excavated and rock is placed using a hydraulic excavator. Geotextile underlayment is installed by laborers. Associated practices are Subsurface Drain (606), Underground Outlet (620), Structure for Water Control (587), and Critical Area Seeding (342).

Scenario Feature Measure: Square Foot of Waterway

Scenario Unit: Square Foot

Scenario Typical Size: 4,710

Scenario Cost: $11,911.71 **Scenario Cost/Unit:** $2.53

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	$2.14	295	$631.30
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	$35.05	3	$105.15
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	3	$52.32
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.00	205	$10,865.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 468 - Lined Waterway or Outlet

Scenario: #4 - Rock Lined, 24 in

Scenario Description:

Install 300 ' long by 15' wide by 1.5' deep with 2:1 side slopes trapezoidal or parabolic shaped waterway lined with 24" thick riprap (D100 = 18", Velocity ~ 11 ft/sec). 1/2 the channel is excavated, before excavation for riprap. Excess excavation is spoiled in the immediate area. Riprap is installed over 100% of the width of the waterway to prevent scour. Cost include excavation, spoiling of excess material, geotextile underlayment and installing 18" Rock Riprap. Lined waterway width is measured from top of bank to top of bank. (9'+3.35'+3.35') x 300' = 4710 Square Feet

Before Situation:

Excessive sedimentation and soil erosion as a result of ephemeral or classic gully erosion. Velocities are generally too high or saturated soil conditions make it difficult to establish a grassed waterway.

After Situation:

Rock lined waterway is 300 ' long by 15' wide by 1.5' deep with 2:1 sideslopes. Waterway is excavated and rock is placed using a hydraulic excavator. Geotextile underlayment is installed by laborers. Associated practices are Subsurface Drain (606), Underground Outlet (620), Structure for Water Control (587), and Critical Area Seeding (342).

Scenario Feature Measure: Square Foot of Waterway

Scenario Unit: Square Foot

Scenario Typical Size: 4,710

Scenario Cost: $26,248.11 **Scenario Cost/Unit:** $5.57

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	$2.14	555	$1,187.70
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	$35.05	3	$105.15
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	3	$52.32
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.00	465	$24,645.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 468 - Lined Waterway or Outlet

Scenario: #6 - Articulated Concrete Block

Scenario Description:

Install 300 ' long by 15' wide (at top) by 1.5' deep with 2:1 sides slopes trapezoidal or parabolic shaped waterway lined with artiulated concrete block (ACB). 1/2 the channel is excavated, before excavation for ACB and subgrade material. Excess excavation is spoiled in the immediate area. Articulated concrete block is installed over 100% of the width of the waterway to prevent scour. Cost include excavation, spoiling of excess material, 3" of clean sand or gravel subgrade, and 6" height articulated concrete block. Lined waterway width is measured from top of bank to top of bank. (9'+3.35'+3.35') x 300' = 4710 Square Feet

Before Situation:

Excessive sedimentation and soil erosion as a result of ephemeral or classic gully erosion. Velocities are generally too high or saturated soil conditions make it difficult to establish a grassed waterway. Usually installed in locations where rock or other lining materials are not readily available.

After Situation:

Articulated Concrete Block lined waterway is 300 ' long by 15' wide by 1.5' deep with 2:1 sideslopes. Waterway is excavated using a hydraulic excavator. Articulated concrete block is placed on 3" of clean sand or gravel subgrade and installed with a hydraulic excavator, loader and laborers. Associated practices are Subsurface Drain (606), Underground Outlet (620), Structure for Water Control (587), and Critical Area Seeding (342).

Scenario Feature Measure: Square Foot of Waterway

Scenario Unit: Square Foot

Scenario Typical Size: 4,710

Scenario Cost: $32,523.70 **Scenario Cost/Unit:** $6.91

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.14	200	$428.00
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$56.49	22.5	$1,271.03
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	$89.33	22.5	$2,009.93
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	$17.44	51	$889.44
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	51	$1,073.04
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	$24.27	25.5	$618.89
Materials						
Articulated block	1906	Articulated precast concrete blocks with a typical thickness of 4.5 inches. Includes materials only.	Square Foot	$5.25	4710	$24,727.50
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	45	$990.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 472 - Access Control

Scenario: #1 - Animal exclusion from sensitive areas (FI)

Scenario Description:

Exclude 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 and/or to allow for fuel loads to accumulate to address other resource issues. Control will be by permanent or 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:

Adequate fuel loads are permitted to accumulate so that other conservation practices may be implemented and/or sensitive areas are protected from adverse actions of domestic and/or wild animals by excluding them from the area.

Scenario Feature Measure: Acres of Treatment

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $949.08 **Scenario Cost/Unit:** $23.73

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$23.14	38	$879.32
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	$17.44	4	$69.76

Practice: 484 - Mulching

Scenario: #1 - Natural Material - Straw

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. 2 tons per acre of straw applied and anchored with light tillage equipment, treader, knifed in, etc.

Before Situation:

Typical scenario is applying mulch on 1 acres of a 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: $433.72 **Scenario Cost/Unit:** $433.72

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	$23.65	2	$47.30
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	1	$37.50
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	2	$42.08
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	4	$69.76
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, grassed waterways or diversions. Blanket is typically made of coconut coir, wood fiber, or 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 and a grassed waterway is being installed and seeded to permanent cover. 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 staples. Soil erosion is minimized and vegetative cover is established.

Scenario Feature Measure: Total Area Mulched

Scenario Unit: Square Foot

Scenario Typical Size: 5,000

Scenario Cost: $946.24 **Scenario Cost/Unit:** $0.19

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	$17.44	16	$279.04
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 - Tree and Shrub - Squares

Scenario Description:

Barrier fabric or other suitable natural or synthetic mulch is installed with a new tree and shrub planting. Typically used to retain moisture during the installation of conservation practices. Rate is per tree/shrub and assumes 1 square yard of barrier fabric and 5 staples/tree.

Before Situation:

Site conditions vary and erosion and wildlife habitat have been identified as concerns. Fabric squares (as mulch) are added to address soil moisture and temperature issues. Sites are often remote and trees may not be planted in rows, requiring each tree to be mulched individually.

After Situation:

Barrier fabric squares are installed with 5 sod staples each, around individual trees and shrubs to retain moisture and regulate soil temperature.

Scenario Feature Measure: Number of Trees Mulched

Scenario Unit: Each

Scenario Typical Size: 100

Scenario Cost: $224.00 **Scenario Cost/Unit:** $2.24

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.24	100	$224.00

Practice: 484 - Mulching

Scenario: #4 - Tree and Shrub - Rolls

Scenario Description:

Barrier fabric or other suitable natural or synthetic mulch is installed with a new tree and shrub planting. Typically used to retain soil moisture, control soil temperature, and minimize erosion by providing cover during the installation of conservation practices. Two 300 foot tree rows will use barrier fabric to conserve moisture. Rate is per linear foot (300' roll x 2= 600') and 3 staples/pins per tree.

Before Situation:

Site conditions vary, and erosion and wildlife habitat have been identified as concerns. Barrier fabric (as mulch) is added to address soil moisture loss. Sites are typically on field edges, each tree row to be mulched individually.

After Situation:

Barrier fabric rolls are installed with 3 metal pins/staples per tree. Moisture is retained, temperature controlled, and erosion is minimized.

Scenario Feature Measure: Number of Trees Installed

Scenario Unit: Linear Foot

Scenario Typical Size: 600

Scenario Cost: $347.46 **Scenario Cost/Unit:** $0.58

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	$23.65	2	$47.30
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	$17.44	7	$122.08
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	2	$42.08
Materials						
Mulch, polyethylene plastic, 1.0 mil	1303	1.0 mil polyethylene plastic mulch, with anchoring. Includes materials and shipping only.	Square Yard	$0.34	400	$136.00

Practice: 484 - Mulching

Scenario: #5 - Hydro-mulching

Scenario Description:

Installation of mulch through hydraulic methods on critical areas with steep slopes, grassed waterways or diversions. The mulch is comprised of wood cellulose fiber pulp and may include seed, fertilizer, and other approved materials. Mulch is typically applied at a rate of 1500 pounds per acre as a slurry by using hydroseeding methods. Used to help control erosion and establish vegetative cover.

Before Situation:

Areas being seeded to permanent cover. Soil erosion is a concern and there is little to no vegetation.

After Situation:

The hydro-mulch is applied to appropriate areas as needed for vegetation establishment. Soil erosion is minimized and vegetative cover is established.

Scenario Feature Measure: Area Covered by Mulch

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $856.38 **Scenario Cost/Unit:** $856.38

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	$856.38	1	$856.38

Practice: 490 - Tree/Shrub Site Preparation

Scenario: #3 - Windbreak, mechanical only

Scenario Description:

This practice involves the use of various mechanical equipment in order to prepare a site for tree row planting and remove undesirable vegetation and improve site conditions for establishing trees and/or shrubs. Typical sites include abandoned fields, pastures, rangelands, or forestland that was recently harvested. This practice is typically used to address the following resource concerns: degraded plant condition - undesirable plant productivity and health, and inadequate structure and composition.

Before Situation:

Ground needs prepared for establishemnt of trees and shrubs in rows. Undesirable vegetation is present on the site including herbaceous plants and woody vegetation. Noxious and invasive species may also be present on the site. If left uncontrolled, undesirable vegetation will inhibit successful establishment of target species of trees and/or shrubs.

After Situation:

Ground has been prepare to establish tree and shrub rows. Undesirable vegetation has been treated using appropriate herbicides, reducing competition for target trees and/or shrubs. Site conditions are favorable for successful establishment of trees and/or shrubs. The typical size of the practice is 1.5 acres.

Scenario Feature Measure: Area of Treatment

Scenario Unit: Acre

Scenario Typical Size: 2

Scenario Cost: $126.63 **Scenario Cost/Unit:** $63.32

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	1.5	$15.96
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.85	3	$47.55
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	3	$63.12

Practice: 490 - Tree/Shrub Site Preparation

Scenario: #6 - Windbreak, chemical only

Scenario Description:

This practice involves the use of chemical treatment in order to prepare a site for tree row planting and remove undesirable vegetation and improve site conditions for establishing trees and/or shrubs. Typical sites include abandoned fields, pastures, rangelands, or forestland that was recently harvested. This practice is typically used to address the following resource concerns: degraded plant condition - undesirable plant productivity and health, and inadequate structure and composition.

Before Situation:

Ground needs prepared for establishemnt of trees and shrubs in rows. Undesirable vegetation is present on the site including herbaceous and woody vegetation. Noxious and invasive species may also be present. If left uncontrolled, undesirable vegetation will inhibit successful establishment of target species of trees and/or shrubs.

After Situation:

Ground has been prepare to establish tree and shrub rows. Undesirable vegetation has been treated using appropriate herbicides, reducing competition for target trees and/or shrubs. Site conditions are favorable for successful establishment of trees and/or shrubs. The typical size of the practice is 1.5 acres.

Scenario Feature Measure: Area of treatment

Scenario Unit: Acre

Scenario Typical Size: 2

Scenario Cost: $114.24 **Scenario Cost/Unit:** $57.12

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	3	$17.58
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	1.5	$23.45
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	1.5	$1.98
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	$71.23	1	$71.23

Practice: 500 - Obstruction Removal

Scenario: #1 - Removal and Disposal of Fence, Feedlot

Scenario Description:

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

Before Situation:

On headquarters or any land where existing feedlot fence interferes 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 feedlot fence will be 300 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 Foot

Scenario Typical Size: 300

Scenario Cost: $1,067.51 **Scenario Cost/Unit:** $3.56

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	$37.50	5	$187.50
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	5	$217.70
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	6	$126.24
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	$17.44	6	$104.64
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94
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	$173.49	1	$173.49

Practice: 500 - Obstruction Removal

Scenario: #2 - Removal and Disposal of Fence, landscape

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: $2,860.31 **Scenario Cost/Unit:** $1.08

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	20	$750.00
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	20	$870.80
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	21	$441.84
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	21	$366.24
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94
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	$173.49	1	$173.49

Practice: 500 - Obstruction Removal

Scenario: #3 - Removal and Disposal of Power Lines and Poles

Scenario Description:

Remove and disposal of power lines and poles thru demolition, excavation or other means required for removal. Dispose of all power lines and poles so that it does not impede subsequent work or cause onsite or offsite damage. Dispose of all power lines and poles by removal to an approved location, or reuse location. Remove and dispose all power lines and poles 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 length is 2640 linear feet of an impaired area. The removal of power lines and poles will be performed by using means required for removal with the use of heavy equipment and hand labor. Dispose of all lines and poles 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: Length of Power Lines

Scenario Unit: Linear Foot

Scenario Typical Size: 2,640

Scenario Cost: $8,672.75 **Scenario Cost/Unit:** $3.29

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.80	20	$1,356.00
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	20	$750.00
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	20	$870.80
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$122.31	20	$2,446.20
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	$17.44	21	$366.24
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	42	$883.68
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$25.06	42	$1,052.52
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	3	$773.82
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	$173.49	1	$173.49

Practice: 500 - Obstruction Removal

Scenario: #4 - Removal and Disposal of Steel and or Concrete Structures

Scenario Description:

Remove and disposal of large 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: $24,075.98 **Scenario Cost/Unit:** $12.04

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	$188.08	50	$9,404.00
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$56.49	50	$2,824.50
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$122.31	50	$6,115.50
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	$17.44	51	$889.44
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	$25.06	153	$3,834.18
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	$492.48	1	$492.48
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 500 - Obstruction Removal

Scenario: #5 - Removal and Disposal of Wood Structures

Scenario Description:

Remove and disposal of wood structures (including large isolated trees) by demolition, excavation or other similar 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 similar 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: $12,588.48 **Scenario Cost/Unit:** $6.29

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$122.31	25	$3,057.75
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$56.49	25	$1,412.25
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$188.08	25	$4,702.00
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	$25.06	78	$1,954.68
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	$17.44	26	$453.44
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	1	$492.48
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 500 - Obstruction Removal

Scenario: #6 - Removal and disposal of individual landscape structures

Scenario Description:

Remove and disposal of individual landscape structures (windmills, large trees, etc.) by demolition, excavation or other means required for removal. Dispose of all landscape structures so that it does not impede wildlife movement and/or subsequent work or cause onsite or offsite damage. Dispose of all associated materials by removal to an approved location, or reuse location. Remove and dispose all materials in order to apply conservation practices or facilitate the planned land use. Landscape structure removal will address the resource concerns of wildlife collision or avoidance at the landscape level.

Before Situation:

On any land where existing obstructions interfere with planned land use development, public safety or infrastructure. The site may be recreation areas, farms, ranches, and areas. This is not intended for the removal of obstructions from aquatic environments.

After Situation:

The typical area will be an area of 15 feet by 15 feet (225 square feet) of impaired land. The removal of landscape 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 materials from the obstruction removal so that it does not impede wildlife movement 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: 225

Scenario Cost: $1,301.93 **Scenario Cost/Unit:** $5.79

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	2	$87.08
Truck, dump, 8 CY	1401	Dump truck for moving bulk material. Typically capacity is 12 ton or 8 cubic yards. Includes equipment only.	Hour	$58.77	1	$58.77
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	$115.06	2	$230.12
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	2	$42.08
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	2	$34.88
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$25.06	3	$75.18
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	3	$773.82

Practice: 500 - Obstruction Removal

Scenario: #7 - Removal and Disposal of Brush and Trees <= 6 inch Diameter

Scenario Description:

Remove and dispose of brush and trees predominantly <= 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:

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.

Scenario Feature Measure: Land Area

Scenario Unit: Acre

Scenario Typical Size: 2

Scenario Cost: $2,207.92 **Scenario Cost/Unit:** $1,103.96

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	2	$75.00
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$125.42	8	$1,003.36
Brush Chipper, 6" capacity	938	Brush Chipper, 6" capacity, typically 35 HP. Includes chipper and power unit. Labor not included.	Hour	$22.29	8	$178.32
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	$17.44	9	$156.96
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	9	$189.36
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$173.49	2	$346.98
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 500 - Obstruction Removal

Scenario: #8 - Removal and Disposal of Brush and Trees > 6 inch Diameter

Scenario Description:

Remove and dispose of brush and trees predominantly > 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: $4,047.11 **Scenario Cost/Unit:** $2,023.56

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	$37.50	2	$75.00
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$188.08	10	$1,880.80
Brush Chipper, 15" capacity	1868	Brush Chipper, 15" capacity, typically 165 HP. Includes chipper and power unit. Does not include labor.	Hour	$66.03	10	$660.30
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	$25.06	11	$275.66
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	11	$231.44
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	1	$492.48
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	$173.49	1	$173.49

Practice: 511 - Forage Harvest Management

Scenario: #3 - Per-Ann Crops - Delayed Mowing

Scenario Description:

In perennial or annual 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 or annual forage crops are produced and harvested; ground nesting birds are disturbed and/or fledgling birds are killed in the process.

After Situation:

Perennial or annual forage 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: 40

Scenario Cost: $120.73 **Scenario Cost/Unit:** $3.02

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	$24.27	1	$24.27
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 Grasses, 1 species

Scenario Description:

Establish or reseed 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 includes seed, equipment and labor for seedbed prep, tillage, and seeding.

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 Forage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $8,156.80 **Scenario Cost/Unit:** $101.96

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	80	$851.20
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	80	$1,631.20
Materials						
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	80	$5,674.40

Practice: 512 - Forage and Biomass Planting

Scenario: #2 - Native Perennial Grasses, 1 species, forgone income

Scenario Description:

Establish or reseed 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 includes seed, equipment and labor for seedbed prep, tillage, and seeding. The land being seeded was previously cropland with a typical rotation of wheat and corn.

Before Situation:

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 Forage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $10,933.60 **Scenario Cost/Unit:** $136.67

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	80	$851.20
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	80	$1,631.20
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$23.14	120	$2,776.80
Materials						
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	80	$5,674.40

Practice: 512 - Forage and Biomass Planting

Scenario: #3 - Native Perennial Grasses, multi species

Scenario Description:

Establish or reseed 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 includes seed, equipment and labor for seedbed prep, tillage, and seeding.

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 Forage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $20,160.80 **Scenario Cost/Unit:** $252.01

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	80	$851.20
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	80	$1,631.20
Materials						
Three plus Species Mix, Warm Season, Native Perennial	2327	Native, warm season perennial grass. Includes material and shipping only.	Acre	$220.98	80	$17,678.40

Practice: 512 - Forage and Biomass Planting

Scenario: #4 - Native Perennial Grasses, multi species, forgone income

Scenario Description:

Establish or reseed 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 includes seed, equipment and labor for seedbed prep, tillage, and seeding. The land being seeded was previously cropland with a typical rotation of wheat and corn.

Before Situation:

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 Forage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $22,937.60 **Scenario Cost/Unit:** $286.72

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	80	$1,631.20
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	80	$851.20
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$23.14	120	$2,776.80
Materials						
Three plus Species Mix, Warm Season, Native Perennial	2327	Native, warm season perennial grass. Includes material and shipping only.	Acre	$220.98	80	$17,678.40

Practice: 512 - Forage and Biomass Planting

Scenario: #5 - Introduced Perennial Grasses-Legume

Scenario Description:

Establish or reseed adapted perennial introduced 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 grasses for pasture, hayland, and wildlife openings. This practice may be utilized for organic or regular production. This scenario includes seed, equipment and labor for seedbed prep, tillage, and seeding.

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 Forage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 60

Scenario Cost: $3,146.40 **Scenario Cost/Unit:** $52.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	60	$638.40
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	60	$1,223.40
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	60	$1,284.60

Practice: 512 - Forage and Biomass Planting

Scenario: #6 - Introduced Perennial Grasses-Legume, foregone income

Scenario Description:

Establish or reseed adapted perennial introduced 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 grasses for pasture, hayland, and wildlife openings. This practice may be utilized for organic or regular production. This scenario includes seed, equipment and labor for seedbed prep, tillage, and seeding. The land being seeded was previously cropland with a typical rotation of wheat and corn.

Before Situation:

Cropland being converted to grass. 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 Forage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 60

Scenario Cost: $5,229.00 **Scenario Cost/Unit:** $87.15

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	60	$1,223.40
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	60	$638.40
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$23.14	90	$2,082.60
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	60	$1,284.60

Practice: 512 - Forage and Biomass Planting

Scenario: #7 - Introduced Perennial & Native Grass Mix

Scenario Description:

Establish or reseed adapted introduced grasses and at least one native species 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 grasses for pasture, hayland, and wildlife openings. Native grass species, which have a significantly greater cost than introduced species, comprise one third of the grass mixture. This practice may be utilized for organic or regular production. This scenario includes seed, equipment and labor for seedbed prep, tillage, and seeding.

Before Situation:

Existing stand of perennial grasses, a 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 erosion on cropland, hayland, pasture, and/or biomass production.

Scenario Feature Measure: Acres of Forage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $6,176.00 **Scenario Cost/Unit:** $77.20

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	$20.39	80	$1,631.20
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	80	$851.20
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	40	$856.40
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	40	$2,837.20

Practice: 512 - Forage and Biomass Planting

Scenario: #8 - Introduced Perennial & Native Grass Mix, foregone income

Scenario Description:

Establish or reseed adapted introduced grasses and at least one native species 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 grasses for pasture, hayland, and wildlife openings. Native grass species, which have a significantly greater cost than introduced species, comprise one third of the grass mixture. This practice may be utilized for organic or regular production. This scenario includes seed, equipment and labor for seedbed prep, tillage, and seeding. The land being seeded was previously cropland with a typical rotation of wheat and corn.

Before Situation:

Land currently being cropped. 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 Forage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $8,952.80 **Scenario Cost/Unit:** $111.91

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	80	$851.20
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	80	$1,631.20
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$23.14	120	$2,776.80
Materials						
One Species, Warm Season, Native Perennial Grass	2322	Native, warm season perennial grass. Includes material and shipping only.	Acre	$70.93	40	$2,837.20
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	40	$856.40

Practice: 512 - Forage and Biomass Planting

Scenario: #14 - Organic

Scenario Description:

Establish or reseed adapted organic perennial cool season grasses or cool season grass and legumes mix 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 cool season grasses for pasture, hayland, and wildlife openings. This practice may be utilized for organic or regular production. This scenario includes seed, equipment and labor for seedbed prep, tillage, and seeding.

Before Situation:

Poorly managed/degraded pasture or cropland being converted to pasture and/or hay.

After Situation:

Suitable organic 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 Forage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $8,903.20 **Scenario Cost/Unit:** $111.29

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	160	$1,702.40
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	80	$1,631.20
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	80	$5,569.60

Practice: 512 - Forage and Biomass Planting

Scenario: #15 - Organic, forgone income

Scenario Description:

Establish or reseed adapted organic perennial cool season grasses or cool season grass and legumes mix 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 cool season grasses for pasture, hayland, and wildlife openings. This practice may be utilized for organic or regular production. This scenario includes seed, equipment and labor for seedbed prep, tillage, and seeding. The land being seeded was previously cropland with a typical rotation of wheat and corn.

Before Situation:

Cropland being converted to pasture and/or hay.

After Situation:

Suitable organic 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 Forage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $11,680.00 **Scenario Cost/Unit:** $146.00

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	160	$1,702.40
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	80	$1,631.20
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$23.14	120	$2,776.80
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	80	$5,569.60

Practice: 512 - Forage and Biomass Planting

Scenario: #16 - PP Interseed Legumes

Scenario Description:

Interseed legumes and/or forbs into an existing grass stand for the purpose of increasing plant diversity, soil quality and fertility, plant health and enhancing the quality of forage. Scenario is appropriate for conventional production. Payment includes seed, seeding and fertility for interseeding establishment.

Before Situation:

Existing grass stand that needs additional species diversity.

After Situation:

A more diverse grass stand provides improved forage quality and availability, and improved soil condition. Payment scenario is based on red and ladino clover interseeded into a 20 acre cool season grass stand. Inputs are based on medium to low existing fertility.

Scenario Feature Measure: Acres of Forage and Biomass Planting

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $5,625.60 **Scenario Cost/Unit:** $281.28

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$6.50	20	$130.00
Lime application	953	Lime application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$9.69	20	$193.80
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	20	$407.80
Materials						
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.51	2000	$1,020.00
Lime, ENM	75	Fertilizer: Limestone Spread on field.	Ton	$58.25	40	$2,330.00
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	20	$1,082.00
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	$0.66	700	$462.00

Practice: 516 - Livestock Pipeline

Scenario: #1 - Shallow or Above Ground Pipeline, any diameter

Scenario Description:

Description: 1,320 feet of 1 1/4" PE pipe installed above ground or at a 12" depth to supply water for domestic animals. Installation includes all appurtenances and labor. Appurtenances include: couplings, fittings, thrust blocks, gate valves, air release valves, drain valve, and pressure relief valve, and are included in the cost of pipe material. Revegetation is not included.
Resource Concerns: Inadequate Livestock Water, Inefficient Energy Use.
Associated Practices: Critical Area Planting (342), Pumping Plant (533), Watering Facility (614),Water Harvesting Catchment (636), Spring Development (574), and Prescribed Grazing (528).

Before Situation:

Inadequate water supply for domestic animals located on grazed range, pasture, or grazed forest in the northern plains region. This practice will be installed either above ground or within 18" of the surface due to site conditions (i.e., difficult to install pipe below frost depth) or areas where allowed by waiver or state specific practice standard allows for installation of portable pipelines.

After Situation:

Pipeline(s) convey and/or distribute water to storage and/or watering facilities, for use by livestock or wildlife.

Scenario Feature Measure: Length of Pipe Installed

Scenario Unit: Linear Foot

Scenario Typical Size: 1,320

Scenario Cost: $3,436.66 **Scenario Cost/Unit:** $2.60

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	$1.11	1320	$1,465.20
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	$17.44	10	$174.40
Materials						
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$1.06	1452	$1,539.12
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 516 - Livestock Pipeline

Scenario: #3 - Standard Installation, 2" dia. or less (ND-SD)

Scenario Description:

Description: The 2,640 foot 1 1/2" PVC pipeline installed at a depth of 72" will meet the needs of domestic animals. This type of installation is only appropriate in the colder climate of the northern plains region (ND & SD). This item includes installation, all materials, appurtenances, and labor required to construct and install the pipeline. Appurtenances include: couplings, fittings, anchors, thrust blocks, gate valves, air release valves, drain valve, and pressure relief valve, and are included in the cost of pipe material. 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), Spring Development (574), and Prescribed Grazing (528).

Before Situation:

Inadequate water supply for domestic animals located on grazed range, pasture, or grazed forest in the colder climate of the northern plains region (ND & SD).

After Situation:

Pipeline(s) convey and/or distribute water to storage and/or watering facilities, for use by livestock or wildlife. Pipeline will supply adequate water for domestic animals on grazed range, pasture, or grazed forest in the northern plains region (ND & SD). The 2,640 feet of 1 1/2" diameter PVC pipe will be installed below ground at a depth of greater than 60" to meet the water quantity requirements of domestic animals.

Scenario Feature Measure: Length of Pipe Installed

Scenario Unit: Linear Foot

Scenario Typical Size: 2,640

Scenario Cost: $9,219.56 **Scenario Cost/Unit:** $3.49

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Earth, 12" x 60"	1459	Trenching, earth, 12" wide x 60" depth, includes equipment and labor for trenching, laying 3"-6" CPP drain line with envelope, and backfilling.	Foot	$1.88	2640	$4,963.20
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	$17.44	44	$767.36
Materials						
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	2	$152.82
Pipe, PVC, 1 ½", SCH 40	975	Materials: - 1 1/2" - PVC - SCH 40 - ASTM D1785	Foot	$1.06	2904	$3,078.24
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 516 - Livestock Pipeline

Scenario: #4 - Standard Installation, greater than 2" dia.

Scenario Description:

Description: The 5,000 feet of 3" PVC pipeline installed at a depth of 72" will meet the needs of domestic animals. This type of installation is appropriate in the the northern plains region. This item includes installation, all materials, appurtenances, and labor required to construct and install the pipeline. Appurtenances include: couplings, fittings, thrust blocks, gate valves, air release valves, drain valve, and pressure relief valve, and are included in the cost of pipe material. 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), Spring Development (574), and Prescribed Grazing (528).

Before Situation:

Water supplies need to be conveyed through pipelines for use by livestock or wildlife. Resource Concerns: Inadequate Livestock Water, Inefficient Energy Use.

After Situation:

Pipeline(s) convey and/or distribute water to storage and/or watering facilities, for use by livestock or wildlife. Pipeline will supply adequate water for domestic animals on grazed range, pasture, or grazed forest in the northern plains region (ND & SD). The 5,000 feet of 3" diameter PVC pipe will be installed below ground at a depth of greater than 60" to meet the water quantity requirements of domestic animals.

Scenario Feature Measure: Length of Pipe Installed

Scenario Unit: Linear Foot

Scenario Typical Size: 5,000

Scenario Cost: $20,929.78 **Scenario Cost/Unit:** $4.19

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	$90.68	32	$2,901.76
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	$17.44	64	$1,116.16
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	32	$673.28
Materials						
Pipe, PVC, 3", SCH 40	977	Materials: - 3" - PVC - SCH 40 - ASTM D1785	Foot	$2.85	5500	$15,675.00
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	4	$305.64
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 516 - Livestock Pipeline

Scenario: #5 - Backhoe, 2" dia. or less

Scenario Description:

Description: The 2,640 feet 2" PVC pipeline installed at a depth of 60" in rocky conditions to meet the needs of domestic animals. Trencher installation is not possible due to site conditions. This item includes installation, all materials, appurtenances, and labor required to construct and install the pipeline. Appurtenances include: couplings, fittings, expansion joints, anchors, thrust blocks, gate valves, air release valves, drain valve, and pressure relief valve, and are included in the cost of pipe material. 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), Spring Development (574), and Prescribed Grazing (528).

Before Situation:

Water supplies need to be conveyed through pipelines for use by livestock or wildlife. Resource Concerns: Inadequate Livestock Water, Inefficient Energy Use.

After Situation:

Pipeline(s) convey and/or distribute water to storage and/or watering facilities, for use by livestock or wildlife. Pipeline will supply adequate water for domestic animals on grazed range, pasture, or grazed forest in the northern plains. The 2,640 feet of 2" diameter PVC pipe will be installed in rocky conditions at a depth of 60" or more to meet the water quantity requirements of domestic animals.

Scenario Feature Measure: Length of Pipe Installed

Scenario Unit: Linear Foot

Scenario Typical Size: 2,640

Scenario Cost: $13,122.18 **Scenario Cost/Unit:** $4.97

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	80	$4,519.20
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	80	$1,683.20
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	$17.44	84	$1,464.96
Materials						
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	2	$152.82
Earthfill Material, purchased, common	2060	Purchased earthfill materials includes both silt or clay. Material only.	Cubic Yard	$20.15	50	$1,007.50
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.39	2904	$4,036.56
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 516 - Livestock Pipeline

Scenario: #6 - Backhoe, greater than 2" dia.

Scenario Description:

Description: The 2,640 feet 3" PVC pipeline installed at a depth of 60" in rocky conditions to meet the needs of domestic animals. Trencher installation is not possible due to site conditions. This item includes installation, all materials, appurtenances, and labor required to construct and install the pipeline. Appurtenances include: couplings, fittings, expansion joints, anchors, thrust blocks, gate valves, air release valves, drain valve, and pressure relief valve, and are included in the cost of pipe material. 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), Spring Development (574), and Prescribed Grazing (528).

Before Situation:

Water supplies need to be conveyed through pipelines for use by livestock or wildlife. Resource Concerns: Inadequate Livestock Water, Inefficient Energy Use.

After Situation:

Pipeline(s) convey and/or distribute water to storage and/or watering facilities, for use by livestock or wildlife. Pipeline will supply adequate water for domestic animals on grazed range, pasture, or grazed forest in the northern plains. The 2,640 feet of 3" diameter PVC pipe will be installed in rocky conditions at a depth of 60" or more to meet the water quantity requirements of domestic animals.

Scenario Feature Measure: Length of Pipe Installed

Scenario Unit: Linear Foot

Scenario Typical Size: 2,640

Scenario Cost: $17,362.02 **Scenario Cost/Unit:** $6.58

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	80	$4,519.20
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	80	$1,683.20
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	$17.44	84	$1,464.96
Materials						
Earthfill Material, purchased, common	2060	Purchased earthfill materials includes both silt or clay. Material only.	Cubic Yard	$20.15	50	$1,007.50
Pipe, PVC, 3", SCH 40	977	Materials: - 3" - PVC - SCH 40 - ASTM D1785	Foot	$2.85	2904	$8,276.40
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	2	$152.82
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 516 - Livestock Pipeline

Scenario: #7 - Boring, any diameter

Scenario Description:

Description: 200 feet of 2" PVC pipeline installed by boring through road bed or under streams to meet the needs of domestic animals. Typical trencher or plowing installation is not possible due to site disturbance or environmental concerns. This item includes installation, all materials, appurtenances, and labor required to construct and install the pipeline. Appurtenances include: couplings, fittings, expansion joints, anchors, thrust blocks, gate valves, air release valves, drain valve, and pressure relief valve, and are included in the cost of pipe material. 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), Spring Development (574), and Prescribed Grazing (528).

Before Situation:

Water supplies need to be conveyed through pipelines for use by livestock or wildlife. Resource Concerns: Inadequate Livestock Water, Inefficient Energy Use.

After Situation:

Pipeline(s) convey and/or distribute water to storage and/or watering facilities, for use by livestock or wildlife. Pipeline will supply adequate water for domestic animals on grazed range, pasture, or grazed forest in the northern plains. The 200 feet of 2" diameter PVC pipe will be installedunder roads or streams at a depth of 60" or more to avoid unnecessary disturbance and to meet the water quantity requirements of domestic animals.

Scenario Feature Measure: Length of Pipe Installed

Scenario Unit: Linear Foot

Scenario Typical Size: 200

Scenario Cost: $9,672.35 **Scenario Cost/Unit:** $48.36

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Horizontal Boring, ≤ 3" diameter	1131	Includes equipment, labor and setup.	Foot	$45.30	200	$9,060.00
Materials						
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	1	$76.41
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.39	200	$278.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 516 - Livestock Pipeline

Scenario: #8 - Rural Water Connection Equipment

Scenario Description:

The rural water connection includes the 4' manhole, meter, 500' of pipe, valves, and necessary installation for connecting from a rural water pipeline to a livestock distribution pipeline. This item includes installation, all materials, appurtenances, and labor required to construct and install the meter pit. This item does not include the hook-up fees to the rural water system. 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), Spring Development (574), and Prescribed Grazing (528).

Before Situation:

Inadequate water supply for domestic animals located on grazed range, pasture, or grazed forest in the northern plains region.

After Situation:

A rural water connection which provides access to a reliable, high quality water supply for meeting the needs of domestic animals on grazed range, pasture, or grazed forest in the northern plains region. The 4' manhole, meter, pipe and appurtenances will enable the pipeline to meet the quantity requirements of domestic animals.

Scenario Feature Measure: Rural Water Connection

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $4,352.12 **Scenario Cost/Unit:** $4,352.12

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	$90.68	6	$544.08
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	4	$225.96
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	10	$210.40
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	$17.44	12	$209.28
Materials						
Manhole, 4' x 4'	1053	Precast Manhole with base and top delivered. 4' diameter x 4' depth. Materials only.	Each	$1,736.11	1	$1,736.11
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.39	600	$834.00
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	1	$76.41
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

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: $25,155.64 **Scenario Cost/Unit:** $10.39

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	$83.47	32	$2,671.04
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	$24.27	40	$970.80
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

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: $28,532.92 **Scenario Cost/Unit:** $11.79

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	$3.97	807	$3,203.79
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	$24.27	40	$970.80
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	$83.47	32	$2,671.04
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, 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	$173.49	1	$173.49

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: $13,697.75 **Scenario Cost/Unit:** $8.49

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	1613	$6,403.61
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.85	6	$95.10
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$55.09	20	$1,101.80
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	$83.47	3	$250.41
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	20	$420.80
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	$35.05	8	$280.40
Materials						
Soil Dispersant	1490	Soil Amendment (tetrasodium pyrophosphate (TSPP), sodium tripolyphosphate (STPP), or soda ash or approved equivalent)	Ton	$483.80	6.53	$3,159.21
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 i	Dollar	$1.03	1200	$1,236.00
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	1	$492.48

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. The soil liner is covered with a protective soil cover.

Scenario Feature Measure: Volume of Liner Material including Soil Cover over Liner

Scenario Unit: Cubic Yard

Scenario Typical Size: 2,420

Scenario Cost: $16,901.54 **Scenario Cost/Unit:** $6.98

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	$3.97	2420	$9,607.40
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.85	6	$95.10
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$55.09	20	$1,101.80
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	20	$420.80
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	$35.05	8	$280.40
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	$83.47	3	$250.41
Materials						
Soil Dispersant	1490	Soil Amendment (tetrasodium pyrophosphate (TSPP), sodium tripolyphosphate (STPP), or soda ash or approved equivalent)	Ton	$483.80	6.53	$3,159.21
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 i	Dollar	$1.03	1200	$1,236.00
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	1	$492.48

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: $63,491.48 **Scenario Cost/Unit:** $39.36

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	$55.09	6	$330.54
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	1613	$6,403.61
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.85	4	$63.40
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	6	$126.24
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$83.47	2	$166.94
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$35.05	1	$35.05
Materials						
Bentonite	41	Bentonite, includes materials (50# bag)	Each	$10.64	5227	$55,615.28
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	1	$492.48

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 including 1 foot of soil cover over liner

Scenario Unit: Cubic Yard

Scenario Typical Size: 3,227

Scenario Cost: $69,899.06 **Scenario Cost/Unit:** $21.66

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	$3.97	3227	$12,811.19
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.85	4	$63.40
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$55.09	6	$330.54
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	$83.47	2	$166.94
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	6	$126.24
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	$35.05	1	$35.05
Materials						
Bentonite	41	Bentonite, includes materials (50# bag)	Each	$10.64	5227	$55,615.28
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	1	$492.48
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 521D - Pond Sealing or Lining, Compacted Clay Treatment

Scenario: #2 - Material haul, greater than 1 mile

Scenario Description:

Construction of a compacted soil liner, treated with compacted clay, to reduce seepage from ponds or waste storage impoundment structures. Practice implementation includes compaction of the soil liner under proper moisture conditions to the designed liner thickness, and protection of the finished liner. Material haul > 1 mile. Associated practices include PS378, PS313, & other waste water impoundments.

Before Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits. An adequate quantity of soil suitable for constructing a clay liner without amendments is available at an economical haul distance.

After Situation:

Water conservation and environmental protection provided by limiting seepage losses from ponds or waste storage impoundments.

Scenario Feature Measure: Volume of Liner Material (including volume of soil cover, as needed)

Scenario Unit: Cubic Yard

Scenario Typical Size: 2,420

Scenario Cost: $40,518.78 **Scenario Cost/Unit:** $16.74

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	$0.33	12100	$3,993.00
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	$2.14	2420	$5,178.80
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	2420	$9,607.40
Excavation, clay, large equipment, 1500 ft	1217	Bulk excavation of clay with scrapers with average haul distance of 1500 feet. Includes equipment and labor.	Cubic Yard	$6.49	1613	$10,468.37
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.63	2420	$8,784.60
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	$83.47	9	$751.23
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	3	$1,477.44

Practice: 521D - Pond Sealing or Lining, Compacted Clay Treatment

Scenario: #3 - Use On-Site Material

Scenario Description:

Construction of a compacted soil liner, using materials available on-site, to reduce seepage from ponds or waste storage impoundment structures. Practice implementation includes compaction of the subgrade and soil liner under proper moisture conditions to the designed liner thickness using materials available at the construction site. Associated practices include PS378, PS313, & other waste water impoundments.

Before Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits without proper moisture and density control. An adequate quantity of soil suitable for constructing a clay liner without amendments is available on-site.

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 volume of soil cover, as needed)

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,613

Scenario Cost: $12,076.73 **Scenario Cost/Unit:** $7.49

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	1613	$6,403.61
Excavation, clay, large equipment, 150 ft	1219	Bulk excavation of clay with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$6.10	807	$4,922.70
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	1	$492.48
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 521D - Pond Sealing or Lining, Compacted Clay Treatment

Scenario: #4 - Use On-site Material with Soil Cover

Scenario Description:

Construction of a compacted soil liner, treated with compacted clay, to reduce seepage from ponds or waste storage impoundment structures. Practice implementation includes compaction of the soil liner under proper moisture conditions to the designed liner thickness, and soil cover to protect the finished liner using materials available at the construction site. Associated practices include PS378, PS313, & other waste water impoundments.

Before Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits. An adequate quantity of soil suitable for constructing a clay liner without amendments is available on-site.

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 volume of soil cover, as needed)

Scenario Unit: Cubic Yard

Scenario Typical Size: 2,420

Scenario Cost: $14,707.55 **Scenario Cost/Unit:** $6.08

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	$3.26	807	$2,630.82
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	1613	$6,403.61
Excavation, clay, large equipment, 150 ft	1219	Bulk excavation of clay with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$6.10	807	$4,922.70
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	1	$492.48
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 528 - Prescribed Grazing

Scenario: #1 - Small Ranch Unit

Scenario Description:

Design and implementation of a grazing system on small pasture less than 320 acres 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) and record keeping. Beginning ranchers implementing an initial grazing system on small ranchettes.

Before Situation:

Current grazing system on a small ranch unit (<320 acres) 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: Acres of Treatment

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $2,856.04 **Scenario Cost/Unit:** $35.70

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						
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
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.91	60	$1,854.60
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	$35.05	26	$911.30

Practice: 528 - Prescribed Grazing

Scenario: #2 - Range, 3-6 Pastures

Scenario Description:

Design and implementation of a grazing system using a minimum of 3, and not more than 6, pastures in rotation that will enhance rangeland health and ecosystem function as well as optimize efficiency and economic return through monitoring (ex: trend, composition, production, etc), and 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 rotation 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: Acres of Treatment

Scenario Unit: Acre

Scenario Typical Size: 1,000

Scenario Cost: $6,857.14 **Scenario Cost/Unit:** $6.86

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$44.18	1	$44.18
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
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.91	100	$3,091.00
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	$35.05	80	$2,804.00
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	$17.44	50	$872.00

Practice: 528 - Prescribed Grazing

Scenario: #3 - Range, 7 or More Pastures

Scenario Description:

Design and implementation of a grazing system, using a minimum of 7 pastures in rotation, that will enhance rangeland health and ecosystem function, as well as optimize efficiency and economic return through monitoring (ex: trend, composition, production, etc), and 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 rotation 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: Acres of Treatment

Scenario Unit: Acre

Scenario Typical Size: 1,000

Scenario Cost: $9,452.44 **Scenario Cost/Unit:** $9.45

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	$30.91	150	$4,636.50
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	$17.44	70	$1,220.80
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	$35.05	100	$3,505.00

Practice: 528 - Prescribed Grazing

Scenario: #5 - Range, 30-73% Rest

Scenario Description:

Design and implementation of a grazing system that will enhance pasture condition and ecosystem function by providing rest to the pastures during the growing season (30-73% rest) 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: Acres of Treatment

Scenario Unit: Acre

Scenario Typical Size: 160

Scenario Cost: $1,760.92 **Scenario Cost/Unit:** $11.01

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.91	26	$803.66
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	$35.05	26	$911.30

Practice: 528 - Prescribed Grazing

Scenario: #7 - Habitat Mgt., Grouse

Scenario Description:

Development and implementation of a grazing schedule that will create, restore, and/or enhance habitat components for grouse species including Lesser prairie-chicken and Sage grouse (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) may be deferred during periods of critical wildlife use.

Scenario Feature Measure: Acres of Treatment

Scenario Unit: Acre

Scenario Typical Size: 160

Scenario Cost: $1,980.47 **Scenario Cost/Unit:** $12.38

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						
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
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.91	26	$803.66
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	26	$631.02
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$35.05	13	$455.65

Practice: 528 - Prescribed Grazing

Scenario: #8 - Livestock Deferment (FI)

Scenario Description:

Defer livestock grazing for a 12 month period to allow for regrowth and recovery to occur on a 40 acre grazed range unit where a plant or animal resource concerns exists. Complete livestock exclusion is required during the specified time period. Deferment may be necessary on whole units or portions of units as determined by appropriate assessment.

Before Situation:

Inadequate plant cover exists for nesting, brooding, and/or winter habitat for upland birds on grazing/wildlife lands. Inadequate plant growth or regrowth after livestock use does not permit the use by wildlife and/or creates a plant condition resource concern.

After Situation:

Adequte cover exists after deferment which provides adequate cover for wildlife or plant growth/recovery.

Scenario Feature Measure: Acres of Treatment

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $949.08 **Scenario Cost/Unit:** $23.73

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$23.14	38	$879.32
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	$17.44	4	$69.76

Practice: 528 - Prescribed Grazing

Scenario: #9 - 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) and 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: Acres of Treatment

Scenario Unit: Acre

Scenario Typical Size: 150

Scenario Cost: $1,662.75 **Scenario Cost/Unit:** $11.09

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$44.18	1	$44.18
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
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.91	26	$803.66
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	13	$315.51
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	26	$453.44

Practice: 528 - Prescribed Grazing

Scenario: #10 - Cover Crop/Aftermath

Scenario Description:

Design and implementation of a grazing system using multiple fields of cover crops or cover crops in combination with crop aftermath. Use of these crop fields will provide additional forage and relieve pressure on rangeland fields, thereby enhancing rangeland health and ecosystem function as well as optimizing efficiency and economic return through monitoring (ex: trend, composition, production, etc), and record keeping. This grazing will typically occur in the fall. If the grazing occurs on cover crop that is being used as part of pollinator system the field can not be grazed until after the honey bees are moved from the area which is usually early September.

Before Situation:

Current grazing system exhibits undesirable and inefficient use of forage plants 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, as well as utilizing the cover crops to a level that will continue to improve the soil health of the cropland. Livestock are managed in rotation in a way that enhances soil health and function through proper use and distribution, and efficient harvest of forage resources. Grazing system success will be evaluated through monitoring.

Scenario Feature Measure: Acres of Treatment

Scenario Unit: Acre

Scenario Typical Size: 320

Scenario Cost: $2,458.59 **Scenario Cost/Unit:** $7.68

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						
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
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.91	35	$1,081.85
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	$35.05	28	$981.40
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	$17.44	17.5	$305.20

Practice: 533 - Pumping Plant

Scenario: #3 - Irrigation, Variable Frequency Drive

Scenario Description:

Description: This is an installation of electrical and electronic components designed to vary the frequency of the voltage to vary the speed of an electric motor in an irrigation system. This directly affects pressure and flowrate. This would 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.

Before Situation:

Standard electrical connection from electrical utility to pump motor. No capability to match pump output pressure and/or flowrate to field(s) need(s). Result is over/under pressure(s) and/or flow rate(s), possible hydraulic anomalies, energy loss, and or inefficient water application in the irrigation system.

After Situation:

VFD Modifications are implemented at the pump site to allow for varying the speed of a 50 Hp electric motor to match the pressure and flow requirements for a center pivot irrigation system.

Scenario Feature Measure: Number of Pumps

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $11,584.18 **Scenario Cost/Unit:** $11,584.18

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	8	$139.52
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	$24.27	8	$194.16
Materials						
Variable Speed Drive, 50 HP	1288	Variable speed drive for 50 Horsepower electric motor. Does not include motor. Materials only.	Horsepower	$225.01	50	$11,250.50

Practice: 533 - Pumping Plant

Scenario: #4 - irrigation, Surface Water

Scenario Description:

Decription: This scenario includes the installation of an electric motor and pump with surface water (such as an irrigation canal) as the water source. This is done in conjunction with an irrigation conversion practice to ensure energy and water savings are realized. This scenario includes all materials, equipment and labor to install the pump and motor, including intake screens. 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: 160 acres of cropland that is being irrigated under a less efficient system than a center pivot or linear move system with low pressure nozzles which is being serviced by a pump set up for the existing system. The 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: 160 acres of cropland that has undergone an irrigation conversion practice to use a more efficient method of irrigation, including installation of a pumping plant with an irrigation canal as the water source. The properly designed and efficient pumping plant is installed, reducing energy use and improving irrigation efficiency.

Scenario Feature Measure: Pump Power Requirements

Scenario Unit: Brake Horse Power

Scenario Typical Size: 50

Scenario Cost: $12,863.10 **Scenario Cost/Unit:** $257.26

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	$146.94	2	$293.88
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	4	$225.96
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	4	$84.16
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	16	$279.04
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	$35.05	8	$280.40
Materials						
Pump intake screen, Linear, variable cost portion	2070	Variable cost portion of linear fish intake pump screen including all adapters, o-rings, mounting tabs, and other accessories. Includes materials and shipping only.	Gallons per Minute	$3.32	900	$2,988.00
Pump intake screen, Linear, fixed cost portion	2069	Fixed cost portion of linear fish intake pump screen including all adapters, o-rings, mounting tabs, and other accessories. This is the base cost for the system. Includes materials and shipping only.	Each	$504.76	1	$504.76
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	50	$6,048.50

Materials

Pump, > 5 HP to 30 HP, pump and motor, fixed cost portion	1011	Fixed cost portion of a pump between 5 and 30 HP, including the pump and motor. This portion is a base cost for the pump and is not dependant on horsepower. The total cost will include this fixed cost plus a variable cost portion. Includes material and 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	$257.94	1	$257.94

Practice: 533 - Pumping Plant

Scenario: #5 - Livestock, Manure Transfer

Scenario Description:

Description: Pump and accessories to move manure from storage location to manure distribution site/equipment. Part of a animal waste management system. Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters.
Associated Practices include: 313 - Waste Storage Facility; 634 - Waste Transfer

Before Situation:

Livestock facility that is not in compliance with federal and/or state regulations for animal feeding operations for handling livestock manure.

After Situation:

A manure transfer pump is installed as part of animal manure handling system. The typical installation includes a 15 hp chopper/screw pump installed at the facility with all necessary appurtenances and controls. Other pump types may be substituted as needed to transfer manure. Waste is properly managed in accordance federal and/or state regulations for animal feeding operations to address water quality concerns.

Scenario Feature Measure: Number of Pumps

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $14,987.74 **Scenario Cost/Unit:** $14,987.74

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	$115.06	16	$1,840.96
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	$146.94	5	$734.70
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	$25.06	16	$400.96
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	$17.44	48	$837.12
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	$35.05	24	$841.20
Materials						
Pump, > 5 HP to 30 HP, pump and motor, fixed cost portion	1011	Fixed cost portion of a pump between 5 and 30 HP, including the pump and motor. This portion is a base cost for the pump and is not dependant on horsepower. The total cost will include this fixed cost plus a variable cost portion. Includes material and 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	15	$1,814.55
Manhole, 6' x 10'	2107	Precast Manhole with base and top delivered. 6' diameter x 10' depth. Materials only.	Each	$6,359.85	1	$6,359.85
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 533 - Pumping Plant

Scenario: #8 - Livestock, with Pressure Tank (HP)

Scenario Description:

Descriptions: Typically this is a system that requires a 1.5 - 2 Hp submersible electric-powered pump installed in a well or structure. It is used for watering livestock as part of a prescribed grazing system. Submersible pump installed to deliver stockwater from a well or waterbody to a watering facility. Installation includes drop pipe, pump, and all necessary appurtenances and includes a pressure tank.
Resource Concerns: Livestock Production Limitation - Inadequate livestock water.

Associated Practices include: 374 - Farmstead Energy Improvement; 516 - Livestock Pipeline.

Before Situation:

Grazing system that has an inadequate water supply for livestock.

After Situation:

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: 2

Scenario Cost: $3,721.85 **Scenario Cost/Unit:** $1,860.93

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	8	$451.92
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	$17.44	8	$139.52
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$35.05	8	$280.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	8	$168.32
Materials						
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$1.06	200	$212.00
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	1.5	$599.21
Pressure Tank, 40 gallon	1038	Pressure Tank, 40 gallon. Includes materials and shipping only.	Each	$447.54	0	$0.00
Pumping Plant Pit, Concrete, 1200 Gallon	1922	Precast concrete septic tank structure, 1200 gal capacity, with access port and ladder. Materials only.	Each	$1,794.42	0.25	$448.61
Pressure Tank, 80 gallon	1039	Pressure Tank, 80 gallon. Includes materials and shipping only.	Each	$633.19	1	$633.19
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, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 533 - Pumping Plant

Scenario: #9 - Livestock, without Pressure Tank (HP)

Scenario Description:

Description: A 1 Hp submersible electric-powered pump is installed in a well or structure. It is used for watering livestock as part of a prescribed grazing system. Submersible pump installed to deliver stockwater from a well or waterbody to a watering facility. Installation includes drop pipe, pump, and all necessary appurtenances. Installation without pressure tank is typically used during warm seasons.
Resource Concerns: Livestock Production Limitation - Inadequate livestock water; Insufficient water - Inefficient use of irrigation water.
Associated Practices include: 374 - Farmstead Energy Improvement; 516 - Livestock Pipeline.

Before Situation:

Grazing system that has an inadequate water supply for livestock.

After Situation:

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 Required

Scenario Unit: Horsepower

Scenario Typical Size: 1

Scenario Cost: $1,368.94 **Scenario Cost/Unit:** $1,368.94

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	$35.05	4	$140.20
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	$17.44	8	$139.52
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	1	$399.47
Pump, ≤ 5 HP, pump and motor, fixed cost portion	1009	Fixed cost portion of a pump less than or equal to 5 HP pump and motor. This portion is a base cost and is not dependant on horsepower. The total cost of any pump will include this fixed cost plus a variable cost portion. The completed pump and motor will include the motor and controls. Includes Includes material and shipping only.	Each	$530.75	1	$530.75
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$1.06	150	$159.00

Practice: 533 - Pumping Plant

Scenario: #10 - Windmill-Powered Pump

Scenario Description:

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 8 ft diameter mill and 27-foot tower which is pumping from a 100-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. Associated Practices include: 374 - Farmstead Energy Improvement; 516 - Livestock Pipeline.

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, 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: Windmill Units

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $6,744.12 **Scenario Cost/Unit:** $6,744.12

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	8	$300.00
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	$146.94	2	$293.88
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	$17.44	16	$279.04
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	$35.05	8	$280.40
Materials						
Windmill, 6 or 8', fan diameter	1035	Includes materials costs for windmill head and 27’ tower	Each	$5,590.80	1	$5,590.80

Practice: 533 - Pumping Plant

Scenario: #11 - Solar-Powered Pump, 0.5 hp

Scenario Description:

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. 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; 516 - Livestock Pipeline; 561 - Heavy Use Area Protection; and, 614 - Watering Facility.

Before Situation:

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.

After Situation:

The typical scenario assumes installation of a 373-watt photovoltaic (PV) panel, 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 0.5 Hp solar-powered submersible pump to deliver about 3 gpm and develop a pressure at the pump outlet of about 20 psi.). The installation includes the pump, wiring, pipeline in the well, solar panels, frame mounts, inverter, and all appurtenances. Water will be pumped to pressurize the Livestock Pipeline (516). Grazing - Livestock exclusion from surface water will result in improved surface water quality and reduced erosion. Grazing has potential to be well distributed.

Scenario Feature Measure: Each Pumping Plant

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $5,632.32 **Scenario Cost/Unit:** $5,632.32

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	$24.27	20	$485.40
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
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$1.06	100	$106.00
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
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

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

Practice: 533 - Pumping Plant

Scenario: #12 - Solar-Powered Pump, 1 hp

Scenario Description:

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. 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; 516 - Livestock Pipeline; 561 - Heavy Use Area Protection; and, 614 - Watering Facility.

Before Situation:

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.

After Situation:

The typical scenario assumes installation of a 746-watt photovoltaic (PV) panel, capable of operating a 1 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 Hp solar-powered submersible pump to deliver about 3 gpm and develop a pressure at the pump outlet of about 20 psi.). The installation includes the pump, wiring, pipeline in the well, solar panels, frame mounts, inverter, and all appurtenances. Water will be pumped to pressurize the Livestock Pipeline (516). Grazing - Livestock exclusion from surface water will result in improved surface water quality and reduced erosion. Grazing has potential to be well distributed.

Scenario Feature Measure: Each Pumping Plant

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $9,816.00 **Scenario Cost/Unit:** $9,816.00

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	$24.27	20	$485.40
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	1	$399.47
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$1.06	200	$212.00
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, 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

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

Practice: 533 - Pumping Plant

Scenario: #13 - Solar-Powered Pump, 2 hp

Scenario Description:

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. 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; 516 - Livestock Pipeline; 561 - Heavy Use Area Protection; and, 614 - Watering Facility.

Before Situation:

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.

After Situation:

The typical scenario assumes installation of a 1.5-kW photovoltaic (PV) panel, capable of operating a 2 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 2 Hp solar-powered submersible pump to deliver about 3 gpm and develop a pressure at the pump outlet of about 20 psi.). The installation includes the pump, wiring, pipeline in the well, solar panels, frame mounts, inverter, and all appurtenances. Water will be pumped to pressurize the Livestock Pipeline (516). Grazing - Livestock exclusion from surface water will result in improved surface water quality and reduced erosion. Grazing has potential to be well distributed.

Scenario Feature Measure: Each Pumping Plant

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $18,077.37 **Scenario Cost/Unit:** $18,077.37

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	$24.27	20	$485.40
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
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$1.06	300	$318.00
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	$798.94
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

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	2	$15,511.80

Practice: 533 - Pumping Plant

Scenario: #14 - Livestock, Variable Frequency Drive

Scenario Description:

Description: This is an installation of electrical and electronic components designed to vary the frequency of the voltage to vary the speed of an electric motor in a livestock watering system to provide a constant pressure and flow rate. This would give the operator the flexibility to operate several systems separately or at the same time. Resource concerns: Livestock Production Limitation - Inadequate livestock water and distribution.

Associated Practices: 374 - Farmstead Energy Improvement; 516 - Livestock Pipeline; 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 livestock needs. 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:

A VFDis installed at the pump site to vary the speed of a submersible electric motor to match the pressure and flow requirements for a livestock watering system.

Scenario Feature Measure: Number of Pumps

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $9,043.03 **Scenario Cost/Unit:** $9,043.03

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	$17.44	16	$279.04
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$83.47	16	$1,335.52
Materials						
Pump, motor and variable frequency drive, fixed cost portion	1016	Fixed cost portion of the Pump: Pump, motor and variable frequency drive. This portion is a base cost for all Pump: Pump, motor and variable frequency drive and is not dependant on horsepower. The total cost of any Pump: Pump, motor and variable frequency drive will include this fixed cost plus a variable cost portion. The completed Pump: Pump, motor and variable frequency drive will include the motor and controls. This cost will include material, labor and equipment.	Each	$6,915.61	1	$6,915.61
Pump, motor and variable frequency drive, variable cost portion	1017	Variable cost portion of the Pump: Pump, motor and variable frequency drive. This portion IS dependent on the total horsepower for the Pump: Pump, motor and variable frequency drive. The total cost of any Pump: Pump, motor and variable frequency drive will include this variable cost plus the fixed cost portion. The completed Pump: Pump, motor and variable frequency drive will include the motor and controls. This cost will include material, labor and equipment.	Horsepower	$256.43	2	$512.86

Practice: 533 - Pumping Plant

Scenario: #15 - Wind Turbine-Powered Pump

Scenario Description:

Description: The typical scenario assumes installation of a submersible pump powered by a wind turbine in a well or a live stream. The installation includes the pump, wiring, drop pipe, wind turbine, mounts, inverter, and all appurtenances. 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; 516 - Livestock Pipeline; 561 - Heavy Use Area Protection; and, 614 - Watering Facility.

Before Situation:

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.

After Situation:

The typical scenario assumes installation of a 1.5 kW wind turbine, capable of operating a 1.5 Hp submersible pump in a well or other water source (Notes: 1) A wind turbine 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 1.5 Hp submersible pump to deliver about 11 gpm and develop a pressure at the pump outlet of about 20 psi.). The installation includes the pump, wiring, pipeline in the well, wind turbine, frame mounts, inverter, and all appurtenances. Water will be pumped to pressurize the Livestock Pipeline (516). Grazing - Livestock exclusion from surface water will result in improved surface water quality and reduced erosion. Grazing has potential to be well distributed.

Scenario Feature Measure: Each Pumping Plant

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $3,404.63 **Scenario Cost/Unit:** $3,404.63

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	$35.05	12	$420.60
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	$17.44	16	$279.04
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	1.5	$599.21
Wind Turbine	2596	Wind generator, 1.5 kW maximum, 48 volt system. Includes materials and shipping only.	Each	$1,363.03	1	$1,363.03
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$1.06	200	$212.00
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: 548 - Grazing Land Mechanical Treatment

Scenario: #1 - Range Mechanical Treatment

Scenario Description:

Using a heavy modified plow, or combinations of equipment, that modify physical soil layers 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: 25

Scenario Cost: $779.75 **Scenario Cost/Unit:** $31.19

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Grazingland Renovation, Furrowing	2024	Contour furrowing on existing grazingland including tillage implement, power unit and labor.	Acre	$30.83	25	$770.75
Materials						
Wire flags	1586	Small vinyl flags attached to wire stakes, typically, 36" in length, for marking tree rows	Each	$0.09	100	$9.00

Practice: 548 - Grazing Land Mechanical Treatment

Scenario: #2 - Pastureland Mechanical Treatment

Scenario Description:

This also applies to organic operations as well. Chisel plowing or subsoiling will be used to break the restrictive layers in order to increase water infiltration, and 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 thatch build up.

After Situation:

Forage growth is increased due to greater rooting depths and increased water infiltration.

Scenario Feature Measure: area of treatmnent

Scenario Unit: Acre

Scenario Typical Size: 25

Scenario Cost: $484.75 **Scenario Cost/Unit:** $19.39

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	$19.03	25	$475.75
Materials						
Wire flags	1586	Small vinyl flags attached to wire stakes, typically, 36" in length, for marking tree rows	Each	$0.09	100	$9.00

Practice: 550 - Range Planting

Scenario: #1 - Native, Standard Prep

Scenario Description:

Establishment of a mixture of NATIVE adapted perennial species on a grazed land unit to improve forage condition, improve wildlife habitat and/or reduce erosion. Seed mix of Native species is chosen based on range conditions and availability of seed. Planting by preparing a seedbed with LIGHT TO MODERATE TILLAGE and seeding with a no-till drill, range drill, or by broadcasting.

Before Situation:

Rangeland or cropland with or without an existing stand of perennial or annual grasses, OR a monoculture, OR no grasses are 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 NATIVE adapted perennial vegetation such as grasses, forbs, and legumes improve forage quality and quantity and reduce soil erosion on grazed range, pasture, forest or other suitable location.

Scenario Feature Measure: Acres of Range Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $20,160.80 **Scenario Cost/Unit:** $252.01

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	80	$851.20
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	80	$1,631.20
Materials						
Three plus Species Mix, Warm Season, Native Perennial	2327	Native, warm season perennial grass. Includes material and shipping only.	Acre	$220.98	80	$17,678.40

Practice: 550 - Range Planting

Scenario: #2 - Native, Standard Prep (FI)

Scenario Description:

Establishment of a mixture of NATIVE adapted perennial species on a grazed land unit to improve forage condition, improve wildlife habitat and/or reduce erosion. Seed mix of Native species is chosen based on range conditions and availability of seed. Planting by preparing a seedbed with LIGHT TO MODERATE TILLAGE and seeding with a no-till drill, range drill, or by broadcasting.

Before Situation:

Rangeland or cropland with or without an existing stand of perennial or annual grasses, OR a monoculture, OR no grasses are 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 NATIVE adapted perennial vegetation such as grasses, forbs, and legumes improve forage quality and quantity and reduce soil erosion on grazed range, pasture, forest or other suitable location.

Scenario Feature Measure: Acres of Range Planting

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $22,937.60 **Scenario Cost/Unit:** $286.72

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	80	$851.20
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	80	$1,631.20
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$23.14	120	$2,776.80
Materials						
Three plus Species Mix, Warm Season, Native Perennial	2327	Native, warm season perennial grass. Includes material and shipping only.	Acre	$220.98	80	$17,678.40

Practice: 550 - Range Planting

Scenario: #5 - Native, Wildlife, or Pollinator (FI)

Scenario Description:

Establishment of a mixture of PREDOMINANTLY NATIVE adapted perennial species on a grazed land unit to improve habitat for pollinators,beneficial insects, and wildlife species. Seed mix of PREDOMINANTLY NATIVE SPECIES IS CHOSEN TO SPECIFICALLY BENEFIT WILDLIFE (ex: big game spp, Sage grouse, Lesser Prairie Chicken, others) or POLLINATORS (eg. inclusion of 5-10 forb species) based on range conditions. FOR POLLINATOR HABITAT: Consideration is given to selecting plants that bloom sequentially throughout the growing season, where feasible. For honeybee foraging habitat, species are selected which will be in bloom when hives are in the area. Planting by preparing a seedbed with MODERATE TO HEAVY TILLAGE (ex: ripping & heavy disk) and seeding with a no-till drill, range drill, or by broadcasting.

Before Situation:

Rangeland or cropland with or without an existing stand of perennial or annual grasses, OR a monoculture, OR no grasses are 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 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, with an emphasis on species beneficial to wildlife or Pollinators on grazed range, pasture, 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: $17,144.00 **Scenario Cost/Unit:** $342.88

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	50	$1,019.50
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.85	50	$792.50
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	50	$532.00
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$23.14	75	$1,735.50
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	50	$13,064.50

Practice: 550 - Range Planting

Scenario: #6 - Non Native, Wildlife, or Pollinator (FI)

Scenario Description:

Establishment of a mixture of adapted perennial species on a grazed land unit to improve habitat for pollinators,beneficial insects, and wildlife species. Seed mix of PREDOMINANTLY NATIVE SPECIES IS CHOSEN TO SPECIFICALLY BENEFIT WILDLIFE (ex: big game spp, Sage grouse, Lesser Prairie Chicken, others) or POLLINATORS (eg. inclusion of 5-10 forb species) based on range conditions. FOR POLLINATOR HABITAT: Consideration is given to selecting plants that bloom sequentially throughout the growing season, where feasible. For honeybee foraging habitat, species are selected which will be in bloom when hives are in the area. Planting by preparing a seedbed with MODERATE TO HEAVY TILLAGE (ex: ripping & heavy disk) and seeding with a no-till drill, range drill, or by broadcasting.

Before Situation:

Rangeland or cropland with or without an existing stand of perennial or annual grasses, OR a monoculture, OR no grasses are 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 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 adapted perennial vegetation, such as grasses, forbs, legumes, with an emphasis on species beneficial to wildlife or Pollinators on grazed range, pasture, 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: $11,587.30 **Scenario Cost/Unit:** $231.75

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.85	50	$792.50
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	50	$532.00
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	50	$1,019.50
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$23.14	120	$2,776.80
Materials						
Native or Non-Native Grass and Forb Mix, for Wildlife (including pollinators) or Ecosystem Restoration	2502	Native or Non-Native Grass and Forb Mix, including specialized species. Includes material and shipping only.	Acre	$129.33	50	$6,466.50

Practice: 550 - Range Planting

Scenario: #9 - Saline (FI)

Scenario Description:

Establish and maintain permanent herbaceous vegetation on saline/sodic sites. Grass seeding on 20 acres of saline/sodic affected soils. This practice designed for Saline Seep with Recharge or Discharge Area and Saline/Sodic soils. Seed mix of Predominantly Non-Native species is chosen based on site 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:

Cropland is without existing stand of annual grasses OR monoculture OR no grasses present where natural reseeding or vegetation enhancement is unlikely. Existing conditions often require complete suppression or eradication of existing vegetation to ensure success of planting. Resource concerns may include: undesirable plant productivity and health, soil erosion and soil quality. Saline areas left unattended continue to expand.

After Situation:

The establishment and maintenance of permanent herbaceous vegetation on saline/sodic sites. Grass seeding on 20 acres of saline/sodic affected soils. This practice designed for Saline Seep with Recharge or Discharge Area and Saline/Sodic soils.

Scenario Feature Measure: Acres of Saline Planting

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $6,821.69 **Scenario Cost/Unit:** $341.08

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$10.64	20	$212.80
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.85	20	$317.00
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	20	$407.80
Foregone Income						
FI, Corn Dryland	1959	Dryland Corn is Primary Crop	Acre	$313.09	6.6	$2,066.39
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$168.98	6.7	$1,132.17
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$261.78	6.7	$1,753.93
Materials						
Three Species Mix, Cool Season, Introduced Perennial Grass	2315	Cool season, introduced grass mix. Includes material and shipping only.	Acre	$46.58	20	$931.60

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 80 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 3 structures to control field water levels.
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.

Scenario Feature Measure: Number of Control Structures

Scenario Unit: Each

Scenario Typical Size: 3

Scenario Cost: $233.01 **Scenario Cost/Unit:** $77.67

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	0.33	$14.58
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	9	$218.43

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, 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 agricultural, urban, recreational and other frequently and/or intensively used areas requiring treatment to address soil erosion and water quality
degradation.

After Situation:

The stabilized area is surfaced with approximately 600 square feet of approximately 11 cubic yards of welded wire mesh reinforced concrete with 11 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 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: Volume of Concrete

Scenario Unit: Cubic Yard

Scenario Typical Size: 11

Scenario Cost: $2,239.54 **Scenario Cost/Unit:** $203.59

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	$146.94	11	$1,616.34
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	$2.14	25	$53.50
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	$17.44	4	$69.76
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	11	$242.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

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, 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 agricultural, urban, recreational and other frequently and/or intensively used areas requiring treatment to address soil erosion and water quality
degradation.

After Situation:

The stabilized area is surfaced with approximately 30 cubic yards of rock and or gravel on approximately 160 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 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: Volume of Rock and/or Gravel

Scenario Unit: Cubic Yard

Scenario Typical Size: 30

Scenario Cost: $1,239.22 **Scenario Cost/Unit:** $41.31

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	$2.24	160	$358.40
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.14	43	$92.02
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	4	$69.76
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$15.37	30	$461.10
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 561 - Heavy Use Area Protection

Scenario: #3 - Rock/Gravel

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 to provide a stable, non-eroding surface. Installation includes all materials, equipment, and labor to install this practice. The stabilized area will address the resource concerns of soil erosion and water quality degradation.

Before Situation:

This practice applies to agricultural, urban, recreational and other frequently and/or intensively used areas requiring treatment to address soil erosion and water quality
degradation.

After Situation:

The stabilized area is surfaced with approximately 270 cubic yards of rock and or gravel 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 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: Volume of Rock and/or Gravel

Scenario Unit: Cubic Yard

Scenario Typical Size: 270

Scenario Cost: $4,460.16 **Scenario Cost/Unit:** $16.52

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	$17.44	3	$52.32
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$15.37	270	$4,149.90
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 574 - Spring Development

Scenario: #1 - Spring, up to 50 ft Collection

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 30 ft long, 4 inch diameter HDPE perforated pipe enclosed in a sand/gravel envelope overlaid by 3 ft wide filter fabric (30 ft long) and behind a two layer vinyl cutoff wall (4 ft height x 30 ft long) to retain water. Water is directed (via 50 ft long, 4 inch PVC) to a spring box (48 inch diameter x 6 ft long CMP) that is located below the cutoff wall. The spring box is equipped with a watertight lid and two outlets. One outlet serves as overflow pipe to account for occasions where inflow exceeds outflow. The collection system is commonly composed of a single or a network of perforated 4 inch diameter drainage pipe placed in an excavated collection trench that runs across the slope. The second outflow pipe from the spring box is directed to buried large storage (not included) or 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: $3,282.96 **Scenario Cost/Unit:** $3,282.96

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	$2.24	10	$22.40
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	8	$451.92
Trencher, 8"	936	Equipment and power unit costs. Labor not included.	Hour	$90.68	8	$725.44
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	$17.44	16	$279.04
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	16	$336.64
Materials						
Pipe, PVC, 4", SCH 40	978	Materials: - 4" - PVC - SCH 40 - ASTM D1785	Foot	$4.08	50	$204.00
Poly film, 6 mil.	245	6 mil, polyethylene, black	Square Foot	$0.08	240	$19.20
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	10	$220.00
Pipe, PVC, 1 ½", SCH 40	975	Materials: - 1 1/2" - PVC - SCH 40 - ASTM D1785	Foot	$1.06	100	$106.00
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	$192.62	1	$192.62
Pipe, CMP, 48", 14 Gauge	1280	48" Corrugated Metal Pipe, Galvanized, Uncoated, 14 gage. Material cost only.	Foot	$32.67	6	$196.02
Pipe, HDPE, 4", PCPT, Single Wall	1270	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 4" diameter - ASTM F405. Material cost only.	Foot	$0.46	30	$13.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 574 - Spring Development

Scenario: #2 - Spring, > 50 ft Collection

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 90 ft long, 4 inch diameter HDPE perforated pipe enclosed in a sand/gravel envelope overlaid by 3 ft wide filter fabric (90 ft long) and behind a two layer vinyl cutoff wall (4 ft height x 90 ft long) to retain water. Water is directed (via 100 ft long, 4 inch PVC) to a spring box (48 inch diameter x 8 ft long CMP) that is located below the cutoff wall and away from the spring collection area. The spring box is equipped with a watertight lid and two outlets. One outlet serves as overflow pipe to account for occasions where inflow exceeds outflow. The collection system is commonly composed of a single or a network of perforated 4 inch diameter drainage pipe placed in an excavated collection trench that runs across the slope. The second outflow pipe from the spring box is directed to buried large storage (not included), or 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: $5,002.38 **Scenario Cost/Unit:** $5,002.38

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	$2.24	30	$67.20
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	16	$903.84
Trencher, 8"	936	Equipment and power unit costs. Labor not included.	Hour	$90.68	8	$725.44
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	$17.44	32	$558.08
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	24	$504.96
Materials						
Poly film, 6 mil.	245	6 mil, polyethylene, black	Square Foot	$0.08	720	$57.60
Pipe, PVC, 4", SCH 40	978	Materials: - 4" - PVC - SCH 40 - ASTM D1785	Foot	$4.08	100	$408.00
Pipe, HDPE, 4", PCPT, Single Wall	1270	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 4" diameter - ASTM F405. Material cost only.	Foot	$0.46	90	$41.40
Pipe, CMP, 48", 14 Gauge	1280	48" Corrugated Metal Pipe, Galvanized, Uncoated, 14 gage. Material cost only.	Foot	$32.67	8	$261.36
Pipe, PVC, 1 ½", SCH 40	975	Materials: - 1 1/2" - PVC - SCH 40 - ASTM D1785	Foot	$1.06	100	$106.00
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	$192.62	1	$192.62
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	30	$660.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 576 - Livestock Shelter Structure

Scenario: #2 - Permanent Wind Shelter

Scenario Description:

Permanent Livestock Fabricated Wind Shelter is installed to provde protection for livestock.

Before Situation:

Herds are held and fed in fragile riparian areas in order to reduce stress on domestic animals from harsh winter conditions and provide protection from wind. The concentration of animals in these areas can degrade streambanks, cause excessive sedimentation, damage woody vegetation, overgraze herbacious vegetation, in addition to degrading water quality through manure deposition and erosion. Resouce concerns are water quality, animal health, plant productivity, health, and vigor, and inadequate shelter.

After Situation:

Permanent fabricated wind shelters are installed in order to provide shelter for livestock in upland grazing areas away from the riparian zones. As a result, animals can be held in an area away from the riparian zone thereby eliminating the impacts to water quality and riparian health. A typical scenario is a Fabricated Wind Shelter installed in association with an animal feeding operation (AFO). The AFO has been moved out of the riparian zone where shelter was previously provided by the surrounding riparian woody vegetation. The AFO has been moved to a location where shelter is not naturally provided and needs to be fabricated. The typical fabrication involves a permanent, wood framed, metal or wood faced, 8.5 - foot high, 200 - foot long, fabricated wind shelter, 80% solid face, secured to the ground with wood posts.

Scenario Feature Measure: Length of Wind Shelter

Scenario Unit: Linear Foot

Scenario Typical Size: 200

Scenario Cost: $6,122.81 **Scenario Cost/Unit:** $30.61

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	$23.65	5	$118.25
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.44	5	$42.20
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	16	$600.00
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	$17.44	21	$366.24
Materials						
Post, Wood, CCA treated, 6" x 12-14'	13	Wood Post, Line/End 6" X 12-14', CCA Treated. Includes materials and shipping only.	Each	$26.73	26	$694.98
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.86	400	$344.00
Corrugated Steel, 21 gauge	224	Corrugated or ribbed, galvanized, 21 gauge, includes fasteners, materials only.	sq ft	$2.72	1360	$3,699.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 578 - Stream Crossing

Scenario: #3 - Low water crossing, rock armor

Scenario Description:

Stabilize the bottom and slope of a stream channel using rock riprap. This scenario includes site preparation, dewatering, acquiring and installing gravel or geotextile with rock riprap on channel bottom and approaches. Final travel surface shall be rock. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Typical stream has 75 foot bottom width and approaches. Width is 12 feet for a total area as 900 square 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:

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: 900

Scenario Cost: $3,289.74 **Scenario Cost/Unit:** $3.66

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.68	4	$390.72
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	$1.82	40	$72.80
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$25.06	4	$100.24
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.00	41.7	$2,210.10
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 578 - Stream Crossing

Scenario: #4 - Low water crossing, concrete slab

Scenario Description:

Stabilize the bottom and slope of a stream channel using concrete in place. This scenario includes site preparation, dewatering, acquiring and installing cast in place concrete on channel bottom and approaches. Final travel surface shall be concrete. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Typical stream has 50 foot bottom width and 8 foot approach on each side. Width is 12 feet for a total area of 792 square 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:

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: 792

Scenario Cost: $3,885.30 **Scenario Cost/Unit:** $4.91

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.82	70	$127.40
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.68	2	$195.36
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	$146.94	19.3	$2,835.94
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	$25.06	2	$50.12
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	7.3	$160.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 578 - Stream Crossing

Scenario: #5 - Low water crossing, concrete block

Scenario Description:

Stabilize the bottom and slope of a stream channel using articulated concrete block mats. This scenario includes site preparation, dewatering, acquiring and installing articulated concrete block mats on channel bottom and approaches. Final travel surface shall be concrete blocks. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Typical stream has 50 foot bottom width and 8 foot approach on each side. Width is 12 feet for a total area of 792 square 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:

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: 792

Scenario Cost: $5,945.90 **Scenario Cost/Unit:** $7.51

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	$1.82	70	$127.40
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.68	2	$195.36
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	$115.06	2	$230.12
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	$24.27	4	$97.08
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$25.06	2	$50.12
Materials						
Articulated block	1906	Articulated precast concrete blocks with a typical thickness of 4.5 inches. Includes materials only.	Square Foot	$5.25	882	$4,630.50
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	88	$99.44
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 578 - Stream Crossing

Scenario: #6 - Low water crossing, geocell

Scenario Description:

Stabilize the bottom and slope of a stream channel using geocell mats filled with rock, typically suited for a "low energy" channel. This scenario includes site preparation, dewatering, acquiring and installing geocell mats on channel bottom and approaches. Final travel surface shall be a rock aggregate covering above the geocell. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Typical stream has 50 foot bottom width and 8 foot approach on each side. Width is 12 feet for a total area of 792 square 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:

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: 792

Scenario Cost: $3,314.92 **Scenario Cost/Unit:** $4.19

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.82	70	$127.40
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.68	2	$195.36
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	$25.06	2	$50.12
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	2	$48.54
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	25	$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	88	$99.44
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	$20.19	98	$1,978.62
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

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, 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. In order to ensure plant community establishment and integrity, a vegetative management plan shall be prepared and paid in accordance with Conservation Practice Standard (CPS) 342, Critical Area Planting.

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 - Storm 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: Lineal Feet of Bioengineering Installed

Scenario Unit: Linear Foot

Scenario Typical Size: 1,000

Scenario Cost: $24,504.96 **Scenario Cost/Unit:** $24.50

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	$192.34	25	$4,808.50
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.80	16	$1,084.80
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	$2.14	2500	$5,350.00

Labor

Labor

Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$35.05	90	$3,154.50
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$25.06	75	$1,879.50
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	16	$336.64
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	380	$6,627.20

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	1000	$490.00

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	3	$773.82

Practice: 580 - Streambank and Shoreline Protection

Scenario: #3 - Rock Riprap

Scenario Description:

Protection of streambanks using riprap to stabilize and protect banks of streams or excavated channels 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, 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. In order to ensure plant community establishment and integrity, a vegetative management plan shall be prepared and paid in accordance with Conservation Practice Standard (CPS) 342, Critical Area Planting.
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 - Storm 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: Volume of Riprap Installed

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,117

Scenario Cost: $67,440.82 **Scenario Cost/Unit:** $60.38

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.82	2500	$4,550.00
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.80	16	$1,084.80
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	$35.05	50	$1,752.50
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	16	$336.64
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.00	1117	$59,201.00
Mobilization						

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 580 - Streambank and Shoreline Protection

Scenario: #4 - Gabion

Scenario Description:

Protection of streambanks using gabions to stabilize and protect banks of streams or excavated channels 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, geotextile, and rock gabions; a 12-foot high bank for 48 linear feet is used for estimation purposes. The gabions will be 3' thick and 3' long stacked 12' high. The bank around the gabion will be graded to a stable slope and revegetated. In order to ensure plant community establishment and integrity, a vegetative management plan shall be prepared and paid in accordance with Conservation Practice Standard (CPS) 342, Critical Area Planting.
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 - Storm 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: Length of Shoreline protected

Scenario Unit: Linear Foot

Scenario Typical Size: 48

Scenario Cost: $22,121.09 **Scenario Cost/Unit:** $460.86

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.80	16	$1,084.80
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.82	150	$273.00
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.26	100	$326.00
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	$35.05	50	$1,752.50
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	$17.44	20	$348.80

Labor

Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	16	$336.64

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	$134.24	128	$17,182.72
Geotextile, non-woven, heavy weight	1210	Non-woven greater than 8 ounce/square yard geotextile with staple anchoring. Materials and shipping only.	Square Yard	$4.01	75	$300.75

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 582 - Open Channel

Scenario: #1 - Excavate & Fill

Scenario Description:

This scenario is the construction or improvement of a channel in which water flows with a free surface. Typical construction dimensions are 3-4' deep x 30' wide bottom x 2000' length with a side slope of 6:1. 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. 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: 9,920

Scenario Cost: $27,072.10 **Scenario Cost/Unit:** $2.73

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	$125.42	16	$2,006.72
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	$192.34	110	$21,157.40
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	$25.06	126	$3,157.56
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	1	$492.48

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 bank 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: $7,547.86 **Scenario Cost/Unit:** $3.02

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	$23.65	40	$946.00
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	200	$172.00
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	40	$841.60
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	$35.05	41	$1,437.05
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	$17.44	63	$1,098.72
Materials						
Tree, willow	1426	Willow tree for planting, 18" to 36" seedling. Includes materials and shipping only.	Each	$0.67	700	$469.00
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
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	$173.49	1	$173.49

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: Volume of Rock installed

Scenario Unit: Cubic Yard

Scenario Typical Size: 575

Scenario Cost: $31,030.67 **Scenario Cost/Unit:** $53.97

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	$281.64	0.2	$56.33
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	10	$174.40
Materials						
Tree, willow	1426	Willow tree for planting, 18" to 36" seedling. Includes materials and shipping only.	Each	$0.67	100	$67.00
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.00	575	$30,475.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

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: $6,814.57 **Scenario Cost/Unit:** $2,271.52

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	$2.14	40	$85.60
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	$17.44	42	$732.48
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.00	75	$3,975.00
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
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	$173.49	1	$173.49

Practice: 587 - Structure for Water Control

Scenario: #1 - Inlet Flashboard Riser, Metal

Scenario Description:

A Flashboard Riser fabricated of metal 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). 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" Corrugated Metal Pipe, a 50' long - 30" CMP outlet passing through an embankment. Earthwork is included in the associated practice.

Before Situation:

The operator presently flood irrigates his field and has no means to accurately maintain a constant water level at various 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 waterfowl 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 are conserved. The operator is 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: Diameter Inch Foot

Scenario Typical Size: 1,800

Scenario Cost: $4,343.84 **Scenario Cost/Unit:** $2.41

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	$146.94	2	$293.88
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$56.49	8	$451.92
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	28	$146.16
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	$25.06	8	$200.48
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	$17.44	32	$558.08
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	6	$145.62
Materials						
Steel, Angle, 3" x 3" x 1/4"	1372	Materials: Angle, 3" x 3" x 1/4", Meets ASTM A36	Foot	$3.69	24	$88.56
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	$1.60	30	$48.00
Pipe, CMP, 30", 12 Gauge	1824	30" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$33.56	50	$1,678.00

Materials

Pipe, CMP, 36", 12 Gauge	1825	36" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$40.11	6	$240.66

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	$492.48	1	$492.48

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. 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 36" corrugated metal flashboard riser shop fabricated with flashboard channels at the midpoint, and a 50' long - 30" CMP outlet passing through an embankment. Earthwork is included in the associated pracitce.

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 waterfowl 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: Diameter Inch Foot

Scenario Typical Size: 1,800

Scenario Cost: $5,141.80 **Scenario Cost/Unit:** $2.86

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$56.49	10	$564.90
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	28	$146.16
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	$146.94	2	$293.88
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	$17.44	16	$279.04
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$25.06	10	$250.60
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	$24.27	16	$388.32
Materials						
Pipe, CMP, 30", 12 Gauge	1824	30" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$33.56	70	$2,349.20
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	$1.60	30	$48.00
Steel, Angle, 3" x 3" x 1/4"	1372	Materials: Angle, 3" x 3" x 1/4", Meets ASTM A36	Foot	$3.69	24	$88.56

Materials

Pipe, CMP, 36", 12 Gauge	1825	36" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$40.11	6	$240.66

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	$492.48	1	$492.48

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 weir 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 such a commercial product. The typical scenario is an inline structure with a width of 24" and height of six feet. The pipe is 70' of 18" PVC (inlet and outlet combined). Earthwork is included in the associated practice.

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: Diameter Inch Foot

Scenario Typical Size: 1,680

Scenario Cost: $5,153.02 **Scenario Cost/Unit:** $3.07

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	$5.22	15	$78.30
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$56.49	4	$225.96
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$25.06	4	$100.24
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	$17.44	16	$279.04
Materials						
Water Control Structure, Stoplog, Inline, fixed costs portion	2145	Fixed cost portion of Water Level Control Structure, Inline stoplog type. Typically made of PVC or fiberglass materials. Fixed cost portion. Materials only.	Each	$309.67	1	$309.67
Pipe, PVC, 18", SCH 40	1373	Materials: - 18" - PVC - SCH 40 - ASTM D1785	Foot	$30.12	70	$2,108.40
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	144	$1,722.24
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	$71.23	1	$71.23
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

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. Earthwork is included in the associated practice.

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: 960

Scenario Cost: $3,112.95 **Scenario Cost/Unit:** $3.24

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	$5.22	20	$104.40
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$56.49	7	$395.43
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	10	$174.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	7	$147.28
Materials						
Pipe, HDPE, CPT, Double Wall, Soil Tight, 24"	1246	Pipe, Corrugated HDPE Double Wall, 24" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$18.90	40	$756.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	5	$111.50
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.00	22	$1,166.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

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. Earthwork is included in the associated practice.

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: 960

Scenario Cost: $3,698.35 **Scenario Cost/Unit:** $3.85

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$56.49	9	$508.41
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	20	$104.40
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	$25.06	9	$225.54
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	14	$244.16
Materials						
Pipe, CMP, 24", 12 Gauge	1417	24" Corrugated Metal Pipe, Galvanized, Uncoated, 12 gage. Material cost only.	Foot	$27.01	40	$1,080.40
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	5	$111.50
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$53.00	22	$1,166.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 587 - Structure for Water Control

Scenario: #6 - Slide Gate - Flood Dike

Scenario Description:

This scenario includes installation of 15" CMP with a 15" slide gate (screw activated) through a flood control dike. Pipe is typically 48 feet long. During normal conditions the pipe provides un-restricted drainage from areas protedcted by the dike. During high water events on the downstream side of the dike, the gate can be closed to prevent flood water from backing into the protected area above the dike.

Before Situation:

A dike to protect an area from flooding is either in place or planned. Adequate drainage is required during normal operating periods to prevent saturating the area being protected, and flood waters need to be prevented from entering during periods of flooding.

After Situation:

Tide or flood inundation is controlled. Associated practices could be Dike (356), Field Ditch (607), Surface Drain, Main or Lateral (608). After installation of the Dike and Water Control Structure, the area protected by the dike will have proper drainage and protection during high water conditions downstream.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Foot

Scenario Typical Size: 48

Scenario Cost: $2,280.07 **Scenario Cost/Unit:** $47.50

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$56.49	7	$395.43
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	50	$261.00
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	$25.06	7	$175.42
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	14	$244.16
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	$11.24	48	$539.52
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	$257.94	1	$257.94

Practice: 587 - Structure for Water Control

Scenario: #7 - 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: $1,860.63 **Scenario Cost/Unit:** $186.06

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	$71.23	1	$71.23

Practice: 587 - Structure for Water Control

Scenario: #8 - 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: $3,596.30 **Scenario Cost/Unit:** $359.63

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	$71.23	1	$71.23

Practice: 587 - Structure for Water Control

Scenario: #9 - 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: $4,673.72 **Scenario Cost/Unit:** $467.37

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	$71.23	2	$142.46

Practice: 587 - Structure for Water Control

Scenario: #10 - Rock Check

Scenario Description:

This is a structure constructed with rock placed in existing, recently formed and active minor gullies located near the upper end of a watershed. Multiple structures are generally required, with downstream structures placed to force tail water at an upstream structure. The furthest upstream structure is located to control existing head cutting. Resource concerns addressed included gully erosion and water quality.

Before Situation:

Small gullies are actively forming in locations with reletively small drainage areas that result in increased downstream sedimentation and decreased water quality.

After Situation:

Construction of the structures will result in preventing further head cutting in the channel and improved downstream water quality due to a decrease of sediment in the runoff. Construction will consist of minor site shaping, excavaton to tie rock into the embankment, and placement of rock rip rap. Typical dimensions used are 2:1 upstream slope, 5:1 downstream slope with a 3' top width, approximately 4' wide within the channel. The rock will be placed in a key way 1' deep with 1:1 side slopes located below the level top section. The typical height is 3' above the existing channel elevation.

Scenario Feature Measure: Number of Structures

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $957.13 **Scenario Cost/Unit:** $957.13

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	$115.06	3	$345.18
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	$17.44	2	$34.88
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$25.06	3	$75.18
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	$35.05	1	$35.05
Materials						
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$20.89	10	$208.90
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 587 - Structure for Water Control

Scenario: #11 - Earth Check

Scenario Description:

This is a structure constructed with compacted earth placed in existing, recently formed and active, minor gullies located near the upper end of a watershed. Multiple structures are generally required, with downstream structures placed to force tail water at an upstream structure. The furthest upstream structure is located to control existing head cutting. Resource concerns addressed included gully erosion and water quality.

Before Situation:

Small gullies are actively forming in locations with reletively small drainage areas that result in increased downstream sedimentation and decreased water quality.

After Situation:

Construction of the structures will result in preventing further head cutting in the channel and improved downstream water quality due to a decrease of sediment in the runoff. Construction will consist of minor site shaping, and placement of earthfill. Typical dimensions used are 3:1 upstream slope, 5:1 downstream slope with a 3' top width, approximately 4' wide within the channel. The typical height is 3' above the existing channel elevation.

Scenario Feature Measure: Number of Structures

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $676.46 **Scenario Cost/Unit:** $676.46

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	$5.22	10	$52.20
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.26	10	$32.60
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	$89.33	2	$178.66
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	$25.06	2	$50.12
Materials						
Turf reinforcement mat	1212	Synthetic turf reinforcement mat with staple anchoring. Includes materials, equipment and labor.	Square Yard	$5.83	18	$104.94
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 587 - Structure for Water Control

Scenario: #12 - Buried Atutomatic Valve

Scenario Description:

A buried inline water control valve constructed of plastic that maintains a desired water surface, controls the direction or rate of flow, or conveys water to address resource concerns. The water surface elevation is automatically controlled. Cost estimate is based on using a commercially available product.

Before Situation:

The landowner wishes to provide a way to control the water surface elevation in tile drained land.

After Situation:

The water surface elevation in the tile drained land is controlled with an automic valve to provide a 1' increase in water level elevation upstream of each valve.

Scenario Feature Measure:

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $908.16 **Scenario Cost/Unit:** $908.16

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$56.49	1	$56.49
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	2	$10.44
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	$17.44	1	$17.44
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	1	$21.04
Materials						
Water Level Control Valve, Inline	2189	Automatic float valve for drainage pipes up to 8"dia. To maintain head differential in flowing agricultural drains.	Each	$629.26	1	$629.26
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	$173.49	1	$173.49

Practice: 590 - Nutrient Management

Scenario: #1 - Basic

Scenario Description:

This scenario describes the implementation of a basic nutrient management system on > = 40 acres of cropland 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 (Right Source of Nutrients, Right Time of Application, Right Rate, and Right Method of Application) 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 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 soil and/or tissue tests (results interpreted by crop consultant) will help establish the adequacy of the plan in meeting crop needs and potentially reducing 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. Nutrient 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: $176.71 **Scenario Cost/Unit:** $4.42

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	$83.47	2	$166.94
Materials						
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	1	$9.77

Practice: 590 - Nutrient Management

Scenario: #2 - Basic Organic

Scenario Description:

The planned Nutrient Management (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, consultant services that provide nutrient recommendations. Records demonstrating implementation of the 4 R's of the NM standard (Right Source of Nutrients, Right Time of Application, Right Rate, and Right Method of Application) 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.

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 (or comparable) 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. 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: $472.61 **Scenario Cost/Unit:** $11.82

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$83.47	5	$417.35
Materials						
Test, Manure Analysis	306	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$45.49	1	$45.49
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	1	$9.77

Practice: 590 - Nutrient Management

Scenario: #3 - Basic with Manure

Scenario Description:

This scenario describes the implementation of a basic nutrient management system on planning units 40 ac or larger of cropland 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 build up of N and P. Payment for implementation is to defray the costs of soil testing, manure testing, 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 the 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 (Right Source of Nutrients, Right Time of Application, Right Rate, and Right Method of Application) 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.

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 and NI - Nitrogen 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 a 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 and manure test 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.

Scenario Feature Measure: Acre of Applied Material

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $472.61 **Scenario Cost/Unit:** $11.82

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$83.47	5	$417.35
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

Practice: 590 - Nutrient Management

Scenario: #6 - Enhanced-Precision

Scenario Description:

This scenario describes the implementation of a precision nutrient management (NM) system on a conventional cropping system where either no, or only basic NM practices, are being applied. 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 proper nutrient recommendations based on LGU (Land Grant University) recommendations or crop removal rates and an associated nutrient budget, recordkeeping, and monitoring on a precision level that includes split applications, NDVI (Normalized Difference Vegetation Index) sensing, and aerial imaging. Records demonstrating implementation of the 4 R's of the NM plan (Right Source of Nutrients, Right Time of Application, Right Rate, and Right Method of Application) 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). 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. Precision nutrient management 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 effects of improper timing or improper rates. Whole fields with like crops and rotation are fertilized the same. Inefficient energy utilization occurs due to traditional methods and forms of fertilizer 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 and conducted in a way 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. Additional nutrient tests including PSNT (pre-sidedress nitrogen test), CSNT (corn stalk nitrate test), chlorophyll meters, spectral analysis, etc., may be used to further refine nutrient applications. 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. Soil testing is completed annually for N and at least once every three years for P-K. 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. 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 (nutrient runoff, leaching) pollution is minimized. These include practices such as use of split applications, slow release nutrients, nitrogen inhibitors, proper timing of application, more appropriate formulations, banding, etc. 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. Application rates of all sources of nutrients are based upon soil tests (soil testing is completed according to LGU (or comparable) recommendations) and either LGU recommendations, crop removal rates, or industry standard. 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 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. Record keeping will document application of nutrients based on the 4 R's (Right Source of Nutrients, Right Time of Application, Right Rate, and Right Method of Application).

Scenario Feature Measure:

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $2,031.37 **Scenario Cost/Unit:** $50.78

Cost Details (by category):

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

Equipment/Installation

Fertilizer, precision application	952	Fertilizer application performed by light bar/GPS navigation system. Includes equipment, power unit and labor costs.	Acre	$10.96	40	$438.40

Labor

Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$83.47	5	$417.35
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	4	$97.08

Materials

Nitrogen-Urease inhibitor	260	Nitrogen-Urease inhibitor	Acre	$12.76	40	$510.40
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$26.14	1	$26.14
Test, Soil Test, Precision, Grid or Zone	300	Includes materials, shipping, labor, and equipment costs.	Each	$13.55	40	$542.00

Practice: 595 - Integrated Pest Management

Scenario: #1 - Basic IPM for Field Crops

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:

Scenario Unit: Acre

Scenario Typical Size: 40

Scenario Cost: $740.57 **Scenario Cost/Unit:** $18.51

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	$24.27	3	$72.81
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	$83.47	8	$667.76

Practice: 595 - Integrated Pest Management

Scenario: #2 - Advanced IPM for Field Crops

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: $1,098.72 **Scenario Cost/Unit:** $27.47

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	4	$97.08
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$83.47	12	$1,001.64

Practice: 595 - Integrated Pest Management

Scenario: #3 - Basic IPM for Fruit and Vegetable Production

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:

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $980.32 **Scenario Cost/Unit:** $98.03

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	6	$145.62
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	$83.47	10	$834.70

Practice: 595 - Integrated Pest Management

Scenario: #4 - Basic IPM for Orchards

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:

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $1,494.75 **Scenario Cost/Unit:** $149.48

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	$83.47	15	$1,252.05
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	10	$242.70

Practice: 595 - Integrated Pest Management

Scenario: #5 - IPM for Small Farms

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:

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $597.90 **Scenario Cost/Unit:** $597.90

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	$83.47	6	$500.82
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	4	$97.08

Practice: 595 - Integrated Pest Management

Scenario: #6 - Risk Prevention IPM

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:

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $1,198.75 **Scenario Cost/Unit:** $119.88

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	$24.27	15	$364.05
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	$83.47	10	$834.70

Practice: 600 - Terrace

Scenario: #1 - Storage - Level or 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 6,000 feet and side slopes of 8:1 or greater in a field with slopes from 2% to 8% constructed in loam soils or similar with regard to workability. A stable outlet is provided in the form of a Grassed Waterway, Underground Outlet or through soil infiltration. 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 6,000 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: 6,000

Scenario Cost: $13,038.82 **Scenario Cost/Unit:** $2.17

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	$159.24	8	$1,273.92
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$125.42	70	$8,779.40
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	$35.05	8	$280.40
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	$25.06	78	$1,954.68
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	1	$492.48
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 600 - Terrace

Scenario: #2 - Non-Storage - Broadbase

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 6:1 upstream and 6:1 downstream slopes measuring 2,600 feet in a field with slopes from 2% to 4% constructed in loam soils or similar with regard to workability. Channel and embankment slopes are farmed. A stable outlet is provided in the form of a Grassed Waterway, Underground Outlet or through soil infiltration. 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 level or gradient, broadbased terraces measuring 2,600 feet in length, 1.4 height, and 6:1 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 slopes of the installed terrace are 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: 2,600

Scenario Cost: $4,582.64 **Scenario Cost/Unit:** $1.76

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	$125.42	7	$877.94
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	$159.24	2	$318.48
Scraper, Self Propelled, 14 CY	2306	Self propelled earthmoving scraper with 14 CY capacity. Does not include labor.	Hour	$259.52	6	$1,557.12
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	$35.05	6	$210.30
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	$25.06	15	$375.90
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	$492.48	2	$984.96
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 600 - Terrace

Scenario: #3 - Storage - Broadbase

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 4,700 feet in a field with slopes from 2% to 8% constructed in loam soils or similar with regard to workability. Channel and embankment slopes are farmed. A stable outlet is provided in the form of a Grassed Waterway, Underground Outlet or through soil infiltration. 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 level or gradient, broadbased terraces measuring 4,700 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 slopes of the installed terrace are 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: 4,700

Scenario Cost: $15,477.64 **Scenario Cost/Unit:** $3.29

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Scraper, Self Propelled, 14 CY	2306	Self propelled earthmoving scraper with 14 CY capacity. Does not include labor.	Hour	$259.52	34	$8,823.68
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	$159.24	4	$636.96
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$125.42	24	$3,010.08
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	$35.05	6	$210.30
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	$25.06	62	$1,553.72
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	2	$984.96
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 600 - Terrace

Scenario: #4 - Broad Base, Rebuild

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 4,700 feet in a field with slopes from 2% to 8% constructed in loam soils or similar with regard to workability. This scenario pertains to the rebuilding of Broad Base Terraces in a field that has previously been terraced and the terrace system has exceeded the design life and requires restoration. Channel and embankment slopes are farmed. A stable outlet is provided in the form of a Grassed Waterway, Underground Outlet or through soil infiltration. 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 level or gradient, broadbased terraces measuring 4,700 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 slopes of the installed terrace are typically farmed. This scenario restores the terrace system in a field that was previously terraced. 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: 4,700

Scenario Cost: $7,823.70 **Scenario Cost/Unit:** $1.66

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Scraper, Self Propelled, 14 CY	2306	Self propelled earthmoving scraper with 14 CY capacity. Does not include labor.	Hour	$259.52	15	$3,892.80
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$125.42	10	$1,254.20
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	$159.24	4	$636.96
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	$35.05	2	$70.10
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$25.06	29	$726.74
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	2	$984.96

Practice: 600 - Terrace

Scenario: #5 - Non-Storage - Grass Back

Scenario Description:

An earthen embankment with channel constructed across the field slope as part of a system to shorten slope lengths and reduce sheet, rill, and gully erosion in a cropped field. The typical installation is a system of terraces (2,500 feet in length) that have one relatively flat (6:1) front slope and one steep (2:1) back slope constructed in a field with slopes steeper than 10% installed in loam soils or similar soils with regard to workability. The steep slope is established to permanent vegetation with the flatter slope farmed. The terrace is typically constructed at a gradient and is not designed to temporarily store water. 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 measuring 2,500 feet in length and approximately 2 C.Y. of earthwork per L.F. 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: $8,386.68 **Scenario Cost/Unit:** $3.35

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	$125.42	42	$5,267.64
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	$159.24	6	$955.44
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	$35.05	6	$210.30
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	$25.06	48	$1,202.88
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	1	$492.48
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 600 - Terrace

Scenario: #6 - Storage - Grass Back

Scenario Description:

An earthen embankment with channel constructed across the field slope as part of a system to shorten slope lengths and reduce sheet, rill, and gully erosion in a cropped field. The typical installation is a system of terraces (2,500 feet in length) that have one relatively flat (6:1) front slope and one steep (2:1) back slope constructed in a field with slopes steeper than 10% installed in loam soils or similar soils with regard to workability. The steep slope is established to permanent vegetation with the flatter slope farmed. Either all, or a portion of the terrace, is constructed to temporarily store water, which is then released with an underground outlet or by other means. 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 measuring 2,500 feet in length and approximately 3 C.Y. of earthwork per L.F. 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: $11,546.76 **Scenario Cost/Unit:** $4.62

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$125.42	63	$7,901.46
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	$159.24	6	$955.44
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	$25.06	69	$1,729.14
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$35.05	6	$210.30
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	$492.48	1	$492.48
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 600 - Terrace

Scenario: #7 - Non-Storage - Narrow Base

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 and 4,500' length in a field with slopes exceeding 8% constructed in loam soils or similar in regards to workability. The terrace is typically constructed at a gradient and is not designed to temporarily store water. 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 measuring 4,500 feet in length and approximately 1.5 C.Y. of earthwork per L.F. is installed with spacing designed to intercept flow of water and shorten slope length to reduce erosion to acceptable levels. Work is typically done with dozer. 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: 4,500

Scenario Cost: $13,613.90 **Scenario Cost/Unit:** $3.03

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	$159.24	3	$477.72
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$188.08	56	$10,532.48
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$35.05	4	$140.20
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	$25.06	59	$1,478.54
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	2	$984.96

Practice: 600 - Terrace

Scenario: #8 - Storage - Narrow Base

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 and 4,500' length in a field with slopes exceeding 10% constructed in loam soils or similar in regards to workability. Either all, or a portion of the terrace, is constructed to temporarily store water, which is then released with an underground outlet or by other means. 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 measuring 4,500 feet in length and approximately 1.6 C.Y. of earthwork per L.F. is installed with spacing designed to intercept flow of water and shorten slope length to reduce erosion to acceptable levels. Work is typically done with dozer. 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: 4,500

Scenario Cost: $14,650.76 **Scenario Cost/Unit:** $3.26

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	$188.08	60	$11,284.80
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	$159.24	4	$636.96
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	$35.05	4	$140.20
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	$25.06	64	$1,603.84
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	2	$984.96

Practice: 600 - Terrace

Scenario: #9 - Narrow Base, Rebuild

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. This scenario pertains to the rebuilding of Narrow Base Terraces in a field that has previously been terraced and the terrace system has exceeded the design life and requires restoration. The typical installation is a system of narrow base terraces with 2:1 slopes, 4,500' length, and 2.5' height in a field with slopesfrom 6 to 12% constructed in loam soils or similar in regards to workability. A stable outlet is provided in the form of a Grassed Waterway, Underground Outlet or through soil infiltration. 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 4,500 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 typically done with dozer. This scenario restores the terrace system in a field that was previously terraced. 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: 4,500

Scenario Cost: $5,940.86 **Scenario Cost/Unit:** $1.32

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	$159.24	3	$477.72
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$188.08	20	$3,761.60
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	$25.06	23	$576.38
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$35.05	4	$140.20
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	$492.48	2	$984.96

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: $466.88 **Scenario Cost/Unit:** $4.67

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	$42.27	10	$422.70

Practice: 610 - Salinity and Sodic Soil Management

Scenario: #2 - Soil Management (non-Irrigated) (FI)

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 obvious saline areas (seeps) in the field. The recharge area of the seep must be determined before the extents of the treatment can be planned. Analysis of the soil conditions in areas in and around the affected saline areas (2, five acres seeps) has not been completed. The remaining 90 acres of the field will be assessed to determine groundwater gradients and extents of the recharge area.

After Situation:

A determination of extent of recharge area has been made. The area to be treated has been identified (10 acres). Treatments include: soil testing to determine the salt concentrations, establishing permanent vegetative cover in saline areas (342), modify the crop rotation to increase seasonal water use (328), and reduced tillage practices (either 345 or 329). The producer has developed and is carrying out a Salinity and Sodic Soil Management Plan. The water cycle is balanced to minimize upward movement of salts to the surface, reducing evaporation, resulting in increase productivity across the field Ten acres of dryland wheat will be replaced with grass due to the saline/sodic conditions..

Scenario Feature Measure: Acres included in Salinity and Sodic Soil Management Plan

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $1,769.98 **Scenario Cost/Unit:** $17.70

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, Hay, General Grass	2122	General Grass Hay is Primary Land Use	Ton	$41.38	-10	($413.80)
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$168.98	10	$1,689.80
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.27	10	$422.70
Materials						
Test, Soil Test, Precision, Grid or Zone	300	Includes materials, shipping, labor, and equipment costs.	Each	$13.55	2	$27.10

Practice: 610 - Salinity and Sodic Soil Management

Scenario: #3 - 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. Sampling on a 3-5 year interval is recommended if conditional soils are irrigated or marginal irrigation water is used.. Monitor (sample) one site per 40 acres of each major soil. Monitoring prodedures include; GPS reference all sites, duplicate (2 samples) all sites of each major soil, sample after harvest, sampled to a depth of 6 feet and examined to 10 feet noting water table depth. Also sample each genetic soil horizon or portion no greater than 12 inches. Monitoring should be done by or under the supervision of an experienced soil scientist.
Resource Concerns: Soil Quality Degradation - Concentration of salts or other chemicals, and Water Quality Degradation- Excessive salts in surface and ground waters.
Associated Practices: 328-Conservation Crop Rotation; 449-Irrigation Water Management; and 590-Nutrient Management.

Before Situation:

Salintiy and or Sodic conditions have developed in the root zone of a 100 acre irrigated cropland field resulting in decreased soil quality, plant health problems, and yield reductions.

After Situation:

Producer conducts soil conductivity and salinity test to determine the root zone depth of water application necessary for flushing accumulated salts and maintaining a proper salt balance. Producer conducts irrigation suitability test of water supply results to determine suitability of applied water for irrigation and additional irrigation volumes needed for leaching. Routine periodic checks of water EC will be conducted by producer to monitor for water salinity which might require changes to Salinity and Sodic Soil Management Plan. The Salinity and Sodic Soil Management Plan is carried out employing soil and water testing and as applicable changes in Irrigation Water Management (449), Conservation Crop Rotation (328), tillage, and use of soil amendments. The producer has developed and is carrying out a Salinity and Sodic Soil Management Plan resulting in improved soil quality and plant health.

Scenario Feature Measure: Acres included in Salinity and Sodic Soil Management Plan

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $1,304.57 **Scenario Cost/Unit:** $13.05

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	$42.27	10	$422.70
Materials						
Testing, soil sampling and EC analysis, bore hole	2055	Collecting and testing 5 soil samples per 60" bore hole. Inclueds EC measurements. Includes equipment and labor.	Hour	$199.41	4	$797.64
Test, Standard Water Test, Irrigation Suitability	310	Irrigation water suitability lab analysis. Includes pH, alkalinity, carbonates/bicarbonates, EC, dissolved solids, B, Cl, Ca, Mg, Na, SAR, and hardness.	Each	$40.05	1	$40.05

Practice: 610 - Salinity and Sodic Soil Management

Scenario: #4 - Soil Management (Irrigated) (FI)

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. Sampling on a 3-5 year interval is recommended if conditional soils are irrigated or marginal irrigation water is used. Monitor (sample) one site per 40 acres of each major soil. Monitoring prodedures include; GPS reference all sites, duplicate (2 samples) all sites of each major soil, sampled after harvest, to a depth of 6 feet and examined to 10 feet noting water table depth. Also sample each genetic soil horizon or portion no greater than 12 inches. Monitoring should be done by or under the supervision of an experienced soil scientist.
Resource Concerns: Soil Quality Degradation - Concentration of salts or other chemicals, and Water Quality Degradation- Excessive salts in surface and ground waters.
Associated Practices: 328-Conservation Crop Rotation; Residue Managements (either 345 or 329); 449-Irrigation Water Management; and 590-Nutrient Management.

Before Situation:

Saline and/or sodic conditions have developed in the root zone of a 160 acre irrigated cropland field resulting in decreased soil quality, plant health and vigor and yield reductions. Irrigation water quality (levels of salts and sodium) is unknown, water is applied in excess of crop need and the majority of soils in the field suitable for irrigation. Crop rotation includes; corn, soybean and spring wheat. Affected area equals 20 acres.

After Situation:

Producer conducts soil conductivity and salinity test to determine the root zone depth of water application necessary for flushing accumulated salts and maintaining a proper salt balance. Producer conducts irrigation suitability test of water supply results to determine suitability of applied water for irrigation and additional irrigation volumes needed for leaching. Routine periodic checks of water EC will be conducted by producer to monitor for water salinity which might require changes to Salinity and Sodic Soil Management Plan. The Salinity and Sodic Soil Management Plan is carried out employing soil and water testing and as applicable changes in Irrigation Water Management (449), Conservation Crop Rotation (328), Residue Management (345 or 329) and use of soil amendments (where applicable). The producer is implementing a Salinity and Sodic Soil Management Plan resulting in improved soil quality and plant health. Twenty acres of irrigated cropland will be replace with grass due to the saline/sodic conditions.

Scenario Feature Measure: Acres included in Salinity and Sodic Soil Management Plan

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $6,809.87 **Scenario Cost/Unit:** $68.10

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
Foregone Income						
FI, Hay, General Grass	2122	General Grass Hay is Primary Land Use	Ton	$41.38	-40	($1,655.20)
FI, Soybeans Irrigated	1962	Irrigated Soybeans is Primary Crop	Acre	$315.01	10	$3,150.10
FI, Corn Irrigated	1960	Irrigated Corn is Primary Crop	Acre	$401.04	10	$4,010.40
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.27	10	$422.70
Materials						
Testing, soil sampling and EC analysis, bore hole	2055	Collecting and testing 5 soil samples per 60" bore hole. Inclueds EC measurements. Includes equipment and labor.	Hour	$199.41	4	$797.64
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: 614 - Watering Facility

Scenario: #2 - Steel Tank

Scenario Description:

A permanent watering facility for livestock constructed of galvanized steel with 1,200 gallon capacity that stores adequate quantity and quality of water for storage and or direct drinking access. All watering facilities will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation. The watering facility will be placed on a gravel or compacted earthen base. This watering facility will address the resource concerns of inadequate supply of water for livestock and or wildlife, habitat degradation, water quality, and undesirable plant productivity and health.

Before Situation:

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.

After Situation:

A permanent watering facility with a capacity of 1,200 gallons constructed of galvinized steel is installed with all tank materials, tank plumbing and float valve, to provide adequate water storage capacity to ensure an adequate supply and quality of water for livestock or wildlife for storage and or direct drinking access and provides improved plant productivity and health, water quality, and habit. 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 gravel or compacted earth foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 1,200

Scenario Cost: $1,967.77 **Scenario Cost/Unit:** $1.64

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	2	$87.08
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	2	$112.98
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	4	$69.76
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	4	$84.16
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$15.37	1.5	$23.06
Tank, Galvanized Steel Livestock, > 300 - 1,000 gallon	1068	Includes tank materials and float valve	Gallon	$0.75	1200	$900.00
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.90	3	$23.70
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.86	30	$25.80
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.47	2	$48.94
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	1	$76.41

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 614 - Watering Facility

Scenario: #3 - Rubber Tire Tank on Earth

Scenario Description:

A permanent watering facility for livestock constructed using a rubber equipment tire with concrete plug with 1,200 gallon capacity placed on a gravel or compacted earth foundation that stores adequate quantity and quality of water for storage and or direct drinking access. All watering facilities will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation. This watering facility will address the resource concerns of inadequate supply of water for livestock, habitat degradation, water quality, and undesirable plant productivity and health.

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 during the entire year in the Northern Plains Region, where water is not available in sufficient quantities at specific locations, and habitat, water quality, plant productivity and health needs to be improved.

After Situation:

A permanent watering facility with a capacity of greater than 1,200 gallons constructed using a rubber equipment tire with concrete plug is installed on a gravel or compacted earth foundation with all tank materials, tank plumbing and float valve, to provide adequate water storage capacity to ensure an adequate supply and quality of water for livestock or wildlife for storage and or direct drinking access and provides improved plant productivity and health, water quality, and habitat. All watering facilities are constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation and placed on a properly prepared foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as appropriate.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 1,200

Scenario Cost: $1,899.47 **Scenario Cost/Unit:** $1.58

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	1	$43.54
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	1	$56.49
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	$101.26	0.25	$25.32
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	2	$42.08
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	2	$34.88
Materials						
Tank, Tire, 10' diameter	287	Tire, includes material cost for tank and shipping. Labor and other appurtenance costs not included.	Each	$983.38	1	$983.38
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.47	2	$48.94
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$15.37	1.5	$23.06

Materials

Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.90	3	$23.70
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.86	30	$25.80
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	1	$76.41

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 614 - Watering Facility

Scenario: #4 - Fiberglass Tank on Earth

Scenario Description:

A permanent watering facility for livestock constructed using a fiberglass tank with 1,200 gallon capacity placed on a gravel or compacted earth foundation that stores adequate quantity and quality of water for storage and or direct drinking access. All watering facilities will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation. This watering facility will address the resource concerns of inadequate supply of water for livestock, habitat degradation, water quality, and undesirable plant productivity and
health.

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 during the entire year in the Northern Plains Region, where water is not available in sufficient quantities at specific locations, and habitat, water quality, plant productivity and health needs to be improved.

After Situation:

A permanent watering facility with a capacity of greater than 1,200 gallons constructed using a fiberglass tank is installed on a gravel or compacted earth foundation with all tank materials, tank plumbing and float valve, to provide adequate water storage capacity to ensure an adequate supply and quality of water for livestock or wildlife for storage and or direct drinking access and provides improved plant productivity and health, water quality, and habitat. All watering facilities are constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation and placed on a properly prepared foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as
appropriate.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 1,200

Scenario Cost: $5,393.92 **Scenario Cost/Unit:** $4.49

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	4	$225.96
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	4	$174.16
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	$17.44	6	$104.64
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	10	$210.40
Materials						
Tank, Fiberglass, 10' diameter	2526	Fiberglass, includes material cost for tank and shipping. Labor and other appurtence costs not included.	Each	$3,964.97	1	$3,964.97
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	1	$76.41
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.47	2	$48.94
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.86	30	$25.80
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.90	3	$23.70

Materials

Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$15.37	1.5	$23.06

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 614 - Watering Facility

Scenario: #5 - Rubber Tire Tank on Concrete

Scenario Description:

A permanent watering facility for livestock constructed using a rubber equipment tire with concrete plug with 1,200 gallon capacity placed on a concrete foundation that stores adequate quantity and quality of water for storage and or direct drinking access. All watering facilities will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation. This watering facility will address the resource concerns of inadequate supply of water for livestock, habitat degradation, water quality, and undesirable plant productivity and health.

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.

After Situation:

A permanent watering facility with a capacity of greater than 1,200 gallons constructed using a rubber equipment tire with concrete plug is installed on a concrete foundation with all tank materials, tank plumbing and float valve, to provide adequate water storage capacity to ensure an adequate supply and quality of water for livestock or wildlife for storage and or direct drinking access and provides improved plant productivity and health, water quality, and habitat. All watering facilities are constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation and placed on a properly prepared foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as appropriate.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 1,200

Scenario Cost: $2,114.43 **Scenario Cost/Unit:** $1.76

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	$101.26	0.25	$25.32
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	$146.94	1.5	$220.41
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	1	$56.49
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	1	$43.54
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	2	$42.08
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	2	$34.88
Materials						
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.90	3	$23.70

Materials

Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.86	30	$25.80
Tank, Tire, 10' diameter	287	Tire, includes material cost for tank and shipping. Labor and other appurtenance costs not included.	Each	$983.38	1	$983.38
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.47	2	$48.94
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	1	$76.41
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	0.8	$17.60

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 614 - Watering Facility

Scenario: #6 - Fiberglass Tank on Concrete

Scenario Description:

A permanent watering facility for livestock constructed using a fiberglass tank with 1,200 gallon capacity placed on a concrete foundation that stores adequate quantity and quality of water for storage and or direct drinking access. All watering facilities will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation. This watering facility will address the resource concerns of inadequate supply of water for livestock, habitat degradation, water quality, and undesirable plant productivity and health.

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.

After Situation:

A permanent watering facility with a capacity of greater than 1,200 gallons constructed using a fiberglass tank is installed on a concrete foundation with all tank materials, tank plumbing and float valve, to provide adequate water storage capacity to ensure an adequate supply and quality of water for livestock or wildlife for storage and or direct drinking access and provides improved plant productivity and health, water quality, and habitat. All watering facilities are constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation and placed on a properly prepared foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as appropriate.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 1,200

Scenario Cost: $5,608.87 **Scenario Cost/Unit:** $4.67

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	$146.94	1.5	$220.41
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	4	$225.96
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	4	$174.16
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	10	$210.40
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	$17.44	6	$104.64
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	0.8	$17.60
Tank, Fiberglass, 10' diameter	2526	Fiberglass, includes material cost for tank and shipping. Labor and other appurtence costs not included.	Each	$3,964.97	1	$3,964.97
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.90	3	$23.70

Materials

Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.86	30	$25.80
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.47	2	$48.94
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	1	$76.41

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 614 - Watering Facility

Scenario: #7 - Steel Rim Tank - Bottomless

Scenario Description:

A permanent watering facility for livestock constructed of a 30' diameter galvanized steel rim with impermeable membrane or bentonite treated earthen bottom with 10,500 gallons of capacity that stores adequate quantity and quality of water for storage and or direct drinking access. All watering facilities will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation. This watering facility will address the resource concerns of inadequate supply of water for livestock, habitat degradation, water quality, and undesirable plant productivity and health.

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.

After Situation:

A permanent watering facility constructed of a galvanized steel rim with impermeable membrane or bentonite treated earthen bottom with a capacity of 10,500 gallons is installed with all tank materials, tank plumbing and float valve, to provide adequate water storage capacity to ensure an adequate supply and quality of water for livestock or wildlife for storage and or direct drinking access and provides improved plant productivity and health, water quality, and habitat. All watering facilities are constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation and placed on a properly prepared foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns must be protected by using Heavy Use Area Protection (561) as appropriate.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 10,500

Scenario Cost: $3,827.06 **Scenario Cost/Unit:** $0.36

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	3	$130.62
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	3	$169.47
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	$17.44	6	$104.64
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	6	$126.24
Materials						
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.86	30	$25.80
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.90	3	$23.70
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.47	2	$48.94
Bentonite	41	Bentonite, includes materials (50# bag)	Each	$10.64	6	$63.84
Poly film, 6 mil.	245	6 mil, polyethylene, black	Square Foot	$0.08	1414	$113.12

Materials

Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	19.7	$433.40
Tank, Galvanized Steel Bottomless Livestock, > 6,000 gallon	1070	Includes tank materials, shipping, and float valve, no liner	Gallon	$0.19	10500	$1,995.00
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	1	$76.41

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 614 - Watering Facility

Scenario: #8 - Steel Rim Tank - Concrete Base

Scenario Description:

A permanent watering facility for livestock constructed of a 20' diameter galvanized steel rim set in a reinforced concrete base with 4,700 gallons of capacity that stores adequate quantity and quality of water for storage and or direct drinking access. All watering facilities will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation. This watering facility will address the resource concerns of inadequate supply of water for livestock, habitat degradation, water quality, and undesirable plant productivity and
health.

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.

After Situation:

A permanent watering facility constructed of a galvanized steel rim set in a reinforced concrete base with a capacity of 10,500 gallons is installed with all tank materials, tank plumbing and float valve, to provide adequate water storage capacity to ensure an adequate supply and quality of water for livestock or wildlife for storage and or direct drinking access and provides improved plant productivity and health, water quality, and habitat. All watering facilities are constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation and placed on a properly prepared foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns must be protected by using Heavy Use Area Protection (561) as
appropriate.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 4,700

Scenario Cost: $5,168.46 **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	$146.94	11.2	$1,645.73
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	4	$225.96
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	10	$435.40
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	$35.05	4	$140.20
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	14	$294.56
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	12	$209.28
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	8.4	$184.80
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	1	$76.41

Materials

Tank, Galvanized Steel Bottomless Livestock, ≤ 6,000 gallon	1069	Includes tank materials, shipping, and float valve, no liner	Gallon	$0.28	4700	$1,316.00
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.86	60	$51.60
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.47	2	$48.94
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.90	3	$23.70

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 614 - Watering Facility

Scenario: #9 - Water Fountain

Scenario Description:

A permanent watering facility consisting of a commercially available water fountain for livestock set on a concrete base to be installed with all tank materials, and plumbing, to provide adequate water supply capacity to ensure an adequate quality of water for livestock and direct drinking access and provide improved plant productivity and health, water quality, and habitat. All watering facilities are constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation and placed on a properly prepared foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as appropriate.

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.

After Situation:

A permanent watering facility consisting of a commercially available water fountain for livestock set on a concrete base is installed with tank plumbing to to ensure an adequate supply and quality of water for livestock or wildlife for direct drinking access and provides improved plant productivity and health, water quality, and habitat. All watering facilities are constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation and placed on a properly prepared foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as appropriate.

Scenario Feature Measure: Number of Tanks Installed

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $1,664.48 **Scenario Cost/Unit:** $1,664.48

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$146.94	1.6	$235.10
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	2	$87.08
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	$17.44	2	$34.88
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	2	$42.08
Materials						
Tank, Freeze Proof, 4 hole	281	Tank, Freeze Proof with 4 drinking holes. Includes materials and shipping.	Each	$913.39	1	$913.39
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	1	$76.41
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	0.8	$17.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 614 - Watering Facility

Scenario: #10 - Precast Concrete Tank

Scenario Description:

A permanent watering facility with a capacity of 500 gallons constructed of PreCast Concrete is installed with all tank materials, plumbing and float valve, to provide adequate water storage capacity to ensure an adequate supply and quality of water for livestock for storage and or direct drinking access and provide improved plant productivity and health, water quality, and habitat. All watering facilities are constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation and placed on a properly prepared foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as appropriate.

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.

After Situation:

A permanent watering facility with a capacity of 500 gallons is constructed of PreCast concrete, tank plumbing and float valve, to provide adequate water storage capacity to ensure an adequate supply and quality of water for livestock or wildlife for storage and or direct drinking access and provides improved plant productivity and health, water quality, and habitat. All watering facilities are constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation and placed on a properly prepared foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as appropriate.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 500

Scenario Cost: $1,796.19 **Scenario Cost/Unit:** $3.59

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	$56.49	1	$56.49
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	1	$43.54
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	2	$42.08
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	2	$34.88
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$15.37	0.9	$13.83
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	1	$76.41
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.47	1	$24.47
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.86	20	$17.20
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.90	3	$23.70

Materials

Tank, Concrete, 500 gallon	1049	Concrete tank for water storage, with riser and lid. Includes materials and delivery	Each	$947.71	1	$947.71

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 614 - Watering Facility

Scenario: #11 - Insulated Tank with Cover

Scenario Description:

A permanent watering facility for livestock constructed using a rubber equipment tire with concrete plug or fiberglass tank with 1,200 gallon capacity placed on a gravel or compacted earth foundation that stores adequate quantity and quality of water for storage and or direct drinking access. This scenario includes an insulated cover for the watering facility. All watering facilities will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation. This watering facility will address the resource concerns of inadequate supply of water for livestock, habitat degradation, water quality, and undesirable plant productivity and health.

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.

After Situation:

A permanent insulated watering facility with a capacity of greater than 1,200 gallons constructed using a rubber equipment tire with concrete plug or fiberglass tank is installed on a gravel or compacted earth foundation to provide livestock water year-round with all tank materials, tank plumbing and float valve, to provide adequate water storage capacity to ensure an adequate supply and quality of water for livestock or wildlife for storage and or direct drinking access and provides improved plant productivity and health, water quality, and habitat. All watering facilities are constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation and placed on a properly prepared foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as appropriate.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 1,200

Scenario Cost: $6,694.32 **Scenario Cost/Unit:** $5.58

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	4	$225.96
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	4	$174.16
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	$17.44	10	$174.40
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	10	$210.40
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic yard	$15.37	1.5	$23.06
Tank, Fiberglass Cover	1076	Includes materials and shipping only.	Square Foot	$16.41	78.5	$1,288.19
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.90	3	$23.70
Freeze Proof Hydrant, ≤ 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$76.41	1	$76.41
Tank, Fiberglass, 10' diameter	2526	Fiberglass, includes material cost for tank and shipping. Labor and other appurtence costs not included.	Each	$3,964.97	1	$3,964.97

Materials

Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.86	20	$17.20

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 614 - Watering Facility

Scenario: #12 - Enclosed Storage Tank

Scenario Description:

A permanent below ground storage facility to provide water for a watering facility for livestock, wildlife and/or other conservation practices. All water storage facilities will be constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation. This watering facility will address the resource concerns of inadequate supply of water for livestock and or wildlife, habitat degradation, water quality, and undesirable plant productivity and health.

Before Situation:

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.

After Situation:

A permanent water storage facility using a below ground concrete tank is installed with all tank materials, tank plumbing and float valve, to provide adequate water storage capacity to ensure an adequate supply and quality of water for livestock, wildlife or other conservation practices for storage and/or direct drinking access and provides improved plant productivity and health, water quality, and habitat. All water storage facilities are constructed from approved durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation and placed on a properly prepared foundation with required plumbing. All needed pipelines are installed using Livestock Pipeline (516). Any needed vegetation of disturbed areas will use Critical Area Planting (342). All collectors or catchments for collecting precipitation will be addressed by using Water Harvesting Catchment (636). Any needed water source installation will use Water Well (642), Pumping Plant (533), Spring Development (574), or Livestock Pipeline (516) as appropriate. Areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns will be protected by using Heavy Use Area Protection (561) as appropriate.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 5,000

Scenario Cost: $8,074.61 **Scenario Cost/Unit:** $1.61

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$192.34	4	$769.36
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.80	4	$271.20
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	$35.05	4	$140.20
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	$17.44	16	$279.04
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$25.06	8	$200.48
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	1.3	$28.99
Tank, Concrete, 2500 gallon	1055	Concrete tank for water storage, with riser and lid. Includes materials and delivery.	Each	$3,180.70	2	$6,361.40
Tank, Float Valve Assembly	1077	Float Valve, Stem, Swivel, Float Ball	Each	$23.94	1	$23.94

Practice: 620 - Underground Outlet

Scenario: #6 - 6 inch or smaller w Riser

Scenario Description:

Install 400 feet of 4" & 6" approved plastic pipe to convey stormwater from one location to a suitable and stable outlet in non-pressure flow conditions. Trench excavation is 48" deep and 12" wide. Costs include 4" and 6" HDPE corrugated single wall plastic tubing, 6" Perforated PVC Riser Inlet, labor to install pipe, trench excavation, trench backfill, and rodent guard. 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: 400

Scenario Cost: $1,681.09 **Scenario Cost/Unit:** $4.20

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	$5.22	6	$31.32
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.26	400	$504.00
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	$35.05	1	$35.05
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	$17.44	8	$139.52
Materials						
Pipe, HDPE, 6", CPT, Single Wall	1242	Pipe, Corrugated Plastic Tubing, Single Wall, 6" diameter - ASTM F405. Material cost only.	Foot	$1.12	200	$224.00
Inlet, riser, 6"	1261	Riser, polymer, complete vertical perforated UGO inlet with Tee, orifice plate if needed, 6" diameter. Materials only.	Each	$69.66	2	$139.32
Pipe, HDPE, 4", PCPT, Single Wall	1270	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 4" diameter - ASTM F405. Material cost only.	Foot	$0.46	200	$92.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 620 - Underground Outlet

Scenario: #7 - 8 inch - 10 inch w Riser

Scenario Description:

Install 400 feet of 8" and 10" approved plastic pipe (PVC or Dual Wall HDPE) to convey stormwater from one location to a suitable and stable outlet in non-pressure flow conditions and when multiple practices drain into it. Trench Excavation is 48" deep and 24" wide. Typical costs include 8" and 10" PVC pipe, 10" riser inlet , labor to install pipe, trench excavation, trench backfill, and rodent guard. 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: 400

Scenario Cost: $5,603.37 **Scenario Cost/Unit:** $14.01

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	$2.85	400	$1,140.00
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	10	$52.20
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	$35.05	1	$35.05
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	$17.44	8	$139.52
Materials						
Pipe, PVC, 8", SDR 35	994	Materials: - 8" - PVC - SDR 35 - ASTM D3034	Foot	$6.83	200	$1,366.00
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
Pipe, PVC, 10", SDR 35	1251	Pipe, PVC, SDR 35, 10" Diameter - ASTM D3034. Material cost only.	Foot	$10.69	200	$2,138.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 620 - Underground Outlet

Scenario: #9 - 12 inch - 18 inch w Riser

Scenario Description:

Install 400 feet of 12" and 18" approved plastic pipe (PVC or Dual Wall HDPE) to convey stormwater from one location to a suitable and stable outlet in non-pressure flow conditions and when multiple practices drain into it. Trench Excavation is 58" deep and 28" wide. Costs include 12" and 18" HDPE pipe, 10" Perforated PVC Riser Inlet, labor to install pipe, trench excavation, trench backfill, and rodent guard. 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: 400

Scenario Cost: $5,903.39 **Scenario Cost/Unit:** $14.76

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	$5.22	14	$73.08
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$2.85	400	$1,140.00
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	$17.44	8	$139.52
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$35.05	1	$35.05
Materials						
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
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	$11.24	200	$2,248.00
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	$7.29	200	$1,458.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 632 - Waste Separation Facility

Scenario: #1 - Mechanical Separator

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 screw press) 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: $32,605.86 **Scenario Cost/Unit:** $32,605.86

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	$146.94	7.5	$1,102.05
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	$17.44	32	$558.08
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	16	$388.32
Materials						
Vibratory or Rotating Screen	1948	Vibratory or Rotating Screen, includes materials, shipping and equipment.	Each	$30,044.58	1	$30,044.58
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	3.7	$81.40
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	$173.49	1	$173.49
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 632 - Waste Separation Facility

Scenario: #2 - Earthen Settling Structure with picket screen outlet

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 wide by 200 ft long by 3 ft deep)(estimate 0.5' of freeboard above the design storage), 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: $8,051.49 **Scenario Cost/Unit:** $0.27

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	$146.94	12	$1,763.28
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	1000	$3,970.00
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	$17.44	8	$139.52
Materials						
Weeping Wall	1765	Weeping wall or picket screen structure for solid settling basin. Materials only.	Foot	$52.98	24	$1,271.52
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	9.9	$217.80
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	$173.49	1	$173.49
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 632 - Waste Separation Facility

Scenario: #3 - Earthen settling structure with pipe outlet

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 wide by 200 ft long by 3 ft deep, with one screening outlet structure) (estimate 0.5' of freeboard above the design storage) 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: $7,156.27 **Scenario Cost/Unit:** $0.24

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	$146.94	3.3	$484.90
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	1000	$3,970.00
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	$17.44	16	$279.04
Materials						
Pipe, PVC, 12", SCH 80	1352	Materials: - 12" - PVC - SCH 80 - ASTM D1785	Foot	$24.72	60	$1,483.20
Wire Mesh Screen, galvanized, 1/16 in	1229	Wire Mesh Screen, galvanized, 1/16 inch grid spacing. Materials only.	Square Foot	$4.07	32	$130.24
Post, Wood, CCA treated, 6" x 8'	12	Wood Post, End 6" X 8', CCA Treated. Includes materials and shipping only.	Each	$14.96	4	$59.84
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	$1.60	37.3	$59.68
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$173.49	1	$173.49

Practice: 632 - Waste Separation Facility

Scenario: #4 - Earthen settling structure with concrete bottom and pipe outlet

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 with a 30 ft wide by 200 ft long bottom area, 5 ft deep with 3:1 sideslopes. 4.0' depth is used for storage volume computation with 1.0' freeboard. One screening outlet structure is 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: 35,800

Scenario Cost: $22,415.35 **Scenario Cost/Unit:** $0.63

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	$146.94	95.9	$14,091.55
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	1000	$3,970.00
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	$17.44	16	$279.04
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	74.1	$1,652.43
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	$1.60	37.3	$59.68
Wire Mesh Screen, galvanized, 1/16 in	1229	Wire Mesh Screen, galvanized, 1/16 inch grid spacing. Materials only.	Square Foot	$4.07	32	$130.24
Post, Wood, CCA treated, 6" x 8'	12	Wood Post, End 6" X 8', CCA Treated. Includes materials and shipping only.	Each	$14.96	4	$59.84
Pipe, PVC, 12", SCH 80	1352	Materials: - 12" - PVC - SCH 80 - ASTM D1785	Foot	$24.72	60	$1,483.20
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	$173.49	1	$173.49
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 632 - Waste Separation Facility

Scenario: #5 - Concrete Settling Structure with picket screen outlet

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

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 40 ft long with 6 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: 4,000

Scenario Cost: $9,343.27 **Scenario Cost/Unit:** $2.34

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	$146.94	12.3	$1,807.36
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	$319.94	14.8	$4,735.11
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	$2.14	100	$214.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	50	$198.50
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	$17.44	24	$418.56
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	9.9	$220.77
Weeping Wall	1765	Weeping wall or picket screen structure for solid settling basin. Materials only.	Foot	$52.98	20	$1,059.60
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$173.49	1	$173.49

Practice: 632 - Waste Separation Facility

Scenario: #6 - Concrete Sand Settling Lane

Scenario Description:

A concrete structure, a concrete lane with curbs, used to capture and separate a portion of the solids, mainly sand, from a liquid stream from a confinement facility. Removes as portion of the solids to facilitate waste handling and to address water quality concerns.

Associated practices include Nutrient Management (590), Composting Facility (317), Anaerobic Digester (366), Waste Storage Facility (313), Waste 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 (22 ft wide by 740 ft long by 5 in. thick) constructed around or at a livestock feeding operation. A 20' long opening in wall is allowed as an outlet for this lane. 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: 16,280

Scenario Cost: $77,703.43 **Scenario Cost/Unit:** $4.77

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$146.94	301.5	$44,302.41
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	$319.94	72.1	$23,067.67
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	$2.14	2412	$5,161.68
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	201	$4,482.30
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$173.49	1	$173.49

Practice: 634 - Waste Transfer

Scenario: #1 - Concrete Channel

Scenario Description:

Installation of a concrete channel that consists of a slab with curb and footing on each side of the slab for the entire length of the channel to enable the facility manager to direct liquid waste to an existing collection basin and/or waste storage facility.

Water quality concerns will be addressed by preventing liquid waste from entering surface waters, and to facilitate timely land application of manure and wastewater at agronomic rates according to the CNMP. This scenario addresses the potential for surface water and groundwater quality degradation.

Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling.

Before Situation:

Current facility operations are allowing liquid waste to flow uncontrolled during periods of precipitation events or cleaning operations such that water resources can be contaminated.

After Situation:

Typical installation of a 12 foot wide 100' long concrete channel that consists of a 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: $9,945.74 **Scenario Cost/Unit:** $8.29

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	$319.94	11	$3,519.34
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.80	8	$542.40
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	$146.94	22	$3,232.68
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	$2.46	4	$9.84
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	$25.06	8	$200.48
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	$17.44	40	$697.60
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	$35.05	24	$841.20
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	$15.37	26	$399.62

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 634 - Waste Transfer

Scenario: #2 - Gravity flow, less than or equal to 18" diameter conduit

Scenario Description:

Gravity flow conduit is typically a large diameter water tight sanitary sewer pipe used to transfer manure by gravity from one location to another. The gravity transfer system typically consists of an existing inlet structure or hopper with attachment to a smooth interior large diameter pipe. The pipe conveys the slurry waste liquid between the waste collection point and a manure storage or waste treatment structure. Adequate head on the pipe flow or change in elevation must be available for the gravity system to function and should be evaluated by the design engineer. This practice includes the pipe attachment to an existing inlet structure and all other fittings, trench excavation and backfill, labor and a equipment for installation.

This conduit is part of a manure transfer system for a planned waste management or comprehensive nutrient management plan. This scenario addresses the transport of liquid waste to a waste storage or treatment facility to prevent a water quality resource concern of excessive nutrients/organics and harmful levels of pathogens in surface water and/or excessive nutrients/organics in ground water.

Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling.

Before Situation:

An area of waste production is separated from the waste storage facility and current operations may cause water quality concerns as it is not efficient in transporting the waste to the storage. The site has a change in elevation between production area and treatment or storage structure that is adequate to provide sufficient head for a gravity flow conduit to transport the slurry waste liquid stream.

After Situation:

Install a 150 foot long 18" diameter water tight 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 18" sewer grade pipe that will gravity flow to an outlet at a site of manure treatment or storage. This scenario includes the pipe, inlet, outlet, couplers and all other fittings, trench excavation, pipe bedding and backfill. The site should be evaluated by the designing engineer to make sure there is adequate elevation drop before contracting. If required an inlet structure may be contracted under another scenario.

The transfer conduit will provide collection and containment of the manure slurry, thereby protecting water quality resources.

Scenario Feature Measure: Length of pipe installed

Scenario Unit: Feet

Scenario Typical Size: 150

Scenario Cost: $3,673.86 **Scenario Cost/Unit:** $24.49

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	$2.14	97	$207.58
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	57	$297.54
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.26	45	$146.70
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	$35.05	10	$350.50
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	$17.44	24	$418.56
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	$11.24	150	$1,686.00
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	10	$220.00

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	$173.49	2	$346.98

Practice: 634 - Waste Transfer

Scenario: #3 - Gravity flow, greater than 18" diameter conduit

Scenario Description:

Gravity flow conduit is typically a large diameter water tight sanitary sewer pipe used to transfer manure by gravity from one location to another. The gravity transfer system typically consists of an existing inlet structure or hopper with attachment to a smooth interior large diameter pipe. The pipe conveys the slurry waste liquid between the waste collection point and a manure storage or waste treatment structure. Adequate head on the pipe flow or change in elevation must be available for the gravity system to function and should be evaluated by the design engineer. This practice includes the pipe attachment to an existing inlet structure and all other fittings, trench excavation and backfill, labor and a equipment for installation.

This conduit is part of a manure transfer system for a planned waste management or comprehensive nutrient management plan. This scenario addresses the transport of liquid waste to a waste storage or treatment facility to prevent a water quality resource concern of excessive nutrients/organics and harmful levels of pathogens in surface water and/or excessive nutrients/organics in ground water.

Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling.

Before Situation:

An area of waste production is separated from the waste storage facility and current operations may cause water quality concerns as it is not efficient in transporting the waste to the storage. The site has a change in elevation between production area and treatment or storage structure that is adequate to provide sufficient head for a gravity flow conduit to transport the slurry waste liquid stream.

After Situation:

Install a 150 foot long 30" diameter water tight pipe to transfer manure by gravity from one location to another. A gravity transfer system typically consists of a sealed inlet at an existing waste collection structure to a smooth interior 30" sewer grade pipe that will gravity flow to an outlet at a site of manure treatment or storage. This scenario includes the pipe, inlet, outlet, couplers and all other fittings, trench excavation, pipe bedding and backfill. The site should be evaluated by the designing engineer to make sure there is adequate elevation drop before contracting. If required an inlet structure may be contracted under another scenario.

The transfer conduit will provide collection and containment of the manure slurry, thereby protecting water quality resources.

Scenario Feature Measure: Length of pipe installed

Scenario Unit: Feet

Scenario Typical Size: 150

Scenario Cost: $6,253.78 **Scenario Cost/Unit:** $41.69

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	$3.26	45	$146.70
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	57	$297.54
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	$2.14	125	$267.50
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	$35.05	10	$350.50
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	$17.44	24	$418.56
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	$27.60	150	$4,140.00
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$22.00	13	$286.00

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	$173.49	2	$346.98

Practice: 634 - Waste Transfer

Scenario: #4 - Pressure flow, less than or equal to 6" diameter conduit

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. These pipelines may also be utilized to transfer waste within the waste treatment system. 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 for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling; 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: Feet

Scenario Typical Size: 1,000

Scenario Cost: $12,076.14 **Scenario Cost/Unit:** $12.08

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	90	$469.80
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$2.85	1000	$2,850.00
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	$101.26	1	$101.26
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	$17.44	40	$697.60

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	$35.05	10	$350.50

Materials

Pipe, PVC, 6", SDR 21	987	Materials: - 6" - PVC - SDR 21 200 psi - ASTM D2241	Foot	$6.60	1100	$7,260.00

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	$173.49	2	$346.98

Practice: 634 - Waste Transfer

Scenario: #5 - Pressure flow, 8" diameter conduit

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. These pipelines may also be utilized to transfer waste within the waste treatment system. Pressure flow transfer pipelines can be between 3" and 12" diameter but 8" 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 for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling; 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 8 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.

Scenario Feature Measure: Length of pipe installed

Scenario Unit: Feet

Scenario Typical Size: 1,000

Scenario Cost: $17,026.14 **Scenario Cost/Unit:** $17.03

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	$5.22	90	$469.80
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$2.85	1000	$2,850.00
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	$101.26	1	$101.26
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	$17.44	40	$697.60
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	$35.05	10	$350.50

Materials

Pipe, PVC, 8", SDR 21	988	Materials: - 8" - PVC - SDR 21 200 psi - ASTM D2241	Foot	$11.10	1100	$12,210.00

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	$173.49	2	$346.98

Practice: 634 - Waste Transfer

Scenario: #6 - Pressure flow, 10" diameter conduit

Scenario Description:

PVC pipelines are 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. These pipelines may also be utilized to transfer waste within the waste treatment system. PVC transfer pipelines can be between 3" and 30" diameter. 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 prevent a water quality resource concern of excessive nutrients/organics and harmful levels of pathogens in surface water and/or excessive nutrients/organics in ground water.

Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling; PS 635, Vegetated Treatment Area.

Before Situation:

The waste storage structure is separated from the application fields where wastewater nutrients are needed or other components of the waste management system. 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 and is water tight to transfer the manure an/or wastewater. 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.

Scenario Feature Measure: Length of pipe installed

Scenario Unit: Feet

Scenario Typical Size: 1,000

Scenario Cost: $21,828.28 **Scenario Cost/Unit:** $21.83

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	$2.85	1000	$2,850.00
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.22	127	$662.94
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	$101.26	1	$101.26
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	$17.44	40	$697.60
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	$35.05	10	$350.50
Materials						
Pipe, PVC, 10", SDR 21	1714	Materials: - 10" - PVC - SDR 21 - ASTM D2241	Foot	$15.29	1100	$16,819.00
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	$173.49	2	$346.98

Practice: 634 - Waste Transfer

Scenario: #7 - Pressure flow, 12" or greater diameter conduit

Scenario Description:

PVC pipelines are 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. These pipelines may also be utilized to transfer waste within the waste treatment system. PVC transfer pipelines can be between 3" and 30" diameter. 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 prevent a water quality resource concern of excessive nutrients/organics and harmful levels of pathogens in surface water and/or excessive nutrients/organics in ground water.

Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling; PS 635, Vegetated Treatment Area.

Before Situation:

The waste storage structure is separated from the application fields where wastewater nutrients are needed or other components of the waste management system. 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 300 foot long 12 inch diameter PVC gasketted IPS pipe and is water tight to transfer the manure an/or wastewater. 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.

Scenario Feature Measure: Length of pipe installed

Scenario Unit: Feet

Scenario Typical Size: 300

Scenario Cost: $9,638.66 **Scenario Cost/Unit:** $32.13

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	$5.22	89	$464.58
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	$2.14	97	$207.58
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	$101.26	2	$202.52
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	$17.44	40	$697.60
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	$35.05	10	$350.50
Materials						
Pipe, PVC, 12", SDR 21	1717	Materials: - 12" - PVC - SDR 21 - ASTM D2241	Foot	$22.33	330	$7,368.90
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	$173.49	2	$346.98

Practice: 634 - Waste Transfer

Scenario: #8 - Agitator, Liquids Transfer

Scenario Description:

This scenario is for a manure and wastewater agitator, piping and reception pit 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 tanks or pits that are less than 10 feet deep. This scenario does not include a pump.

Associated practices may include: PS 313 Waste Storage Facility for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling

The waste transfer equipment is installed to address water quality concerns by facilitating timely land application of waste at agronomic rates according to the nutrient management plan. This scenario addresses the potential for surface water and groundwater quality degradation.

Before Situation:

In this typical setting, the operator has a small waste storage structure from a confined animal feeding operation without an effective waste handling and transfer system to manage the waste stream departing from the facility.

After Situation:

The typical installation would be for a small manure 10 HP agitator to put settled manure solids into suspension for removal from an animal waste storage structure and transfer to the next step of waste treatment, utilization or storage. Part of an animal waste management system to address water quality concerns. If required a wastewater reception pit, concrete channel or transfer conduit scenario may need to be contracted to support the operation of this waste transfer system equipment.

Scenario Feature Measure: Agitator for wastewater, installed

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: $18,560.10 **Scenario Cost/Unit:** $18,560.10

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	$319.94	9	$2,879.46
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	$146.94	3.6	$528.98
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.26	200	$252.00
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	$35.05	8	$280.40
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	$24.27	12	$291.24
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	$17.44	24	$418.56
Materials						
Pipe, PVC, 8", SDR 21	988	Materials: - 8" - PVC - SDR 21 200 psi - ASTM D2241	Foot	$11.10	220	$2,442.00
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, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 634 - Waste Transfer

Scenario: #9 - Agitator, Slurry Transfer

Scenario Description:

This scenario is for a manure and wastewater agitator, piping and reception pit 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 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 for storage structures; PS 533, Pumping Plant; PS 430, Irrigation Pipeline; PS 632, Solid/Liquid Waste Separation Facility; PS 468, Lined Waterway or Outlet; PS 590 Nutrient Management for waste application; PS 633, Waste Recycling

The waste transfer equipment is installed to address water quality concerns by facilitating timely land application of waste at agronomic rates according to the nutrient management plan. This scenario addresses the potential for surface water and groundwater quality degradation.

Before Situation:

In this typical setting, the operator has waste production from a confined animal feeding operation without an effective waste handling and transfer system to manage the waste stream departing from the facility.

After Situation:

A typical installation would be for a medium 30 HP manure agitator to put settled manure solids into suspension for removal from an animal waste storage structure and transfer to the next step of waste treatment, utilization or storage. Part of an animal waste management system to address water quality concerns. Wastewater reception pit, Concrete Pump installation pit and transfer conduit have been included in this scenario 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: $30,039.89 **Scenario Cost/Unit:** $30,039.89

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	$146.94	6	$881.64
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.26	160	$201.60
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	$319.94	16.6	$5,311.00
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	$101.26	3	$303.78
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	40	$697.60
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	$35.05	24	$841.20
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	$24.27	12	$291.24

Materials

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
Pipe, PVC, 12", SDR 21	1717	Materials: - 12" - PVC - SDR 21 - ASTM D2241	Foot	$22.33	176	$3,930.08

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 635 - Vegetated Treatment Area

Scenario: #1 - Concrete Curb, with or without flow spreaders

Scenario Description:

This is a permanent herbaceous vegetative area or channel installed down slope from a livestock production area. Wastewater (runoff or milking parlor wastewater) is properly collected and released with a controlled gravity outflow into the VTA. The VTA vegetation is harvested to removed nutrients on a regular basis. This practice addresses water quality degradation due to uncontrolled nutrient rich wastewater that can flow into surface waters or leach into ground water. Associated practices: Waste Storage Facility (313), Fence (382), Solid/Liquid Waste Separation Facility (632), 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 2.0 ac in size, includes a concrete curb for distribution flow (sheet flow) into the VTA. Usually 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: 2

Scenario Cost: $7,176.70 **Scenario Cost/Unit:** $3,588.35

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	$146.94	7	$1,028.58
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.24	600	$1,344.00
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	$2.14	70	$149.80
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.80	24	$1,627.20
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	$17.44	20	$348.80
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	$25.06	24	$601.44
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	70	$1,561.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 635 - Vegetated Treatment Area

Scenario: #2 - Concrete Curb with major shaping

Scenario Description:

This is a permanent herbaceous vegetative area or channel installed down slope from a livestock production area. Wastewater (runoff or milking parlor wastewater) is properly collected and released with a controlled gravity outflow into the VTA. The VTA vegetation is harvested to removed nutrients on a regular basis. This practice addresses water quality degradation due to uncontrolled nutrient rich wastewater that can flow into surface waters or leach into ground water. Associated practices: Waste Storage Facility (313), Fence (382), Solid/Liquid Waste Separation Facility (632), 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 2.0 ac in size, includes a concrete curb for distribution flow (sheet flow) into the VTA. Typically requires considerable grading and shaping on a small area to maintain sheet flow throughout the VTA (at least 3000 cy/ac). 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: 2

Scenario Cost: $22,581.24 **Scenario Cost/Unit:** $11,290.62

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	$3.26	6453	$21,036.78
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	$146.94	7	$1,028.58
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 635 - Vegetated Treatment Area

Scenario: #3 - Gated Pipe, with or without flow spreaders

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 outflow into the VTA. The VTA vegetation is harvested to removed nutrients on a regular basis. This practice addresses water quality degradation due to uncontrolled nutrient rich wastewater that can flow into surface waters or leach into ground water. Associated practices: Waste Storage Facility (313), Fence (382), Solid/Liquid Waste Separation Facility (632), 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 10.0 ac in size, includes a gated irrigation pipe to promote sheet flow through the VTA. Usually requires grading and shaping, gravel spreader trenches 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 establishment of the permanent vegetation within the VTA will be completed under the Critical Area Planting (342) Standard. 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: Acres in the Treatment Area

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $22,381.22 **Scenario Cost/Unit:** $2,238.12

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	$1.26	50	$63.00
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.24	2800	$6,272.00
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	$2.14	310	$663.40
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$67.80	24	$1,627.20
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	$25.06	24	$601.44
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	$17.44	20	$348.80
Materials						
Pipe, PVC, 6", SCH 40	980	Materials: - 6" - PVC - SCH 40 - ASTM D1785	Foot	$6.73	50	$336.50
Pipe, aluminum, smooth wall gated irrigation, 8"	2029	8" diameter smooth wall gated irrigation aluminum pipe. Material only.	Foot	$7.20	700	$5,040.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	310	$6,913.00
Mobilization						

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 635 - Vegetated Treatment Area

Scenario: #4 - Gated Pipe with major shaping

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 outflow into the VTA. The VTA vegetation is harvested to removed nutrients on a regular basis. This practice addresses water quality degradation due to uncontrolled nutrient rich wastewater that can flow into surface waters or leach into ground water. Associated practices: Waste Storage Facility (313), Fence (382), Solid/Liquid Waste Separation Facility (632), 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 2 ac in size, includes a gated irrigation pipe to promote sheet flow through the VTA. Typically requires considerable grading and shaping on a small area to maintain sheet flow throughout the VTA (at least 3000 cy/ac). 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 establishment of the permanent vegetation within the VTA will be completed under the Critical Area Planting (342) Standard. 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: Acres in the Treatment Area

Scenario Unit: Acre

Scenario Typical Size: 2

Scenario Cost: $22,960.16 **Scenario Cost/Unit:** $11,480.08

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	$3.26	6453	$21,036.78
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.26	50	$63.00
Materials						
Pipe, aluminum, smooth wall gated irrigation, 8"	2029	8" diameter smooth wall gated irrigation aluminum pipe. Material only.	Foot	$7.20	140	$1,008.00
Pipe, PVC, 6", SCH 40	980	Materials: - 6" - PVC - SCH 40 - ASTM D1785	Foot	$6.73	50	$336.50
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 635 - Vegetated Treatment Area

Scenario: #5 - Sprinkler, Solid Set Distribution

Scenario Description:

This is a permanent herbaceous vegetative area located adjacent to a livestock production area. Wastewater (runoff or milking parlor wastewater) is properly collected at the production area and pumped to mechanically distribute wastewater onto the VTA. The VTA vegetation is harvested to removed nutrients on a regular basis. This practice addresses water quality degradation due to uncontrolled nutrient rich wastewater that can flow into surface waters or leach into ground water. Associated practices: Waste Storage Facility (313), Fence (382), Solid/Liquid Waste Separation Facility (632), 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 8.0 ac in size. Typically does not require grading and shaping to maintain as uniform application onto the VTA is made through a solid set 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. 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: 8

Scenario Cost: $50,745.78 **Scenario Cost/Unit:** $6,343.22

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	$90.68	24	$2,176.32
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	24	$504.96
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	$17.44	24	$418.56
Materials						
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.39	3200	$4,448.00
Irrigation, Solid Set, w/Appurtenances	324	Solid Set irrigation system that includes pipe, sprinklers, connections, installation and appurtenances.	Acre	$4,625.00	8	$37,000.00
Pipe, PVC, 6", SDR 21	987	Materials: - 6" - PVC - SDR 21 200 psi - ASTM D2241	Foot	$6.60	900	$5,940.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 635 - Vegetated Treatment Area

Scenario: #6 - Sprinkler, Mobile Pods

Scenario Description:

This is a permanent herbaceous vegetative area located adjacent to a livestock production area. Wastewater (runoff or milking parlor wastewater) is properly collected at the production area and pumped to mechanically distribute wastewater onto the VTA. The VTA vegetation is harvested to removed nutrients on a regular basis. This practice addresses water quality degradation due to uncontrolled nutrient rich wastewater that can flow into surface waters or leach into ground water. Associated practices: Waste Storage Facility (313), Fence (382), Solid/Liquid Waste Separation Facility (632), 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 3.0 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. 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. The system is sized such that the total number of Pods will distribute wastewater to about a quarter of 3 acre VTA. The pods will be relocated to distribute wastewater throughout the VTA. The VTA is 440 ft x 300 ft. Each Pod Line is 150 ft long with 5 pods spaced evenly. The total number of Pods is 20 (4 lines x 5 pods/line = 20 pods).

Scenario Feature Measure: Amount of VTA installed

Scenario Unit: Acre

Scenario Typical Size: 3

Scenario Cost: $10,042.23 **Scenario Cost/Unit:** $3,347.41

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	$90.68	16	$1,450.88
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	3	$169.47
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	$17.44	16	$279.04
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	19	$399.76
Materials						
Pipe, PVC, 4", SDR 21	986	Materials: - 4" - PVC - SDR 21 200 psi - ASTM D2241	Foot	$3.06	800	$2,448.00
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
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 635 - Vegetated Treatment Area

Scenario: #7 - Sprinkler, Center Pivot

Scenario Description:

This is a permanent herbaceous vegetative area located adjacent to a livestock production area. Wastewater (runoff or milking parlor wastewater) is properly collected at the production area and pumped to mechanically distribute wastewater onto the VTA. The VTA vegetation is harvested to removed nutrients on a regular basis. This practice addresses water quality degradation due to uncontrolled nutrient rich wastewater that can flow into surface waters or leach into ground water. Associated practices: Waste Storage Facility (313), Fence (382), Solid/Liquid Waste Separation Facility (632), 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 8.0 ac in size. Typically does not require grading and shaping to maintain as uniform application onto the VTA is made through a center pivot 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. 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: 8

Scenario Cost: $34,925.71 **Scenario Cost/Unit:** $4,365.71

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	$90.68	16	$1,450.88
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	8	$451.92
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	16	$336.64
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	16	$279.04
Materials						
Pipe, PVC, 6", SDR 21	987	Materials: - 6" - PVC - SDR 21 200 psi - ASTM D2241	Foot	$6.60	333	$2,197.80
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	333	$23,303.34
Irrigation, Center pivot system with appurtenances, fixed cost portion	317	Fixed cost portion of the center pivot system with appurtenances. This portion includes the following items: pivot point, pipe, towers, pad, controls, sprinklers, installation.	Each	$6,390.21	1	$6,390.21
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 638 - Water & Sediment Control Basin

Scenario: #1 - WASCOB base

Scenario Description:

Typical scenario 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: $2,814.05 **Scenario Cost/Unit:** $4.02

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	$3.97	700	$2,779.00
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	$35.05	1	$35.05

Practice: 638 - Water & Sediment Control Basin

Scenario: #2 - WASCOB topsoil

Scenario Description:

Typical scenario 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: $3,029.05 **Scenario Cost/Unit:** $4.33

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	250	$215.00
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	700	$2,779.00
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	$35.05	1	$35.05

Practice: 640 - Waterspreading

Scenario: #1 - Dikes

Scenario Description:

A waterspreading system of dikes installed to uniformly distribute surface water to the field. Dikes are commonly installed on 2% slopes. Dikes are installed with gates to manage the release of the water.

Before Situation:

A field managed for forage with uncontrolled surface water that is not uniformly applied to the field for crop use.

After Situation:

A waterspreading system of dikes are installed to uniformly distribute surface water to the field. The dikes are typically built with a height of 3 feet and have a 4 foot top with 5:1 sideslopes to allow the dike to mowed or cut. The dikes are seeded with a sod forming grass. Each dike will retain water on the field and allow the water to be drained through a 18" CMP pipe with a slide gate (typically a Waterman C8E gate). The typical field size would be 20 acres and would have three dikes approximatley 1000' long installed with 200-300 feet between dikes. The system would address the resource concern of Water Quantity - Inefficient water use on nonirrigated land. Associated practices with the system are 342 Critical Area Planting, 412 - Grassed Waterway, 587 - Structure for Water Control, 511 - Forage Harvest Management.

Scenario Feature Measure: Acres with supplemental water

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $39,147.92 **Scenario Cost/Unit:** $1,957.40

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$56.49	5	$282.45
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	8233	$32,685.01
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	1900	$1,634.00
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	$24.27	8	$194.16
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	10	$174.40
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	$25.06	7	$175.42
Materials						
Slide gate, steel, 2' diameter, low head	1829	2' diameter steel slide gate for low head installations	Each	$406.60	3	$1,219.80
Pipe, CMP, 18", 16 Gauge	1743	18" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$18.89	120	$2,266.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 640 - Waterspreading

Scenario: #2 - Ditches

Scenario Description:

A waterspreading system of level lip ditches installed to uniformly distribute surface water to the field.

Before Situation:

A field managed for forage with uncontrolled surface water that is not uniformly applied to the field for crop use.

After Situation:

A waterspreading system of level lip ditches are installed to uniformly distribute surface water to the field. The ditches are typically built with a depth of 2.5 feet and have a 6 foot top with a V shape. Each ditch with spill water on the field and allow the water to be spread uniformly. The typical field size would be 20 acres and would have four ditches approximatley 1000' long installed with 200-300 feet between ditches. The system would address the resource concern of Water Quantity - Inefficient water use on nonirrigated land. Associated practices with the system are 342 Critical Area Planting, 412 - Grassed Waterway, 587 - Structure for Water Control, 511 - Forage Harvest Management, 362 - Diversion.

Scenario Feature Measure: Acres with supplemental water

Scenario Unit: Acre

Scenario Typical Size: 20

Scenario Cost: $2,878.18 **Scenario Cost/Unit:** $143.91

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	$2.14	1111	$2,377.54
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	$24.27	10	$242.70
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 642 - Water Well

Scenario: #3 - Shallow Well, 100 ft. deep or less

Scenario Description:

Typical construction is for the installation of a well, in areas where sufficient water is known to occur within 100 feet of the ground surface. The well shall be drilled, dug, driven, bored, jetted or otherwise constructed to an aquifer for water supply. The purpose of the practice is to provide water for livestock or irrigation. An average well depth is 75 feet. Well casings are 4-6" in diameter. Plastic casing is installed to a depth of 55 feet.

Before Situation:

Livestock have insufficient water or are fenced from their water source. There is insufficient water for use in micro-irrigation.

After Situation:

Sufficient water is available for livestock or 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: 75

Scenario Cost: $3,720.82 **Scenario Cost/Unit:** $49.61

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	$179.74	8	$1,437.92
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	$17.44	8	$139.52
Materials						
Well Screen, plastic, 4"	1998	4" PVC well screen. Materials only.	Foot	$6.47	20	$129.40
Well Cap, 4"	1785	Well cap, 4". Materials only.	Each	$25.44	1	$25.44
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	$604.19	2	$1,208.38
Well Casing, Plastic, 4"	1803	PVC or ABS non-threaded well casing, 4". Materials only.	Foot	$3.61	55	$198.55
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	1	$22.30
Test, Standard Water Test, Well Water	309	Well Water Suitability test. Includes materials and shipping only.	Each	$40.64	1	$40.64
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 642 - Water Well

Scenario: #5 - Single PVC Casing, greater than 100 ft. deep

Scenario Description:

Typical construction is for the installation of a well, in areas where sufficient water is known to occur 100 - 300 feet of the ground surface. The well shall be drilled, dug, driven, bored, jetted or otherwise constructed to an aquifer for water supply. The purpose of the practice is to provide water for livestock or micro-irrigation. An average well depth is 200 feet. Well casings are 4-6" in diameter. Plastic casing and screen is installed to a depth of 200 feet.

Before Situation:

Livestock have insufficient water or are fenced from their water source. There is insufficient water for use in micro-irrigation.

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: 200

Scenario Cost: $6,460.78 **Scenario Cost/Unit:** $32.30

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	$179.74	20	$3,594.80
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	$17.44	10	$174.40
Materials						
Chlorine	1335	Liquid chlorine bleach. Includes materials only.	Gallon	$2.79	1	$2.79
Well Screen, plastic, 4"	1998	4" PVC well screen. Materials only.	Foot	$6.47	50	$323.50
Well Cap, 4"	1785	Well cap, 4". Materials only.	Each	$25.44	1	$25.44
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	$604.19	2	$1,208.38
Test, Standard Water Test, Well Water	309	Well Water Suitability test. Includes materials and shipping only.	Each	$40.64	1	$40.64
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$22.30	1.5	$33.45
Well Casing, Plastic, 4"	1803	PVC or ABS non-threaded well casing, 4". Materials only.	Foot	$3.61	150	$541.50
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 642 - Water Well

Scenario: #7 - Steel or Copper, 100 ft. or deeper

Scenario Description:

Typical construction is for the installation of a well, in areas where sufficient water is known to occur greater than 2000 feet 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 micro-irrigation. An average well depth is 2500 feet. Plastic Surface casings are 6" in diameter with smaller diameter casing and screen extending into the water bearing formation. Steel casing and screen is installed to a typical depth of 2500 feet.

Before Situation:

Livestock have insufficient water or are fenced from their water source. There is insufficient water for use in micro-irrigation.

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: 2,000

Scenario Cost: $70,762.78 **Scenario Cost/Unit:** $35.38

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	$179.74	120	$21,568.80
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	$17.44	200	$3,488.00
Materials						
Well Screen, stainless steel, 2"	2278	2" Stainless steel well screen. Materials only.	Foot	$21.10	50	$1,055.00
Well Cap, 6"	1786	Well cap, 6". Materials only.	Each	$33.29	1	$33.29
Well Casing, Stainless Steel/Copper, 2"	1796	Stainless steel or Copper well casing, 2". Materials only.	Foot	$19.81	2000	$39,620.00
Chlorine	1335	Liquid chlorine bleach. Includes materials only.	Gallon	$2.79	1	$2.79
Test, Standard Water Test, Well Water	309	Well Water Suitability test. Includes materials and shipping only.	Each	$40.64	1	$40.64
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	$604.19	2	$1,208.38
Well Casing, Plastic, 6"	1804	PVC or ABS non-threaded well casing, 6". Materials only.	Foot	$6.46	500	$3,230.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	2	$515.88

Practice: 642 - Water Well

Scenario: #9 - Dual Casing PVC

Scenario Description:

Typical construction is for the installation of a well, in areas where sufficient water is known to occur within 300 feet from the ground surface in formations that typically contain artesian pressure. 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 micro-irrigation. An average well depth is 300 feet. Surface casings are 4-6" in diameter with grouting to contain artesian pressures, smaller diameter casing (2") extends into water bearing formation. Plastic casing and screen is installed to a typical depth of 300 feet.

Before Situation:

Livestock have insufficient water or are fenced from their water source. There is insufficient water for use in micro-irrigation.

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: 300

Scenario Cost: $10,145.79 **Scenario Cost/Unit:** $33.82

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	$179.74	40	$7,189.60
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	40	$697.60
Materials						
Well Casing, Plastic, 2"	1802	PVC or ABS non-threaded well casing, 2". Materials only.	Foot	$1.10	270	$297.00
Test, Standard Water Test, Well Water	309	Well Water Suitability test. Includes materials and shipping only.	Each	$40.64	1	$40.64
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	$604.19	1	$604.19
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	100	$646.00
Well Screen, plastic, 2"	1997	2" PVC well screen. Materials only.	Foot	$3.96	30	$118.80
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	$257.94	2	$515.88

Practice: 644 - Wetland Wildlife Habitat Management

Scenario: #3 - Management and monitoring only, foregone income (FI)

Scenario Description:

Site management will include managing/monitoring the site to provide food and cover for wetland wildlife species on cropland. Annual vegetation (crops or other annual vegetation) will be allowed to establish and persist during critical nesting and brood rearing seasons and will remain standing (not harvested) until migratory species have left the site. The setting is on lands used for the production of crops where the slope gradient is less than two percent and soils are not excessivly drained. The State-approved habitat evaluation or appraisal found that a limiting factor for wetland wildlife is the absence of sufficient cover and food in the area. The manipulation of existing cover will be accomplished through mechanical methods to provide a diverse vegetation mosaic, within and adjacent to the existing wetland, addressing inadequate habitat for wetland wildlife. Where this occurs on cropped fields, annual crops will be lost for one growing season (foregone income is included).

Before Situation:

The site lacks sufficient and diverse cover and food needed for optimal wetland wildlife habitat or target species. Typically the site has been previously manipulated and utilized for agricultural. With the loss of abundant and diverse cover and food throughout the site, both plant and animal species that are dependent on these elements are no longer present, or are in decline, within the planning unit.

After Situation:

Agricultural crop or annual vegetation has been allowed to persist providing needed food and cover for identified species. Crops and annual vegetation will not be harvested during the critical seasons as identified by the habitat evaluation. As a result of the installation, habitat needs have been adequately met.

Scenario Feature Measure: Wetland Wildlife Cover and Food

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $2,630.10 **Scenario Cost/Unit:** $263.01

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$15.85	10	$158.50
Foregone Income						
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$261.78	3.3	$863.87
FI, Corn Dryland	1959	Dryland Corn is Primary Crop	Acre	$313.09	3.3	$1,033.20
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$168.98	3.4	$574.53

Practice: 645 - Upland Wildlife Habitat Management

Scenario: #1 - Monitoring, Management, Foregone Income

Scenario Description:

Setting is grazingland 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 planning criteria for the targeted wildlife species. 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: $2,548.38 **Scenario Cost/Unit:** $25.48

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.91	2	$61.82
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
Satellite imagery, aerial photography, infrared	966	Infrared imagery	Acre	$0.16	100	$16.00
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$23.14	100	$2,314.00
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	$17.44	5	$87.20
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 - Wildlife Habitat Enhancement (FI)

Scenario Description:

Exclusion of livestock on 640 acres of rangeland for the enhancement of habitat for wildlife.

Before Situation:

Wildlife habitat is grazed during the primary nesting and development periods of targeted wildlife species.

After Situation:

Livestock are excluded for wildlife habitat enhancement for the targeted wildlife species. Implementation includes the exclusion of livestock to allow for adequate regrowth and development of the habitat.

Scenario Feature Measure: Acres Excluded

Scenario Unit: Acre

Scenario Typical Size: 640

Scenario Cost: $14,879.70 **Scenario Cost/Unit:** $23.25

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	AUM	$23.14	640	$14,809.60
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	$35.05	2	$70.10

Practice: 645 - Upland Wildlife Habitat Management

Scenario: #4 - Wildlife Habitat Enhancement - Former Cropland (FI)

Scenario Description:

Setting is cropland 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 planning 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, livestock utlization records, 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. The planner will specify locations and identify the methods to the customer who will implement the monitoring and management plan. Includes foregone income. Setting is cropland that will be managed to benefit rare and declining habitats through deferral or seeding to permanent or annual vegetation.

Before Situation:

Existing cropland production of a soybean, corn, and wheat rotation on cropped fields. This creates a degraded plant condition which results in inadequate habitat for fish and wildlife resulting 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 will highlight the benefits of the habitat treatment efforts.

Scenario Feature Measure: Acres Managed and Monitored

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $24,857.20 **Scenario Cost/Unit:** $248.57

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	$313.09	33.3	$10,425.90
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$261.78	33.3	$8,717.27
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$168.98	33.4	$5,643.93
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	$35.05	2	$70.10

Practice: 645 - Upland Wildlife Habitat Management

Scenario: #5 - Honeybee Habitat Single Species Mix with Monitoring and Foregone Income

Scenario Description:

Setting is cropland with the potential to provide foraging habitat for European honey bees and the decision of the landuser is to forgo planting of corn, soybeans or wheat for this year to benefit the bee. Safe honey bee forage will be provided during the summer under this scenario. This scenario will include the planting of a single spacies annual grass or legume for honey bee forage. Monitoring will be used to determine if the goal of providing safe forage for the honey bee is being met. Monitoring will involve measuring the use of different flowering species by honey bees and native polinators, per NRCS monitoring guidelines.

Before Situation:

Corn, soybeans and wheat fields planted continuously or in rotation with other grain crops. Insects, fungi and flowering weeds are managed with the use of periodic application of pesticides, without regard to the honey bee. Minimal forage and cover habit is available to native pollinators and other wildlife.

After Situation:

In lieu of planting the area to grain, this area will be planted to a single species annual for honey bee forage this year. Application of pesticides will not be applied during the flowering season. These areas will provide safe honey bee forage for a maximum period of time during the growing season, resulting in improved hive health and improved forage and cover habitat for associated wildlife. Monitoring data is used to assist in adaptive management decisions such as pesticide spraying timing and termination of planting following flowering to maximize benefits to the honeybee and minimize risks to the health of the bee associated with pesticide applications.

Scenario Feature Measure: Acres Managed and Monitored

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $26,171.46 **Scenario Cost/Unit:** $327.14

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$20.39	80	$1,631.20
Foregone Income						
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$168.98	26.6	$4,494.87
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$261.78	26.7	$6,989.53
FI, Corn Dryland	1959	Dryland Corn is Primary Crop	Acre	$313.09	26.7	$8,359.50
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	$24.27	38	$922.26
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	$35.05	18	$630.90
Materials						
One Species, Cool Season, Annual Grass or Legume	2311	Cool season annual grass or legume. Includes material and shipping only.	Acre	$39.29	80	$3,143.20

Practice: 645 - Upland Wildlife Habitat Management

Scenario: #6 - Honeybee Habitat Multi Species Mix with Monitoring and Foregone Income

Scenario Description:

Setting is cropland with the potential to provide foraging habitat for European honey bees and the decision of the landuser is to forgo planting of corn, soybeans or wheat for this year to benefit the bee. Safe honey bee forage will be provided during the summer under this scenario. This scenario will include the planting of a multi-specie annual mixture for honey bee forage. Monitoring will be used to determine if the goal of providing safe forage for the honey bee is being met. Monitoring will involve measuring the use of different flowering species by honey bees and native polinators, per NRCS monitoring guidelines.

Before Situation:

Corn, soybeans and wheat fields planted continuously or in rotation with other grain crops. Insects, fungi and flowering weeds are managed with the use of periodic application of pesticides, without regard to the honey bee. Minimal forage and cover habit is available to native pollinators and other wildlife.

After Situation:

In lieu of planting the area to grain, this area will be planted to a mixture of multi species annuals for honey bee forage this year. Application of pesticides will not be applied during the flowering season. These area will provide safe honey bee forage for a maximum period of time during the growing season, resulting in improved hive health and improved forage and cover habitat for associated wildlife. Monitoring data is used to assist in adaptive management decisions such as pesticide spraying timing and termination of planting following flowering to maximize benefits to the honeybee and minimize risks to the health of the bee associated with pesticide applications.

Scenario Feature Measure: Acres Managed and Monitored

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $27,834.66 **Scenario Cost/Unit:** $347.93

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	$20.39	80	$1,631.20
Foregone Income						
FI, Corn Dryland	1959	Dryland Corn is Primary Crop	Acre	$313.09	26.7	$8,359.50
FI, Wheat Dryland	1963	Dryland Wheat is Primary Crop	Acre	$168.98	26.6	$4,494.87
FI, Soybeans Dryland	1961	Dryland Soybeans is Primary Crop	Acre	$261.78	26.7	$6,989.53
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$35.05	18	$630.90
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	38	$922.26
Materials						
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	80	$4,806.40

Practice: 645 - Upland Wildlife Habitat Management

Scenario: #7 - Honeybee Monitoring

Scenario Description:

Setting is land with cover that has the potential to provide foraging habitat for European honey bees. Safe honey bee forage will be provided and managed throughout the summer. Monitoring will be used to determine if the goal of providing safe forage for the honey bee is being met. Monitoring will involve measuring the use of different flowering species by honey bees and native polinators, per NRCS monitoring guidelines.

Before Situation:

Insects, fungi and flowering weeds are managed with the use of periodic application of pesticides, without regard to the honey bee. Minimal forage and cover habit is available to native pollinators and other wildlife.

After Situation:

This area will be managed honey bee forage. Application of pesticides will not be applied during the flowering season. These area will provide safe honey bee forage for a maximum period of time during the growing season, resulting in improved hive health and improved forage and cover habitat for associated wildlife. Monitoring data is used to assist in adaptive management decisions such as pesticide spraying timing and termination of planting following flowering to maximize benefits to the honeybee and minimize risks to the health of the bee associated with pesticide applications.

Scenario Feature Measure: Acres Managed and Monitored

Scenario Unit: Acre

Scenario Typical Size: 80

Scenario Cost: $1,553.16 **Scenario Cost/Unit:** $19.41

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	$35.05	18	$630.90
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	38	$922.26

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. The typical size range for this scenario is 4 watering facilities retrofitted to include an escape ramp (2 ramps per tank).

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: 8

Scenario Cost: $282.96 **Scenario Cost/Unit:** $35.37

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	$17.44	5	$87.20
Materials						
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.47	8	$195.76

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 on the top and third wires according to state standards. 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. The typical size range for this scenario is 1 mile of fence.

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: 5,280

Scenario Cost: $519.10 **Scenario Cost/Unit:** $0.10

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	$30.91	2	$61.82
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	$17.44	2	$34.88
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	10560	$422.40

Practice: 650 - Windbreak/Shelterbelt Renovation

Scenario: #1 - Sod Release

Scenario Description:

Reduce competition from sod around trees/shrubs within a windbreak/shelterbelt. Apply appropriate herbicides to stress or kill competing sod vegetation between and/or within tree/shrub rows. A herbicide application is completed to significantly reduce competition from sod (grass) in the windbreak.

Before Situation:

1000 feet of livestock shelterbelt, 4 rows of mixed deciduous and conifer trees/shrubs, deteriorating due to being sod bound. Resouce concerns: Degraded 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 Foot

Scenario Typical Size: 1,000

Scenario Cost: $132.80 **Scenario Cost/Unit:** $0.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.86	2	$11.72
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$37.50	1	$37.50
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	$17.44	3	$52.32
Materials						
Herbicide, Glyphosate	334	A broad-spectrum, non-selective systemic herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$15.63	2	$31.26

Practice: 650 - Windbreak/Shelterbelt Renovation

Scenario: #2 - Thinning

Scenario Description:

Thinning 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. Typical scenario is 1,000 feet. Resource concern is Degraded plant condition-undesirable plant productivity and health.

Before Situation:

1,000' of windbreak/shelterbelt renovation carried out through manipulating species composition, stand structure and stocking by the thinning of selected trees and understory vegetation to restore the stand for it's 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: Linear Foot

Scenario Typical Size: 1,000

Scenario Cost: $373.65 **Scenario Cost/Unit:** $0.37

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$57.30	2	$114.60
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.35	10	$63.50
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	$17.44	10	$174.40
Materials						
Herbicide, Triclopyor	338	Refer to WIN-PST for product names and active ingredients. Materials and shipping	Acre	$42.30	0.5	$21.15

Practice: 650 - Windbreak/Shelterbelt Renovation

Scenario: #4 - 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 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: $2,648.94 **Scenario Cost/Unit:** $2.65

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	$188.08	10	$1,880.80
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$25.06	11	$275.66
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	$492.48	1	$492.48

Practice: 650 - Windbreak/Shelterbelt Renovation

Scenario: #10 - Supplemental Plantings-Bare Root, wildlife protection

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. Herbivore (deer, rabbits, etc.) damage is likely, so each tree must be protected with a rigid tube tree shelter.

Before Situation:

Dead trees/shrubs are inhibiting windbreak effectiveness. A one (1.0) acre windbreak/shelterbelt is expanded through the hand 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.

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: $3,037.26 **Scenario Cost/Unit:** $3,037.26

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hand tools, tree planting	1590	Various hand tools for digging holes and planting trees such as augers, dibble bars, planting shovel, hoe-dad. Equipment only. Labor not included.	Hour	$11.62	6	$69.72
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	15	$261.60
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	$83.47	2	$166.94
Materials						
Cable ties, plastic	1575	Plastic cable ties (typ. 8-12") to assist in securing items. Materials only.	Each	$0.05	350	$17.50
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	350	$546.00
Tree shelter, solid tube type, 4" x 60"	1567	4" x 60" tree tube for protection from animal damage. Materials only.	Each	$5.07	350	$1,774.50
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.69	200	$138.00
Tree, conifer, seedling, bare root, 1-1	1513	Bare root conifer trees, 1-1 (2 years old). Includes materials and shipping only.	Each	$0.42	150	$63.00

Practice: 650 - Windbreak/Shelterbelt Renovation

Scenario: #11 - Supplemental Plantings-Machine

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. Trees and shrubs planted with a tree planting machine. Shrubs will be planted with a spacing of 4 to 6 feet and hardwoods/conifers 8 to 12 feet apart in the row with rows 16 feet apart. The scenario will include 1/3 shrubs, 1/3 hardwoods, and 1/3 conifers. 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 machine 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.

After Situation:

The integrity and function of the windbreak is restored.

Scenario Feature Measure: Area of Renovation

Scenario Unit: Foot

Scenario Typical Size: 1,000

Scenario Cost: $255.96 **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	$37.50	1	$37.50
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.65	1	$23.65
Mechanical tree planter	1600	Mechanical tree planter. Requires a pulling unit of either tractor or small dozer depending upon site conditions. Does not include labor.	Hour	$6.60	1	$6.60
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	1	$21.04
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	5.5	$95.92
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	$0.69	33	$22.77
Tree, conifer, seedling, bare root, 1-1	1513	Bare root conifer trees, 1-1 (2 years old). Includes materials and shipping only.	Each	$0.42	33	$13.86
Shrub, seedling or transplant, bare root, 6-18"	1506	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.47	66	$31.02

Practice: 650 - Windbreak/Shelterbelt Renovation

Scenario: #12 - Supplemental Plantings-Machine, Wildlife Protection

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. Trees and shrubs planted with a tree planting machine. Shrubs will be planted with a spacing of 4 to 6 feet and hardwoods/conifers 8 to 12 feet apart in the row with rows 16 feet apart. The scenario will include 1/3 shrubs, 1/3 hardwoods, and 1/3 conifers. Resource concerns include Soil erosion - Wind erosion, Degraded plant condition - Inadequate structure and composition, and Livestock production limitation - Inadequate livestock shelter. Herbivore (deer, rabbits, etc.) damage is likely, so each tree must be protected with a rigid tube tree shelter.

Before Situation:

Dead trees/shrubs are inhibiting windbreak effectiveness. A one (1.0) acre windbreak/shelterbelt is expanded through the machine 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.

After Situation:

The integrity and function of the windbreak is restored.

Scenario Feature Measure: Area of Renovation

Scenario Unit: Foot

Scenario Typical Size: 1,000

Scenario Cost: $731.72 **Scenario Cost/Unit:** $0.73

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	$37.50	1	$37.50
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$23.65	1	$23.65
Mechanical tree planter	1600	Mechanical tree planter. Requires a pulling unit of either tractor or small dozer depending upon site conditions. Does not include labor.	Hour	$6.60	1	$6.60
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	7.5	$130.80
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	1	$21.04
Materials						
Stakes, wood, 3/4" x 3/4" x 60"	1583	3/4" x 3/4" x 60" wood stakes to fasten items in place. Includes materials only.	Each	$1.56	66	$102.96
Cable ties, plastic	1575	Plastic cable ties (typ. 8-12") to assist in securing items. Materials only.	Each	$0.05	66	$3.30
Tree shelter, solid tube type, 4" x 60"	1567	4" x 60" tree tube for protection from animal damage. Materials only.	Each	$5.07	66	$334.62
Tree, conifer, seedling, bare root, 1-1	1513	Bare root conifer trees, 1-1 (2 years old). Includes materials and shipping only.	Each	$0.42	33	$13.86
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.69	33	$22.77
Shrub, seedling or transplant, bare root, 6-18"	1506	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.47	66	$31.02
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: 650 - Windbreak/Shelterbelt Renovation

Scenario: #15 - Hand Planted, Bare Root

Scenario Description:

Single 600 foot row of bare root shrubs, conifers, hardwoods, or a combination, for wind protection, wildlife habitat, or snow management. Shrubs will be planted with a spacing of 4 to 6 feet and hardwoods/conifers 8 to 12 feet apart. The scenario will include 1/3 shrubs, 1/3 hardwoods, and 1/3 conifers based on feet of trees. This practice is typically applied to crop, pasture or range lands. Resource Concerns 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 minimize soil erosion or to manage snow deposition. Additional wildlife food and cover provided.

Scenario Feature Measure: Length of tree row

Scenario Unit: Foot

Scenario Typical Size: 600

Scenario Cost: $155.86 **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	$37.50	1	$37.50
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						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	3	$52.32
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	40	$18.80
Tree, hardwood, seedling or transplant, bare root, 6-18"	1509	Bare root hardwood trees 6-18" tall. Includes materials and shipping only.	Each	$0.69	20	$13.80
Tree, conifer, seedling, bare root, 1-1	1513	Bare root conifer trees, 1-1 (2 years old). Includes materials and shipping only.	Each	$0.42	20	$8.40
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: 656 - Constructed Wetland

Scenario: #1 - Medium, 0.5 ac or less

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. 0.5 ac or less). 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 nutrients 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 site is near the property boundary, but still takes cropland out of production (1/2 wetland acreage). The constructed wetland treats the influent 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: $3,948.81 **Scenario Cost/Unit:** #Div/0!

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	$281.64	0.25	$70.41
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	200	$172.00
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	$2.46	400	$984.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	14	$244.16
Materials						
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
Native Aquatic Plants, Emergent or Submerged	2336	Native aquatic emergent or submerged. All required materials for establishing vegetation. Includes material and shipping.	Each	$1.37	1350	$1,849.50
Test, Standard Water Test, Well Water	309	Well Water Suitability test. Includes materials and shipping only.	Each	$40.64	8	$325.12
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 656 - Constructed Wetland

Scenario: #2 - Large, more than 0.5 to 1.0 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 nutrients 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 1.0 acre 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 site is near the property boundary, but still takes cropland out of production (1/2 wetland acreage). The constructed wetland treats the influent 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: $11,172.99 **Scenario Cost/Unit:** $11,172.99

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	809	$695.74
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$281.64	1	$281.64
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$2.46	1619	$3,982.74
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	$17.44	37	$645.28
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, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$9.77	2	$19.54
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
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 656 - Constructed Wetland

Scenario: #3 - Large, more than 1.0 ac.

Scenario Description:

This practice scenario includes the basic earthwork needed to create a constructed wetland to improve water quality for a large site (i.e. >1.0ac). All other components, such as water control structures, dikes or upstream sediment basins, must be paid for under facilitating practices. The purpose of the practice is to address resource concerns related to water quality degradation due to excess nutrients. 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 1.25 acre wetland (i.e. 110' x 500') will be constructed with an average 12" depth. Only the earthwork is considered in this scenario. Any structures or sediment basins will be designed under a separate practice. The constructed wetland site iz near the property boundary, but still takes cropland out of production (1/2 wetland acreage). The constructed wetland treats the influent by reducing excess nutrients and adding oxygen through wetland plants and functions before the effluent is discharged off site.

Scenario Feature Measure: Area of Constructed Wetland

Scenario Unit: Acre

Scenario Typical Size: 1

Scenario Cost: $11,080.08 **Scenario Cost/Unit:** $11,080.08

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	$2.46	1020	$2,509.20
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$281.64	1.25	$352.05
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.86	1020	$877.20
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	$17.44	46	$802.24
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	4585	$6,281.45
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 657 - Wetland Restoration

Scenario: #2 - Depression Sediment Removal

Scenario Description:

A Depressional HGM (Hydrogeomorphic approach to classifying the seven types of wetlands as defined by Brinson, 1993) class wetland is to be restored by removing sediment. The typical size of sediment removal is 1 acre. 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 structure and composition, 22- INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

Before Situation:

The wetland has been converted to agricultural production, and the tract may or may not be drained with a surface ditch. The watershed has been converted from a native to an agricultural landuse, and the resultant soil erosion has deposited an average of 9 inches of sediment in the bottom of the depression.

After Situation:

The deposition has been removed down to the original topsoil layer. A herbaceous plant community has been seeded. Facilitative practices include 327-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. Associated practices are 342-Critical Area Planting, 550-Range Planting, 644-Wetland Wildlife Habitat Management, and 587-Structure for Water Control.

Scenario Feature Measure: Cubic Yards of Excavation

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,613

Scenario Cost: $6,815.44 **Scenario Cost/Unit:** $4.23

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, large equipment, 1500 ft	1221	Bulk excavation of common earth including sand and gravel with scrapers with average haul distance of 1500 feet. Includes equipment and labor.	Cubic Yard	$3.92	1613	$6,322.96
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	1	$492.48

Practice: 657 - Wetland Restoration

Scenario: #4 - Ditchplug - Lateral Restoration

Scenario Description:

A Depressional HGM class wetland (Hydrogeomorphic approach to classifying the seven types of wetlands as defined by Brinson, 1993) is to be restored by filling in the drainage ditch. 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 structure and composition, 22- INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

Before Situation:

The wetland has been converted to agricultural production, and the tract has been drained with a surface ditch. The watershed has been converted from a native to an agricultural landuse.

After Situation:

The drain has been closed by lateral restoration. The ditch has been filled for a distance determined by the permeability of the soil. The earthfill is done with compactive effort. Facilitative practices include 327-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. Associated practices are 342-Critical Area Planting, 550-Range Planting, 644-Wetland Wildlife Habitat Management, and 587-Structure for Water Control.

Scenario Feature Measure: Cubic Yards of Earthfill

Scenario Unit: Cubic Yard

Scenario Typical Size: 111

Scenario Cost: $933.15 **Scenario Cost/Unit:** $8.41

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	111	$440.67
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	$492.48	1	$492.48

Practice: 658 - Wetland Creation

Scenario: #1 - Wetland Creation, Excavation

Scenario Description:

A wetland is created on a flat mineral upland at a location where surface runoff may be intercepted and ponded by excavation. The wetland is created by excavating a depression. Resource concern is 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 24" 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. Associated practices are 342-Critical Area Planting, 550-Range Planting, 644-Wetland Wildlife Habitat Management, and 587-Structure for Water Control.

Scenario Feature Measure: Cubic Yards of Excavation

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,613

Scenario Cost: $3,944.30 **Scenario Cost/Unit:** $2.45

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	$2.14	1613	$3,451.82
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	$492.48	1	$492.48

Practice: 658 - Wetland Creation

Scenario: #3 - Excavation and Embankment

Scenario Description:

A wetland is created on a flat mineral upland at a location where surface runoff may be intercepted and ponded by excavation. The wetland is created by excavating a depression and building a dike to intercept runoff. Resource concern is 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 24" has created a shallow depression in a broad swale which intercepts surface runoff. The excavated material has been spread on adjacent areas. A dike is also constructed at the site with a 8' topwidth, 3:1 sideslopes, 2' fill height for 200'. 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. Associated practices are 342-Critical Area Planting, 550-Range Planting, 644-Wetland Wildlife Habitat Management, and 587-Structure for Water Control.

Scenario Feature Measure: Cubic Yards of Earth Moved

Scenario Unit: Cubic Yard

Scenario Typical Size: 1,613

Scenario Cost: $6,910.53 **Scenario Cost/Unit:** $4.28

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	$3.97	207	$821.79
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	$3.63	1406	$5,103.78
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	$492.48	2	$984.96

Practice: 659 - Wetland Enhancement

Scenario: #1 - Excavation

Scenario Description:

A Depressional HGM class wetland (Hydrogeomorphic approach to classifying the seven types of wetlands as defined by Brinson, 1993) 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 structure and composition, 22- INADEQUATE HABITAT FOR FISH AND WILDLIFE - Habitat degradation.

Before Situation:

The wetland has been converted to agricultural production, and the wetland has lost size and storage volume from accumulated sediments. The wetland receives surface runoff from an adjacent upland watershed, and ponds water on a shallow perched layer. The watershed has been converted from a native to an agricultural landuse, and the resultant soil erosion has deposited 6" of sediment in the bottom of the depression.

After Situation:

Any deposited sediment has been excavated and the depth ofthe wetland has been increased to add storage volume. A herbaceous plant community has been seeded. Facilitative practices include 327-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. Associated practices are 342-Critical Area Planting, 550-Range Planting, 644-Wetland Wildlife Habitat Management, and 587-Structure for Water Control.

Scenario Feature Measure: Cubic Yards of Excavation

Scenario Unit: Cubic Yard

Scenario Typical Size: 8,067

Scenario Cost: $18,248.34 **Scenario Cost/Unit:** $2.26

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	$2.14	8067	$17,263.38
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	$492.48	2	$984.96

Practice: 659 - Wetland Enhancement

Scenario: #3 - Depression Sediment Removal and Ditch Plug

Scenario Description:

A Depressional HGM class wetland (Hydrogeomorphic approach to classifying the seven types of wetlands as defined by Brinson, 1993) 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 structure 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' 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 a native to an 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 327-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. Associated practices are 342-Critical Area Planting, 550-Range Planting, 644-Wetland Wildlife Habitat Management, and 587-Structure for Water Control.

Scenario Feature Measure: Cubic Yards of Earth Moved

Scenario Unit: Cubic Yard

Scenario Typical Size: 8,317

Scenario Cost: $19,240.84 **Scenario Cost/Unit:** $2.31

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	$3.97	250	$992.50
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	$2.14	8067	$17,263.38
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	$492.48	2	$984.96

Practice: 666 - Forest Stand Improvement

Scenario: #6 - Competition Control, Mechanical, Heavy Equipment

Scenario Description:

Using equipment such as a masticator or mulcher to control vegetation that is competing with desirable trees and species or to reduce the stocking level of a stand of desirable trees. The trees to be retained will be marked by a consultant. Resource concerns include Undesirable plant productivity and health; Wildlife habitat degradation; Wildfire hazard; and Inadequate structure and composition.

Before Situation:

A stand of desirable trees is adversely affected by competition either from undesirable species, cull trees, or because the stand is overstocked. The vegetation to be controlled is too large to be mowed or shredded. Therefore other mechanical methods such as using masticators or mulchers is necessary.

After Situation:

The released stand of trees contains the composition and quality needed to meet the landowner's objectives and address the resource concerns.

Scenario Feature Measure: Area treated

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $6,194.93 **Scenario Cost/Unit:** $619.49

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	$129.56	30	$3,886.80
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	30	$631.20
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	$83.47	17	$1,418.99
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	1	$257.94

Practice: 666 - Forest Stand Improvement

Scenario: #8 - Thinning for Wildlife and Forest Health

Scenario Description:

A combination of hand and chemical treatments used to open the canopy of a stand to improve the wildlife habitat and tree health. Resource concerns include: Inadequate structure and composition, Undesirable plant productivity and health, and Habitat degradation.

Before Situation:

The stand of mature trees is overstocked resulting in a closed canopy. This condition is causing a lack of structure, herbaceous layer, and diversity that is needed to meet the landowner's objectives for improved wildlife habitat and forest health. Under the supervision of a consultant forester, it will be marked for thinning and timber stand improvement applications that will include cutting with hand tools (chainsaws) and injection. Costs involved in any commercial harvesting including marking, access, and transportation are not included in this scenario. However the costs involved in marking trees to be treated or left and supervising the TSI work is included.

After Situation:

The stand is treated to favor diversity of important commercial and wildlife species. The canopy is opened to the extent necessary to promote herbaceous growth and the work is performed without excessive damage to the residual trees and site.

Scenario Feature Measure: Acres treated

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: $8,824.72 **Scenario Cost/Unit:** $882.47

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$6.35	60	$381.00
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$30.91	16	$494.56
Chemical, spot treatment, single stem application	964	Ground applied chemical to individual plants or group of plants, e.g., backpack sprayer treatment. Equipment and labor cost included.	Hour	$57.30	40	$2,292.00
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	$17.44	76	$1,325.44
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	$83.47	46	$3,839.62
Materials						
Herbicide, Triazine	1321	Broad spectrum herbicide. Refer to WIN-PST for product names and active ingredients. Includes materials and shipping only.	Acre	$42.78	10	$427.80
Tree Marking Paint	313	Trees to be cut through tree marking are physically identified through the application of paint on the tree. Typically one quart of paint is used to mark one acre of trees. Includes materials and shipping only.	Acre	$6.43	10	$64.30

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: $17.12 **Scenario Cost/Unit:** $17.12

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$17.44	0.167	$2.91
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: $22.03 **Scenario Cost/Unit:** $22.03

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	$17.44	0.167	$2.91
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: $325.90 **Scenario Cost/Unit:** $325.90

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	$24.27	1	$24.27
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: $25.19 **Scenario Cost/Unit:** $25.19

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	$24.27	1	$24.27
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: $250.30 **Scenario Cost/Unit:** $250.30

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	4	$97.08
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: $13,200.00 **Scenario Cost/Unit:** $0.66

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	$0.66	20000	$13,200.00

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: $6,435.00 **Scenario Cost/Unit:** $1.43

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	$1.43	4500	$6,435.00

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: Linear Foot

Scenario Typical Size: 2,400

Scenario Cost: $3,360.00 **Scenario Cost/Unit:** $1.40

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	$1.40	2400	$3,360.00

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: $47,388.32 **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	$24.27	16	$388.32
Materials						
Thermal blanket 10,001 - 50,000 square foot	1148	Thermal blanket greenhouse screens: mechanical energy screen system consists of a drive motor, support cables, controls, and shade material, which may be woven, knitted, or non-woven. Size Range is 10,001 to 50,000 square feet. Materials only.	Square Foot	$1.88	25000	$47,000.00

Practice: 672 - Building Envelope Improvement

Scenario: #5 - Greenhouse - Insulate Unglazed Walls

Scenario Description:

A typical scenario is the installation insulation in green house to address energy loss. The insulation can be either of the cellouse or bubble type (or equivalent). The increased insulation reduces seasonal heat loss and heat gain which reduces the respective need for heating and cooling equipment to operate.

Before Situation:

Green house with standard glazing, plastic or polycarbonate walls and no insulation. Heating and cooling of an existing greenhouse is inefficient due to excessive heat loss.

After Situation:

The greenhouse is fitted with insulation installed truss-to-truss or gutter-to-gutter and/or non glazed endwalls and/or sidewalls, reducing heat loss and gain in the greenhouse. Associated practices/activities: may include 122-AgEMP - HQ and 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Square Feet of insulation

Scenario Unit: Square Foot

Scenario Typical Size: 25,000

Scenario Cost: $7,138.32 **Scenario Cost/Unit:** $0.29

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$24.27	16	$388.32
Materials						
Insulation, Greenhouse, Reflective Bubble	2410	Double bubble reflective insulation with aluminum foil on both sides. Includes materials and shipping only.	Square Foot	$0.27	25000	$6,750.00

Practice: 747 - Denitrifying Bioreactor

Scenario: #1 - Bioreactor with Liner and Cover

Scenario Description:

This bioreactor has geotextile fabric (or polyethylene - PE) between the wood chips and the surrounding soil plus the following components: woodchip filled pit, a soil cover, two water control structures (to allow management of the flow rate and and free water elevation within the bioreactor), and piping to convey water to and from the bioreactor. Woodchips serve as the carbon source necessary to the denitrification process.
Associated practices: Subsurface Drain (606), Structure for Water Control (587), Drainage Water Management (554).
Resource concern: Water Quality Degradation - Excess nutrients in surface and ground waters.
Management and maintenance of the bioreactor (including chip replenishment), as well as monitoring and reporting to demonstrate the performance of the practice are not included in this scenario.

Before Situation:

Before the installation, the subsurface drainage system is contributing nitrates to a surface water source (ditch or stream), high nitrates are a resource concern to the receiving water, and it is feasible to install a bioreactor to reduce the nitrate load from drainage outflows.

After Situation:

All components of the bioreactor are installed and functional. Nitrates are removed from bioreactor outflow. The approximate bioreactor excavated pit volume is 280 cubic yards (e.g. 5 feet deep, 15 feet wide and 100 feet long). Woodchips occupy the lower ~3.5 feet of the pit (200 cu. yd.) and a soil blanket over the woodchips is mounded 1.0 ft. above the surrounding ground surface to shed water and account for settling. A geotextile fabric (or PE material) surrounds the chips to prevent migration of soil into the pit. Two inline water control structures are in place and connected to the two 6" diameter HDPE dual-wall manifold pipes by 10" diameter dual wall pipe.Flow rates are dependent upon the availability of drainage water from the 10" drainage mainline. The soil excavated from the pit is spoiled onto the nearby field.

Scenario Feature Measure: Volume of Carbon Source

Scenario Unit: Cubic Yard

Scenario Typical Size: 200

Scenario Cost: $12,464.31 **Scenario Cost/Unit:** $62.32

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	$2.14	280	$599.20
Trenching, Earth, 24" x 60"	1460	Trenching, earth, 24" wide x 60" depth, includes equipment and labor for trenching and backfilling.	Foot	$3.67	50	$183.50
Aggregate, Wood Chips	1098	Includes materials, equipment and labor	Cubic yard	$21.24	200	$4,248.00
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	$3.26	140	$456.40
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.24	780	$1,747.20
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.54	4	$174.16
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	$17.44	24	$418.56
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$21.04	6	$126.24
Materials						
Water Control Structure, Stoplog, Inline, variable cost portion	2146	Variable cost portion of a Water Level Control Structure, Inline stoplog type. Typically made of PVC or fiberglass materials. Calculate total variable costs by multiplying by the structure height x pipe diameter. Materials only.	Height x Diameter	$11.96	60	$717.60

Materials

Water Control Structure, Stoplog, Inline, fixed costs portion	2145	Fixed cost portion of Water Level Control Structure, Inline stoplog type. Typically made of PVC or fiberglass materials. Fixed cost portion. Materials only.	Each	$309.67	1	$309.67
Water Level Control Structure, Inline, 2 Baffle, 10" diameter	2021	Inline Inlet WCS 6' High x 10" Dia.connections , 2 baffle (3 compartments)	Each	$1,915.78	1	$1,915.78
Pipe, HDPE, CPT, Double Wall, Soil Tight, 6"	1992	Pipe, Corrugated HDPE Double Wall, 6" diameter with soil tight joints - AASHTO M252. Material cost only.	Foot	$2.51	30	$75.30
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	$5.66	40	$226.40

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$257.94	3	$773.82
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$492.48	1	$492.48

Practice: 798 - Seasonal High Tunnel for Crops

Scenario: #1 - Quonset Style High Tunnel

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: $8,042.24 **Scenario Cost/Unit:** $3.72

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	$17.44	71	$1,238.24
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 - Gothic Style High Tunnel

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: $10,483.04 **Scenario Cost/Unit:** $4.85

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	$17.44	71	$1,238.24
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