IMPORTANT: Scenario costs may change in final 2016 payment schedule documents.

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: 865400

Total Scenario Cost: $69,014.44

Scenario Cost/Unit: $0.08

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	16520	$66,327.98
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.90	1860	$1,670.52
Materials						
Structural steel tubing, 2" diameter	1120	Structural steel tubing, 2" diameter, 1/8" wall thickness, materials only	Foot	$3.50	8	$28.00
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	$493.97	2	$987.94

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: 382000

Total Scenario Cost: $56,386.34

Scenario Cost/Unit: $0.15

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	1415	$5,681.24
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	$3.82	12733	$48,602.42
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.90	1210	$1,086.73
Materials						
Structural steel tubing, 2" diameter	1120	Structural steel tubing, 2" diameter, 1/8" wall thickness, materials only	Foot	$3.50	8	$28.00
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	$493.97	2	$987.94

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: 9000

Total Scenario Cost: $27,546.55

Scenario Cost/Unit: $3.06

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$386.95	30.7	$11,879.43
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	$248.80	39.1	$9,728.15
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	195	$1,032.95
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$2.12	620	$1,317.19
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	12	$541.26
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	61.6	$1,427.09
Waterstop, PVC, ribbed, 3/16" x 6"	1614	Waterstop, PVC, ribbed, 3/16" thick by 6"wide. Includes materials, equipment and labor.	Foot	$4.53	180	$816.14
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	12	$286.91
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

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: 20659

Total Scenario Cost: $43,605.11

Scenario Cost/Unit: $2.11

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$386.95	48	$18,573.70
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	$248.80	49	$12,191.28
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic Yard	$3.29	922	$3,037.41
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	334	$1,769.26
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	$3.82	1263	$4,820.93
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	49	$1,135.18
Waterstop, PVC, ribbed, 3/16" x 6"	1614	Waterstop, PVC, ribbed, 3/16" thick by 6"wide. Includes materials, equipment and labor.	Foot	$4.53	193	$875.09
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	$493.97	2	$987.94
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	$71.44	3	$214.33

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: 81600

Total Scenario Cost: $154,624.05

Scenario Cost/Unit: $1.89

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$386.95	134.3	$51,967.65
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	$248.80	302.2	$75,187.88
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	432	$2,288.39
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	$3.82	2115	$8,073.05
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	$2.12	2115	$4,493.30
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	3	$135.31
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	368	$8,525.47
Waterstop, PVC, ribbed, 3/16" x 6"	1614	Waterstop, PVC, ribbed, 3/16" thick by 6"wide. Includes materials, equipment and labor.	Foot	$4.53	524	$2,375.88
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	3	$71.73
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	$493.97	2	$987.94
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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: 66000

Total Scenario Cost: $171,528.51

Scenario Cost/Unit: $2.60

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$386.95	39	$15,091.13
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	$248.80	65	$16,172.11
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	250	$1,003.75
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$2.12	250	$531.12
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	73	$1,691.19
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	$2.07	66000	$136,450.31
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$71.44	1	$71.44

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: 4000

Total Scenario Cost: $37,342.07

Scenario Cost/Unit: $9.34

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$386.95	42	$16,251.98
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	$248.80	74	$18,411.33
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	16	$84.76
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	37	$148.56
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	$3.82	74	$282.46
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$2.12	34	$72.23
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.90	102	$91.61
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	61.7	$1,410.26
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$71.44	1	$71.44

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: 4000

Total Scenario Cost: $27,754.32

Scenario Cost/Unit: $6.94

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$7.39	12	$88.71
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$386.95	2	$773.90
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	$122.61	5.5	$674.37
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	$248.80	62	$15,425.71
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	222	$891.33
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	$3.82	148	$564.92
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	12	$541.26
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	61.7	$1,410.26
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.92	1620	$1,498.12
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	$1.65	1104	$1,823.48

Labor

Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	12	$286.91
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	90	$1,799.47

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	$493.97	4	$1,975.88

DRAFT

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: 4000

Total Scenario Cost: $27,179.25

Scenario Cost/Unit: $6.79

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$7.39	12	$88.71
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$386.95	2	$773.90
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	$122.61	5.5	$674.37
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	$248.80	62	$15,425.71
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	74	$297.11
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	$3.82	148	$564.92
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	12	$541.26
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	61.7	$1,429.41
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.92	1620	$1,498.12
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	$1.65	1104	$1,823.48

Labor

Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	12	$286.91
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	90	$1,799.47

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	$493.97	4	$1,975.88

DRAFT

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: 4000

Total Scenario Cost: $22,432.47

Scenario Cost/Unit: $5.61

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$248.80	74.1	$18,436.21
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	74	$297.11
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	$3.82	148	$564.92
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	50	$1,158.35
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$493.97	4	$1,975.88

DRAFT

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: 4000

Total Scenario Cost: $31,603.24

Scenario Cost/Unit: $7.90

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$386.95	23.7	$9,170.76
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	$248.80	74.1	$18,436.21
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	74	$297.11
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	$3.82	148	$564.92
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	50	$1,158.35
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$493.97	4	$1,975.88

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

Total Scenario Cost: $12,456.04

Scenario Cost/Unit: $283.09

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$248.80	4	$995.21
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	$2.12	8	$17.00
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	$115.03	1	$115.03
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	4	$92.67
Fuel Tank, Anchored	1033	Fuel tank for operating incinerators and/or gasifiers. Materials only.	Gallon	$3.57	285	$1,016.50
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	$9,658.29	1	$9,658.29
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	1	$23.91
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	1	$19.99
Mobilization						

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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: 55.8

Total Scenario Cost: $14,247.71

Scenario Cost/Unit: $255.34

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$248.80	4	$995.21
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	$2.12	8	$17.00
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	$115.03	1	$115.03
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	4	$92.67
Fuel Tank, Anchored	1033	Fuel tank for operating incinerators and/or gasifiers. Materials only.	Gallon	$3.57	285	$1,016.50
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	$11,449.96	1	$11,449.96
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	1	$23.91
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	1	$19.99

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

Practice: 316 - Animal Mortality Facility

Scenario: #3 - Incineration, More than 100 CF Chamber

Scenario Description: This scenario consists of installing a manufactured Type IV incinerator designed to handle a single 1,200 to 1,500 mortality. Typically a single dairy cow or multiple heifers or swine. System shall use high temperature (>1,300 degrees F) incineration with a secondary combustion or afterburner chamber prior to flue discharge. Select smallest incinerator that has a bin capacity to handle largest individual mortality. Payment made per unit of actual chamber size obtained from manufacturers' product literature. This option uses a very small footprint, however, it costs 15-20 gallons of diesel fuel per fill. The usage needs to be significant. At 500 cows with replacements, this option would offset a 4,000 SF concrete pad with another 8,000 to 12,000 SF of grassed area. 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: 119.6

Total Scenario Cost: $16,110.62

Scenario Cost/Unit: $134.70

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$248.80	4	$995.21
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	$2.12	8	$17.00
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	$115.03	1	$115.03
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	4	$92.67
Fuel Tank, Anchored	1033	Fuel tank for operating incinerators and/or gasifiers. Materials only.	Gallon	$3.57	285	$1,016.50
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	$13,312.87	1	$13,312.87
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	1	$23.91
General Labor	231	Labor performed using basic tools such as power tool, shovels, and	Hour	$19.99	1	$19.99

		other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.				

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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

Total Scenario Cost: $43,609.60

Scenario Cost/Unit: $100.95

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$386.95	6	$2,321.71
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	$248.80	15	$3,732.03
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	28	$112.42
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	8	$185.34
Composter, drum, 12 CY	1627	12 CY drum composter unit. Total capacity range is 10-19 CY. Includes equipment, operation controls, and shipping. Labor not included.	Each	$36,615.00	1	$36,615.00
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	$31.26	16	$500.22
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$71.44	2	$142.88

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: 1079

Total Scenario Cost: $58,862.60

Scenario Cost/Unit: $54.55

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$386.95	9	$3,482.57
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$248.80	30	$7,464.05
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	58	$232.87
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	8	$185.34
Composter, drum, 28 CY	1628	28 CY drum composter unit. Total capacity range is 20-29 CY. Includes equipment, operation controls, and shipping. Labor not included.	Each	$46,230.00	1	$46,230.00
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	$31.26	24	$750.33
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

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: 7500

Total Scenario Cost: $3,266.81

Scenario Cost/Unit: $0.44

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	420	$1,686.30
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	$2.53	420	$1,063.06
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

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: 7500

Total Scenario Cost: $4,284.12

Scenario Cost/Unit: $0.57

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	420	$1,686.30
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	$2.53	420	$1,063.06
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	$1.97	200	$393.95
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	$19.99	16	$319.91
Materials						
Freeze Proof Hydrant, > 3' Bury	2393	Freeze Proof Hydrant, more than 3 foot bury. Materials only.	Each	$91.06	1	$91.06
Pipe, PVC, 1 ½", SCH 40	975	Materials: - 1 1/2" - PVC - SCH 40 - ASTM D1785	Foot	$1.06	200	$212.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

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: 5700

Total Scenario Cost: $25,440.33

Scenario Cost/Unit: $4.46

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$248.80	90	$22,392.16
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	110	$441.65
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	$2.12	220	$467.39
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	70	$1,621.69
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

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: 5700

Total Scenario Cost: $26,457.65

Scenario Cost/Unit: $4.64

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$248.80	90	$22,392.16
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	110	$441.65
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	$2.12	220	$467.39
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	$1.97	200	$393.95
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	70	$1,621.69
Freeze Proof Hydrant, > 3' Bury	2393	Freeze Proof Hydrant, more than 3 foot bury. Materials only.	Each	$91.06	1	$91.06
Pipe, PVC, 1 ½", SCH 40	975	Materials: - 1 1/2" - PVC - SCH 40 - ASTM D1785	Foot	$1.06	200	$212.40
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	16	$319.91
Mobilization						

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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

Total Scenario Cost: $10,953.57

Scenario Cost/Unit: $15.21

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$7.39	7	$51.75
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$386.95	3	$1,160.86
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	$122.61	4	$490.45
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	$248.80	14	$3,483.22
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	$2.12	47	$99.85
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	7	$315.73
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	11	$254.84
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.92	880	$813.80
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	$1.65	448	$739.96

Labor

Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	7	$167.36
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	80	$2,501.10

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$71.44	5	$357.21

DRAFT

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

Total Scenario Cost: $11,970.89

Scenario Cost/Unit: $16.63

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$7.39	7	$51.75
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$386.95	3	$1,160.86
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	$122.61	4	$490.45
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	$248.80	14	$3,483.22
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	$2.12	47	$99.85
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	7	$315.73
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	$1.97	200	$393.95
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	11	$254.84
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.92	880	$813.80

Freeze Proof Hydrant, > 3' Bury	2393	Freeze Proof Hydrant, more than 3 foot bury. Materials only.	Each	$91.06	1	$91.06
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	$1.65	448	$739.96
Pipe, PVC, 1 ½", SCH 40	975	Materials: - 1 1/2" - PVC - SCH 40 - ASTM D1785	Foot	$1.06	200	$212.40

Labor

Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	7	$167.36
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	16	$319.91
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	80	$2,501.10

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$71.44	5	$357.21

DRAFT

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

Total Scenario Cost: $19,597.37

Scenario Cost/Unit: $20.41

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$386.95	30	$11,608.56
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$248.80	28	$6,966.45
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	$2.12	85	$180.58
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	14	$324.34
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

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

Total Scenario Cost: $20,614.69

Scenario Cost/Unit: $21.47

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$386.95	30	$11,608.56
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$248.80	28	$6,966.45
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	$2.12	85	$180.58
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	$1.97	200	$393.95
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	14	$324.34
Freeze Proof Hydrant, > 3' Bury	2393	Freeze Proof Hydrant, more than 3 foot bury. Materials only.	Each	$91.06	1	$91.06
Pipe, PVC, 1 ½", SCH 40	975	Materials: - 1 1/2" - PVC - SCH 40 - ASTM D1785	Foot	$1.06	200	$212.40
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	16	$319.91
Mobilization						

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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

Total Scenario Cost: $7,834.44

Scenario Cost/Unit: $13.32

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$386.95	8.6	$3,327.79
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	$248.80	12.6	$3,134.90
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	32.7	$131.29
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	10.9	$252.52
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$493.97	2	$987.94

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

Total Scenario Cost: $12,449.78

Scenario Cost/Unit: $12.97

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$7.39	5.75	$42.51
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	$248.80	20.7	$5,150.20
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	35.6	$142.93
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	5.75	$259.35
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	17.8	$412.37
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.92	928	$858.18
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	$1.65	552	$911.74
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	5.75	$137.48
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	160	$3,199.06
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	$493.97	2	$987.94
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	$174.01	2	$348.02

DRAFT

Practice: 317 - Composting Facility

Scenario: #3 - Composter, open lot, earth floor

Scenario Description: The composting facility is installed to address water quality concerns and disease vectors resulting from improper waste disposal by providing a dedicated facility for storage and treatment, and by creating a compost product that can be used in multiple ways including land application for enrichment of crop ground. This scenario is applicable when geological, soil, and climate conditions are appropriate for earth floors and are allowed by state and local regulations. 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 temporarily, at an environmentally suitable location, until such time that they are disposed of or utilized in a proper manner, typically in accordance with a nutrient management plan. This scenario consists of removing 0.5' of surface material and compacting back into place 1' of soil to create a compacted, impervious earthen floor to act as a working area to store organic material in a static pile or windrow that has sufficient carbon based bulking material to allow natural aeration. Piles typically turned at least once to go into another heat cycle prior to final disposal, typically land application. Typical pad 50' x 200' on an improved compacted earthen surface. Include sufficient area for processing equipment access. Single piles or windrows to minimize runoff. Site to be located out of drainage areas, off-site water diverted and any runoff to spread out into a grassed area or vegetated treatment area as per regulations. Site preparation includes topsoil removal, compaction of subsoil, and reinstalling topsoil, compacted.

Scenario Feature Measure: Square Foot Floor Area

Scenario Unit: Square Foot

Scenario Typical Size: 10000

Total Scenario Cost: $3,789.11

Scenario Cost/Unit: $0.38

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic Yard	$3.29	185	$609.46
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	370	$1,485.55
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.82	185	$706.15
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$493.97	2	$987.94

Practice: 350 - Sediment Basin

Scenario: #1 - Excavated Basin

Scenario Description: A basin constructed by excavation in an existing drainage way on agricultural, urban, or construction sites for the purpose of trapping sediment to preserve the capacity of reservoirs, ditches, canals, diversions, waterways and streams and to prevent undesirable deposition on bottom lands and other developed lands. The sediment basin is created by excavation and impounds less than 3 feet against any embankment or spoil. Excavated material is spoiled, not placed in a designed embankment. Earthen spillway is constructed as needed. Resource concerns addressed include excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition. Surface water causes the sediment (and potentially pesticides and nutrients) to be transported into the riparian areas and water bodies downstream. The typical sediment basin has a drainage area of 5 acres.

Before Situation: Disturbed areas on agricultural or urban land, or construction sites, have excessive erosion that leads to deterioration of downstream waters due to excessive sedimentation.

After Situation: 'The typical sediment basin is constructed by excavating 900 cubic yards and spreading the spoil outside the pool area using a dozer or similar excavation equipment. Sediments will be collected in the basin and the basin will be emptied through an engineered outlet. Associated practice(s): Other practices that may need to be implemented along with sediment basin to address all of the site specific resource concerns include: Critical Area Planting (342) and Mulching (484) where necessary to prevent erosion following construction activities, Structure for Water Control (587) or Underground Outlet (620) if using a dewatering device, Pond Sealing or Lining (521A,521B,521C,521D).

Scenario Feature Measure: Excavated volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 900

Total Scenario Cost: $4,153.01

Scenario Cost/Unit: $4.61

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	3	$82.66
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	$125.43	3	$376.29
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	$3.82	900	$3,435.34
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

Practice: 350 - Sediment Basin

Scenario: #2 - Embankment Basin

Scenario Description: A sediment basin constructed with a low hazard class earthen embankment in an existing drainage way on agricultural, urban, or construction sites for the purpose of trapping sediment to preserve the capacity of reservoirs, ditches, canals, diversions, waterways and streams and to prevent undesirable deposition on bottom lands and other developed lands. The sediment basin is created by a compacted earth embankment and impounds more than 3 feet of water against the embankment. Resource concerns addressed include excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition. Surface water causes the sediment (and potentially pesticides and nutrients) to be transported into the riparian areas and water bodies downstream. The typical sediment basin has a drainage area of 5 acres.

Before Situation: Disturbed areas on agricultural or urban land, or construction sites, have excessive erosion that leads to deterioration of downstream waters due to excessive sedimentation.

After Situation: The typical sediment basin is an embankment of 1000 cy with excavated material from the pool area used to construct the embankment and auxiliary spillway. The embankment will be compacted earthfill. Sediments will be collected in the basin and the basin will be emptied through an engineered outlet. Associated practice(s): Other practices that may need to be implemented along with sediment basin to address all of the site specific resource concerns include: Critical Area Planting (342) and Mulching (484) where necessary to prevent erosion following construction activities, Structure for Water Control (587) or Underground Outlet (620) if using a dewatering device, Pond Sealing or Lining (521A,521B,521C,521D).

Scenario Feature Measure: Embankment volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 1000

Total Scenario Cost: $3,931.97

Scenario Cost/Unit: $3.93

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	9	$247.99
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
Equipment Installation						
Scraper, self propelled, 21 CY	1208	Self propelled earthmoving scraper with 21 CY capacity. Does not include labor.	Hour	$380.58	9	$3,425.26

Practice: 351 - 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: Foot

Scenario Typical Size: 20

Total Scenario Cost: $729.45

Scenario Cost/Unit: $36.47

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, gravel, washed, pea gravel	1331	Washed and graded pea gravel river stone. Includes materials and local delivery within 20 miles of quarry.	Cubic Yard	$25.54	2.9	$74.06
Bentonite	41	Bentonite, includes materials (50# bag)	Each	$24.76	3	$74.27
Chlorine	1335	Liquid chlorine bleach. Includes materials only.	Gallon	$2.74	1	$2.74
Concrete mix, bag	1226	Pre-mixed dry concrete mix in 60 pound bag. Materials only.	Each	$3.69	3	$11.06
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	$56.69	3	$170.06
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	3	$15.89
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	$27.55	3	$82.66
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	2	$39.99
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

Practice: 351 - 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: Foot

Scenario Typical Size: 80

Total Scenario Cost: $643.64

Scenario Cost/Unit: $8.05

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	1.4	$32.00
Bentonite	41	Bentonite, includes materials (50# bag)	Each	$24.76	5	$123.78
Chlorine	1335	Liquid chlorine bleach. Includes materials only.	Gallon	$2.74	1	$2.74
Concrete mix, bag	1226	Pre-mixed dry concrete mix in 60 pound bag. Materials only.	Each	$3.69	4	$14.74
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	$56.69	2	$113.37
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	0.6	$3.18
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$27.55	2	$55.11
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	2	$39.99
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

Practice: 351 - 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: Foot

Scenario Typical Size: 250

Total Scenario Cost: $5,672.17

Scenario Cost/Unit: $22.69

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$56.69	2	$113.37
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	5	$26.49
Grout pump	1334	Grout pump with tremie pipe. Equipment and power unit costs. Labor not included.	Hour	$15.31	4	$61.25
Rotary Drill Rig	1595	Rotary drill rig including equipment and power unit costs. Labor not included.	Hour	$343.29	10	$3,432.94
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	$27.55	2	$55.11
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	2	$39.99
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	4	$125.05
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Materials						
Chlorine	1335	Liquid chlorine bleach. Includes materials only.	Gallon	$2.74	1	$2.74
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	$720.99	1.8	$1,297.78

DRAFT

Practice: 351 - 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: Foot

Scenario Typical Size: 500

Total Scenario Cost: $10,402.57

Scenario Cost/Unit: $20.81

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$56.69	2	$113.37
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	5	$26.49
Grout pump	1334	Grout pump with tremie pipe. Equipment and power unit costs. Labor not included.	Hour	$15.31	8	$122.50
Rotary Drill Rig	1595	Rotary drill rig including equipment and power unit costs. Labor not included.	Hour	$343.29	20	$6,865.88
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$27.55	2	$55.11
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	2	$39.99
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	8	$250.11
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
Materials						
Chlorine	1335	Liquid chlorine bleach. Includes materials only.	Gallon	$2.74	1	$2.74
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	$720.99	3.7	$2,667.67

DRAFT

Practice: 351 - 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: Foot

Scenario Typical Size: 1500

Total Scenario Cost: $17,015.16

Scenario Cost/Unit: $11.34

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$56.69	2	$113.37
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	5	$26.49
Grout pump	1334	Grout pump with tremie pipe. Equipment and power unit costs. Labor not included.	Hour	$15.31	16	$244.99
Rotary Drill Rig	1595	Rotary drill rig including equipment and power unit costs. Labor not included.	Hour	$343.29	40	$13,731.76
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$27.55	4	$110.22
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	4	$79.98
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	16	$500.22
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
Materials						
Chlorine	1335	Liquid chlorine bleach. Includes materials only.	Gallon	$2.74	1	$2.74
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	$720.99	2.7	$1,946.68

DRAFT

Practice: 355 - Groundwater Testing

Scenario: #1 - Basic Water Test

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

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

After Situation: Water quality results are known.

Scenario Feature Measure: No.

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $51.52

Scenario Cost/Unit: $51.52

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	0.5	$10.00
Materials						
Test, Standard Water Test, Irrigation Suitability	310	Irrigation water suitability lab analysis. Includes pH, alkalinity, carbonates/bicarbonates, EC, dissolved solids, B, Cl, Ca, Mg, Na, SAR, and hardness.	Each	$41.52	1	$41.52

DRAFT

Practice: 355 - Groundwater Testing

Scenario: #2 - Specialty Water Test

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

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

After Situation: Water quality results are known.

Scenario Feature Measure: No.

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $213.92

Scenario Cost/Unit: $213.92

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	0.5	$10.00
Materials						
Test, singular specialized water test, well water	2003	Testing for specific pesticide, inorganic chemical or volatile organic not included in a basic well suitability test.. Includes materials and shipping only.	Each	$162.40	1	$162.40
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	$41.52	1	$41.52

DRAFT

Practice: 355 - Groundwater Testing

Scenario: #3 - Full Spectrum Test

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

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

After Situation: Water quality results are known.

Scenario Feature Measure: No.

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $261.27

Scenario Cost/Unit: $261.27

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	0.5	$10.00
Materials						
Test, comprehensive specialized water test, well water	2002	Comprehensive testing for a broad spectrum of pesticides, inorganic chemicals or volatile organics not included in a basic well suitability test. Includes materials and shipping only.	Each	$209.75	1	$209.75
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	$41.52	1	$41.52

DRAFT

Practice: 356 - Dike

Scenario: #1 - Wetland Dike

Scenario Description: Construction of a barrier, constructed of an earthen embankment, to control water level. Embankment structure to provide adequate freeboard, allowance for settlement, and foundation and embankment stability. Payment includes stripping prior to fill placement 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 requires 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. Potential hazard to public safety, land or property mitigated; environmental benefit provided.

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

Scenario Unit: Cubic Yard

Scenario Typical Size: 1890

Total Scenario Cost: $9,008.31

Scenario Cost/Unit: $4.77

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	1890	$7,588.37
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.90	481	$432.00
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	$493.97	2	$987.94

DRAFT

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: 455616

Total Scenario Cost: $45,215.36

Scenario Cost/Unit: $0.10

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	1130	$4,536.96
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	$3.82	10125	$38,647.57
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.90	1130	$1,014.88
Materials						
Structural steel tubing, 2" diameter	1120	Structural steel tubing, 2" diameter, 1/8" wall thickness, materials only	Foot	$3.50	8	$28.00
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	$493.97	2	$987.94

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: 455616

Total Scenario Cost: $61,315.65

Scenario Cost/Unit: $0.13

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	1130	$4,536.96
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	$3.82	14343	$54,747.86
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.90	1130	$1,014.88
Materials						
Structural steel tubing, 2" diameter	1120	Structural steel tubing, 2" diameter, 1/8" wall thickness, materials only	Foot	$3.50	8	$28.00
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	$493.97	2	$987.94

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: 48000

Total Scenario Cost: $8,948.54

Scenario Cost/Unit: $0.19

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Demolition, concrete	1498	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	$10.69	73	$780.22
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	1400	$5,621.02
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	$115.03	8	$920.26
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$27.55	8	$220.43
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	8	$159.95
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$493.97	2	$987.94
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

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: 100000

Total Scenario Cost: $10,778.72

Scenario Cost/Unit: $0.11

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic Yard	$3.29	1600	$5,270.99
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	$115.03	8	$920.26
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	$0.30	12150	$3,622.50
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	$27.55	8	$220.43
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	10	$199.94
Materials						
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$10.13	5	$50.63
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	$493.97	1	$493.97

Practice: 360 - Waste Facility Closure

Scenario: #3 - Liquid Waste Impoundment Conversion to Fresh Water Storage

Scenario Description: This practice scenario includes the conversion of an earthen storage and/or treatment structure or impoundment (embankment or excavated type) to fresh water storage. 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. 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: Cubic feet of structural storage

Scenario Unit: Cubic Foot

Scenario Typical Size: 100000

Total Scenario Cost: $5,507.73

Scenario Cost/Unit: $0.06

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	8	$220.43
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	10	$199.94
Materials						
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$10.13	5	$50.63
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	$115.03	8	$920.26
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	$0.30	12150	$3,622.50
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$493.97	1	$493.97

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: 2300

Total Scenario Cost: $7,903.92

Scenario Cost/Unit: $3.44

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	23	$633.74
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	4	$79.98
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	2	$80.11
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	$493.97	2	$987.94
Equipment Installation						
Motor Grader, 160 HP	1781	Motor Grader or Maintainer, 160 hp. Typical of equipment with HP in range of 150-170. Equipment cost, does not include labor.	Hour	$104.22	4	$416.89
Scraper, Self Propelled, 14 CY	2306	Self propelled earthmoving scraper with 14 CY capacity. Does not include labor.	Hour	$266.72	19	$5,067.60
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.90	710	$637.67

DRAFT

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

Total Scenario Cost: $649,923.39

Scenario Cost/Unit: $714.20

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$45.80	2	$91.60
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$493.97	1	$493.97
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
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	$71.44	1	$71.44
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 operation, piping and collection system for biogas, controls for operating digester and boiler system, boiler needed to maintain digester temperature, and flare excess gas to convert from methane to carbon dioxide. Sized for smaller livestock operations (<1000 AU) includes material, labor, and equipment.	Each	$649,007.65	1	$649,007.65

Practice: 366 - Anaerobic Digester

Scenario: #2 - Medium Plug Flow 1000-2000 AU

Scenario Description: A plug flow anaerobic digester can be part of a waste management system. It provides biological treatment of the waste in the absence of oxygen. This process for manure and other 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: 1750

Total Scenario Cost: $889,683.12

Scenario Cost/Unit: $508.39

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$45.80	2	$91.60
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$493.97	1	$493.97
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$71.44	1	$71.44
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 operation, piping and collection system for biogas, controls for operating digester and boiler system, boiler needed to maintain digester temperature, and flare excess gas to convert from methane to carbon dioxide. Sized for medium sized livestock operations (1000-2000 AU) includes material, labor, and equipment.	Each	$888,508.66	1	$888,508.66

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: 3920

Total Scenario Cost: $1,331,216.21

Scenario Cost/Unit: $339.60

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$45.80	2	$91.60
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$493.97	1	$493.97
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	3	$776.17
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	$71.44	1	$71.44
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 operation, piping and collection system for biogas, controls for operating digester and boiler system, boiler needed to maintain digester temperature, and flare excess gas to convert from methane to carbon dioxide. Sized for large livestock operations (>2000 AU) includes material, labor, and equipment.	Each	$1,329,783.03	1	$1,329,783.03

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: 1039

Total Scenario Cost: $745,576.76

Scenario Cost/Unit: $717.59

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$45.80	2	$91.60
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$493.97	1	$493.97
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
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	$71.44	1	$71.44
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 temperatures for efficient digester operation, Piping and collection system for biogas, Controls for operating digester and boiler system, boiler needed to maintain digester temperature, and flare excess gas to convert from methane to carbon dioxide. Sized for smaller livestock operations (<1000 AU) includes material, labor, and equipment.	Each	$744,661.03	1	$744,661.03

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: 1890

Total Scenario Cost: $1,300,883.49

Scenario Cost/Unit: $688.30

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$45.80	2	$91.60
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$493.97	1	$493.97
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$71.44	1	$71.44
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 temperatures for efficient digester operation, Piping and collection system for biogas, Controls for operating digester and boiler system, boiler needed to maintain digester temperature, and Flare excess gas to convert from methane to carbon dioxide. Sized for medium sized livestock operations (1000-2500 AU) includes material, labor, and equipment.	Each	$1,299,709.03	1	$1,299,709.03

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: 3220

Total Scenario Cost: $1,510,911.12

Scenario Cost/Unit: $469.23

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$45.80	2	$91.60
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$493.97	1	$493.97
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	3	$776.17
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	$71.44	1	$71.44
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 temperatures for efficient digester operation, Piping and collection system for biogas, Controls for operating digester and boiler system, boiler needed to maintain digester temperature, and Flare excess gas to convert from methane to carbon dioxide. Sized for large sized livestock operations (> 2000 AU) includes material, labor, and equipment.	Each	$1,509,477.94	1	$1,509,477.94

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: 1000

Total Scenario Cost: $108,375.96

Scenario Cost/Unit: $108.38

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$45.80	1	$45.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
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	$71.44	1	$71.44
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	$108,000.00	1	$108,000.00

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: 9000

Total Scenario Cost: $52,321.43

Scenario Cost/Unit: $5.81

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$71.44	2	$142.88
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	$5.74	9000	$51,661.10

DRAFT

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: 5000

Total Scenario Cost: $42,701.61

Scenario Cost/Unit: $8.54

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
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	$71.44	2	$142.88
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, equipment, and installation. Does not include foundation preparation.	Square Foot	$8.46	5000	$42,300.00

DRAFT

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: 50000

Total Scenario Cost: $52,028.17

Scenario Cost/Unit: $1.04

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	120	$2,869.06
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	200	$3,998.82
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	$31.26	80	$2,501.10
Equipment Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	60	$2,706.28
Trencher, 8"	936	Equipment and power unit costs. Labor not included.	Hour	$90.86	60	$5,451.48
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Materials						
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Yard	$6.12	5555.6	$33,983.98

DRAFT

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: 50000

Total Scenario Cost: $105,015.27

Scenario Cost/Unit: $2.10

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	120	$2,869.06
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	200	$3,998.82
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	$31.26	80	$2,501.10
Equipment Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	60	$2,706.28
Trencher, 8"	936	Equipment and power unit costs. Labor not included.	Hour	$90.86	60	$5,451.48
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Materials						
Covered Lagoon Flare	1666	Flare excess gas to convert from methane to carbon dioxide. Includes labor and equipment.	Each	$12,910.72	1	$12,910.72
Covered Lagoon Gas Collection System	1664	Piping and collection system for biogas. Includes labor and equipment.	Each	$40,076.39	1	$40,076.39
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Yard	$6.12	5555.6	$33,983.98

DRAFT

Practice: 372 - Combustion System Improvement

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

Scenario Description: Older diesel engine replaced with new diesel engine repower (< 50 bhp). The existing diesel engine may be stationary or portable operating an irrigation pump or an auxiliary engine providing mechanical function for agricultural/forestry equipment. Resource Concerns: Air Quality Impacts - Emissions of Ozone Precursors; Air Quality Impacts - Emissions of Particulate Matter (PM) and PM Precursors; Inefficient Energy Use - Equipment and Facilities; Inefficient Energy Use - Farming/Ranching Practices and Field Operations. Associated Practices include: 374 - Farmstead Energy Improvement; 533 - Pumping Plant; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 447 - Irrigation System, Tailwater Recovery; 449 - Irrigation Water Management; 516 - Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; 614 - Watering Facility; 642 - Water Well, CAP 126 Comprehensive Air Quality Management Plan, CAP 122 Agricultural Energy Management Plan - Headquarters, and CAP 124 Agricultural Energy Management Plan - Landscape.

Before Situation: An old or inefficient diesel engine powers an irrigation pumping plant or grain dryer fan, or is a backup power generation for a farming operation. The emissions of oxides of nitrogen and/or particulate matter from the engine are identified to contribute to an air quality resource concern OR the existing diesel engine is energy inefficient due to a conversion of the irrigation system, reduction in required pump capacity, or age of the power unit. Air Quality Impacts: The existing internal combustion engine emissions are identified to contribute to an air quality resource concern. Inefficient Energy Use: The existing internal combustion engine uses excess fuel to operate an existing irrigation pump, off-road agricultural vehicle or other auxillary engine providing a mechanical function for agricultural/forestry equipment.

After Situation: The repowered diesel engine (< 50 bhp) replaces the existing older engine; the engine being replaced will be disabled and a certificate of inoperability submitted prior to certification of practice completion. The existing engine is supported by a concrete pad; no costs have been included for a new pad. Additional costs may be incurred if a concrete pad is not present. For Air Quality: The repower diesel engine will be cleaner-burning and will emit less particulate matter and/or oxides of nitrogen than the previous existing engine. For Energy: Energy efficiency will be improved by at least 20%; the increase in energy efficiency for the modified unit must be supported by an energy analysis.

Scenario Feature Measure: Number of Engines Replaced

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $6,142.15

Scenario Cost/Unit: $6,142.15

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	8	$250.11
Materials						
Motor, IC Engine, 25-49 HP	1428	Most current Tier-level Diesel or Cleaner Engine and required appurtenances. 25 to 49 bhp. Materials only.	Horsepower	$196.40	30	$5,892.04

Practice: 372 - Combustion System Improvement

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

Scenario Description: Older diesel engine replaced with new diesel engine repower (50-99 bhp). The existing diesel engine may be stationary or portable operating an irrigation pump or an auxiliary engine providing mechanical function for agricultural/forestry equipment. Resource Concerns: Air Quality Impacts - Emissions of Ozone Precursors; Air Quality Impacts - Emissions of Particulate Matter (PM) and PM Precursors; Inefficient Energy Use - Equipment and Facilities; Inefficient Energy Use - Farming/Ranching Practices and Field Operations. Associated Practices include: 374 - Farmstead Energy Improvement; 533 - Pumping Plant; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 447 - Irrigation System, Tailwater Recovery; 449 - Irrigation Water Management; 516 - Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; 614 - Watering Facility; 642 - Water Well, CAP 126 Comprehensive Air Quality Management Plan, CAP 122 Agricultural Energy Management Plan - Headquarters, and CAP 124 Agricultural Energy Management Plan - Landscape.

Before Situation: An old or inefficient diesel engine powers an irrigation pumping plant or grain dryer fan, or is a backup power generation for a farming operation. The emissions of oxides of nitrogen and/or particulate matter from the engine are identified to contribute to an air quality resource concern OR the existing diesel engine is energy inefficient due to a conversion of the irrigation system, reduction in required pump capacity, or age of the power unit. Air Quality Impacts: The existing internal combustion engine emissions are identified to contribute to an air quality resource concern. Inefficient Energy Use: The existing internal combustion engine uses excess fuel to operate an existing irrigation pump, off-road agricultural vehicle or other auxillary engine providing a mechanical function for agricultural/forestry equipment.

After Situation: The repowered diesel engine (50-99 bhp) replaces the existing older engine; the engine being replaced will be disabled and a certificate of inoperability submitted prior to certification of practice completion. The existing engine is supported by a concrete pad; no costs have been included for a new pad. Additional costs may be incurred if a concrete pad is not present. For Air Quality: The repower diesel engine will be cleaner-burning and will emit less particulate matter and/or oxides of nitrogen than the previous existing engine. For Energy: Energy efficiency will be improved by at least 20%; the increase in energy efficiency for the modified unit must be supported by an energy analysis.

Scenario Feature Measure: Number of Engines Replaced

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $15,194.75

Scenario Cost/Unit: $15,194.75

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	16	$500.22
Materials						
Motor, IC Engine, 50-99 HP	1429	Most current Tier-level Diesel or Cleaner Engine and required appurtenances. 50 to 99 bhp. Materials only.	Horsepower	$195.93	75	$14,694.53

Practice: 372 - Combustion System Improvement

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

Scenario Description: Older diesel engine replaced with new diesel engine repower (100-199 bhp). The existing diesel engine may be stationary or portable operating an irrigation pump or an auxiliary engine providing mechanical function for agricultural/forestry equipment. Resource Concerns: Air Quality Impacts - Emissions of Ozone Precursors; Air Quality Impacts - Emissions of Particulate Matter (PM) and PM Precursors; Inefficient Energy Use - Equipment and Facilities; Inefficient Energy Use - Farming/Ranching Practices and Field Operations. Associated Practices include: 374 - Farmstead Energy Improvement; 533 - Pumping Plant; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 447 - Irrigation System, Tailwater Recovery; 449 - Irrigation Water Management; 516 - Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; 614 - Watering Facility; 642 - Water Well, CAP 126 Comprehensive Air Quality Management Plan, CAP 122 Agricultural Energy Management Plan - Headquarters, and CAP 124 Agricultural Energy Management Plan - Landscape.

Before Situation: An old or inefficient diesel engine powers an irrigation pumping plant or grain dryer fan, or is a backup power generation for a farming operation. The emissions of oxides of nitrogen and/or particulate matter from the engine are identified to contribute to an air quality resource concern OR the existing diesel engine is energy inefficient due to a conversion of the irrigation system, reduction in required pump capacity, or age of the power unit. Air Quality Impacts: The existing internal combustion engine emissions are identified to contribute to an air quality resource concern. Inefficient Energy Use: The existing internal combustion engine uses excess fuel to operate an existing irrigation pump, off-road agricultural vehicle or other auxillary engine providing a mechanical function for agricultural/forestry equipment.

After Situation: The repowered diesel engine (100-199 bhp) replaces the existing older engine; the engine being replaced will be disabled and a certificate of inoperability submitted prior to certification of practice completion. The existing engine is supported by a concrete pad; no costs have been included for a new pad. Additional costs may be incurred if a concrete pad is not present. For Air Quality: The repower diesel engine will be cleaner-burning and will emit less particulate matter and/or oxides of nitrogen than the previous existing engine. For Energy: Energy efficiency will be improved by at least 20%; the increase in energy efficiency for the modified unit must be supported by an energy analysis.

Scenario Feature Measure: Number of Engines Replaced

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $31,825.74

Scenario Cost/Unit: $31,825.74

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	16	$500.22
Materials						
Motor, IC Engine, 100-199 HP	1430	Most current Tier-level Diesel or Cleaner Engine and required appurtenances. 100 to 199 bhp. Materials only.	Horsepower	$208.84	150	$31,325.52

Practice: 372 - Combustion System Improvement

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

Scenario Description: Older diesel engine replaced with new diesel engine repower (>= 200 bhp). The existing diesel engine may be stationary or portable operating an irrigation pump or an auxiliary engine providing mechanical function for agricultural/forestry equipment. Resource Concerns: Air Quality Impacts - Emissions of Ozone Precursors; Air Quality Impacts - Emissions of Particulate Matter (PM) and PM Precursors; Inefficient Energy Use - Equipment and Facilities; Inefficient Energy Use - Farming/Ranching Practices and Field Operations. Associated Practices include: 374 - Farmstead Energy Improvement; 533 - Pumping Plant; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 447 - Irrigation System, Tailwater Recovery; 449 - Irrigation Water Management; 516 - Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; 614 - Watering Facility; 642 - Water Well, CAP 126 Comprehensive Air Quality Management Plan, CAP 122 Agricultural Energy Management Plan - Headquarters, and CAP 124 Agricultural Energy Management Plan - Landscape.

Before Situation: An old or inefficient diesel engine powers an irrigation pumping plant or grain dryer fan, or is a backup power generation for a farming operation. The emissions of oxides of nitrogen and/or particulate matter from the engine are identified to contribute to an air quality resource concern OR the existing diesel engine is energy inefficient due to a conversion of the irrigation system, reduction in required pump capacity, or age of the power unit. Air Quality Impacts: The existing internal combustion engine emissions are identified to contribute to an air quality resource concern. Inefficient Energy Use: The existing internal combustion engine uses excess fuel to operate an existing irrigation pump, off-road agricultural vehicle or other auxillary engine providing a mechanical function for agricultural/forestry equipment.

After Situation: The repowered diesel engine (>= 200 bhp) replaces the existing older engine; the engine being replaced will be disabled and a certificate of inoperability submitted prior to certification of practice completion. The existing engine is supported by a concrete pad; no costs have been included for a new pad. Additional costs may be incurred if a concrete pad is not present. For Air Quality: The repower diesel engine will be cleaner-burning and will emit less particulate matter and/or oxides of nitrogen than the previous existing engine. For Energy: Energy efficiency will be improved by at least 20%; the increase in energy efficiency for the modified unit must be supported by an energy analysis.

Scenario Feature Measure: Number of Engines Replaced

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $61,869.88

Scenario Cost/Unit: $61,869.88

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	16	$500.22
Materials						
Motor, IC Engine, 300-399 HP	1433	Most current Tier-level Diesel or Cleaner Engine and required appurtenances. 300 to 399 bhp. Materials only.	Horsepower	$175.34	350	$61,369.66

Practice: 372 - Combustion System Improvement

Scenario: #5 - Electric Motor in-lieu of IC Engine, < 12 HP

Scenario Description: Replace an existing IC engine operating an irrigation well with a new electric motor (< 12 HP). An existing IC engine is stationary or portable (does not propel a vehicle and is not an auxiliary IC engine on a vehicle). This replacement provides the greatest emission reductions by eliminating NOx, VOC, and PM emissions from the source. Resource Concerns: Air Quality Impacts - Emissions of Ozone Precursors; Air Quality Impacts - Emissions of Particulate Matter (PM) and PM Precursors; Inefficient Energy Use - Equipment and Facilities; Inefficient Energy Use - Farming/Ranching Practices and Field Operations. Associated Practices include: 374 - Farmstead Energy Improvement; 533 - Pumping Plant; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 447 - Irrigation System, Tailwater Recovery; 449 - Irrigation Water Management; 516 - Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; 614 - Watering Facility; 642 - Water Well, CAP 126 Comprehensive Air Quality Management Plan, CAP 122 Agricultural Energy Management Plan - Headquarters, and CAP 124 Agricultural Energy Management Plan - Landscape.

Before Situation: Irrigation pump with IC engine withdraws water from a well and provides water through a center pivot irrigation system. The emissions of oxides of nitrogen and/or particulate matter from the engine are identified to contribute to an air quality resource concern OR based on an evaluation of the engine, the pump, the well, and the center pivot irrigation system, the engine is less than 50 percent efficient in delivering water to the system. Air Quality Impacts: The existing internal combustion engine emissions are identified to contribute to an air quality resource concern. Inefficient Energy Use: The existing internal combustion engine uses excess fuel to operate an existing irrigation pump. Plant Condition Impact: Poor plant condition and vigor is evident due to a lack of water during critical times in the growing season. Water Quality Impacts: Fuel tank and fuel line have potential to cause environmental damage with leaks. The existing internal combustion engine is inefficient in delivering water to the system; subsequently, the lack of plant growth and uptake of nutrients, nitrogen and phosphorus are not being fully utilized and are available to be lost to surface and ground waters.

After Situation: The electric motor replaces the existing older engine; the engine being replaced will be disabled and a certificate of inoperability submitted prior to certification of practice completion. The existing engine is supported by a concrete pad; no costs have been included for a new pad. Additional costs may be incurred if a concrete pad is not present. For Air Quality: The electric motor does not produce any on-farm emissions of oxides of nitrogen or particulate matter, resulting in a substantial emissions reduction on the farm. For Energy: Energy efficiency will be improved by at least 20%. For Plant Condition: Plant condition and vigor will be improved. For Water Quality: The potential for environmental damage due to leaks from the tanks and fuel lines has been eliminated. Plant uptake of available nutrients will be increased and less nutrients will be lost to surface and ground waters.

Scenario Feature Measure: Number of Combustion Units Replaced

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $1,460.75

Scenario Cost/Unit: $1,460.75

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	8	$250.11
Materials						
Motor, electric, NEMA Premium, 10 HP	1172	Premium NEMA approved electric motor, 10 Horsepower and all required appurtenances. Includes materials and shipping only.	Each	$1,210.64	1	$1,210.64

Practice: 372 - Combustion System Improvement

Scenario: #6 - Electric Motor in-lieu of IC Engine, 12-74 HP

Scenario Description: Replace an existing IC engine operating an irrigation well with a new electric motor (12-74 HP). An existing IC engine is stationary or portable (does not propel a vehicle and is not an auxiliary IC engine on a vehicle). This replacement provides the greatest emission reductions by eliminating NOx, VOC, and PM emissions from the source. Resource Concerns: Air Quality Impacts - Emissions of Ozone Precursors; Air Quality Impacts - Emissions of Particulate Matter (PM) and PM Precursors; Inefficient Energy Use - Equipment and Facilities; Inefficient Energy Use - Farming/Ranching Practices and Field Operations. Associated Practices include: 374 - Farmstead Energy Improvement; 533 - Pumping Plant; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 447 - Irrigation System, Tailwater Recovery; 449 - Irrigation Water Management; 516 - Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; 614 - Watering Facility; 642 - Water Well, CAP 126 Comprehensive Air Quality Management Plan, CAP 122 Agricultural Energy Management Plan - Headquarters, and CAP 124 Agricultural Energy Management Plan - Landscape.

Before Situation: Irrigation pump with IC engine withdraws water from a well and provides water through a center pivot irrigation system. The emissions of oxides of nitrogen and/or particulate matter from the engine are identified to contribute to an air quality resource concern OR based on an evaluation of the engine, the pump, the well, and the center pivot irrigation system, the engine is less than 50 percent efficient in delivering water to the system. Air Quality Impacts: The existing internal combustion engine emissions are identified to contribute to an air quality resource concern. Inefficient Energy Use: The existing internal combustion engine uses excess fuel to operate an existing irrigation pump. Plant Condition Impact: Poor plant condition and vigor is evident due to a lack of water during critical times in the growing season. Water Quality Impacts: Fuel tank and fuel line have potential to cause environmental damage with leaks. The existing internal combustion engine is inefficient in delivering water to the system; subsequently, the lack of plant growth and uptake of nutrients, nitrogen and phosphorus are not being fully utilized and are available to be lost to surface and ground waters.

After Situation: The electric motor replaces the existing older engine; the engine being replaced will be disabled and a certificate of inoperability submitted prior to certification of practice completion. The existing engine is supported by a concrete pad; no costs have been included for a new pad. Additional costs may be incurred if a concrete pad is not present. For Air Quality: The electric motor does not produce any on-farm emissions of oxides of nitrogen or particulate matter, resulting in a substantial emissions reduction on the farm. For Energy: Energy efficiency will be improved by at least 20%. For Plant Condition: Plant condition and vigor will be improved. For Water Quality: The potential for environmental damage due to leaks from the tanks and fuel lines has been eliminated. Plant uptake of available nutrients will be increased and less nutrients will be lost to surface and ground waters.

Scenario Feature Measure: Number of Combustion Units Replaced

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $6,497.22

Scenario Cost/Unit: $6,497.22

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	12	$375.16
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	$6,122.06	1	$6,122.06

Practice: 372 - Combustion System Improvement

Scenario: #7 - Electric Motor in-lieu of IC Engine, 75-149 HP

Scenario Description: Replace an existing IC engine operating an irrigation well with a new electric motor (75-149 HP). An existing IC engine is stationary or portable (does not propel a vehicle and is not an auxiliary IC engine on a vehicle). This replacement provides the greatest emission reductions by eliminating NOx, VOC, and PM emissions from the source. Resource Concerns: Air Quality Impacts - Emissions of Ozone Precursors; Air Quality Impacts - Emissions of Particulate Matter (PM) and PM Precursors; Inefficient Energy Use - Equipment and Facilities; Inefficient Energy Use - Farming/Ranching Practices and Field Operations. Associated Practices include: 374 - Farmstead Energy Improvement; 533 - Pumping Plant; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 447 - Irrigation System, Tailwater Recovery; 449 - Irrigation Water Management; 516 - Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; 614 - Watering Facility; 642 - Water Well, CAP 126 Comprehensive Air Quality Management Plan, CAP 122 Agricultural Energy Management Plan - Headquarters, and CAP 124 Agricultural Energy Management Plan - Landscape.

Before Situation: Irrigation pump with IC engine withdraws water from a well and provides water through a center pivot irrigation system. The emissions of oxides of nitrogen and/or particulate matter from the engine are identified to contribute to an air quality resource concern OR based on an evaluation of the engine, the pump, the well, and the center pivot irrigation system, the engine is less than 50 percent efficient in delivering water to the system. Air Quality Impacts: The existing internal combustion engine emissions are identified to contribute to an air quality resource concern. Inefficient Energy Use: The existing internal combustion engine uses excess fuel to operate an existing irrigation pump. Plant Condition Impact: Poor plant condition and vigor is evident due to a lack of water during critical times in the growing season. Water Quality Impacts: Fuel tank and fuel line have potential to cause environmental damage with leaks. The existing internal combustion engine is inefficient in delivering water to the system; subsequently, the lack of plant growth and uptake of nutrients, nitrogen and phosphorus are not being fully utilized and are available to be lost to surface and ground waters.

After Situation: The electric motor replaces the existing older engine; the engine being replaced will be disabled and a certificate of inoperability submitted prior to certification of practice completion. The existing engine is supported by a concrete pad; no costs have been included for a new pad. Additional costs may be incurred if a concrete pad is not present. For Air Quality: The electric motor does not produce any on-farm emissions of oxides of nitrogen or particulate matter, resulting in a substantial emissions reduction on the farm. For Energy: Energy efficiency will be improved by at least 20%. For Plant Condition: Plant condition and vigor will be improved. For Water Quality: The potential for environmental damage due to leaks from the tanks and fuel lines has been eliminated. Plant uptake of available nutrients will be increased and less nutrients will be lost to surface and ground waters.

Scenario Feature Measure: Number of Combustion Units Replaced

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $8,147.81

Scenario Cost/Unit: $8,147.81

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	16	$500.22
Materials						
Motor, electric, NEMA Premium, 100 HP	1174	Premium NEMA approved electric motor, 100 Horsepower and all required appurtenances. Includes materials and shipping only.	Each	$7,647.59	1	$7,647.59

Practice: 372 - Combustion System Improvement

Scenario: #8 - Electric Motor in-lieu of IC Engine, 150-299 HP

Scenario Description: Replace an existing IC engine operating an irrigation well with a new electric motor (150-299 HP). An existing IC engine is stationary or portable (does not propel a vehicle and is not an auxiliary IC engine on a vehicle). This replacement provides the greatest emission reductions by eliminating NOx, VOC, and PM emissions from the source. Resource Concerns: Air Quality Impacts - Emissions of Ozone Precursors; Air Quality Impacts - Emissions of Particulate Matter (PM) and PM Precursors; Inefficient Energy Use - Equipment and Facilities; Inefficient Energy Use - Farming/Ranching Practices and Field Operations. Associated Practices include: 374 - Farmstead Energy Improvement; 533 - Pumping Plant; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 447 - Irrigation System, Tailwater Recovery; 449 - Irrigation Water Management; 516 - Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; 614 - Watering Facility; 642 - Water Well, CAP 126 Comprehensive Air Quality Management Plan, CAP 122 Agricultural Energy Management Plan - Headquarters, and CAP 124 Agricultural Energy Management Plan - Landscape.

Before Situation: Irrigation pump with IC engine withdraws water from a well and provides water through a center pivot irrigation system. The emissions of oxides of nitrogen and/or particulate matter from the engine are identified to contribute to an air quality resource concern OR based on an evaluation of the engine, the pump, the well, and the center pivot irrigation system, the engine is less than 50 percent efficient in delivering water to the system. Air Quality Impacts: The existing internal combustion engine emissions are identified to contribute to an air quality resource concern. Inefficient Energy Use: The existing internal combustion engine uses excess fuel to operate an existing irrigation pump. Plant Condition Impact: Poor plant condition and vigor is evident due to a lack of water during critical times in the growing season. Water Quality Impacts: Fuel tank and fuel line have potential to cause environmental damage with leaks. The existing internal combustion engine is inefficient in delivering water to the system; subsequently, the lack of plant growth and uptake of nutrients, nitrogen and phosphorus are not being fully utilized and are available to be lost to surface and ground waters.

After Situation: The electric motor replaces the existing older engine; the engine being replaced will be disabled and a certificate of inoperability submitted prior to certification of practice completion. The existing engine is supported by a concrete pad; no costs have been included for a new pad. Additional costs may be incurred if a concrete pad is not present. For Air Quality: The electric motor does not produce any on-farm emissions of oxides of nitrogen or particulate matter, resulting in a substantial emissions reduction on the farm. For Energy: Energy efficiency will be improved by at least 20%. For Plant Condition: Plant condition and vigor will be improved. For Water Quality: The potential for environmental damage due to leaks from the tanks and fuel lines has been eliminated. Plant uptake of available nutrients will be increased and less nutrients will be lost to surface and ground waters.

Scenario Feature Measure: Number of Combustion Units Replaced

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $24,534.65

Scenario Cost/Unit: $24,534.65

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	40	$1,250.55
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	$23,284.10	1	$23,284.10

Practice: 372 - Combustion System Improvement

Scenario: #9 - Electric Motor in-lieu of IC Engine, >=300 HP

Scenario Description: Replace an existing IC engine operating an irrigation well with a new electric motor (>=300 HP). An existing IC engine is stationary or portable (does not propel a vehicle and is not an auxiliary IC engine on a vehicle). This replacement provides the greatest emission reductions by eliminating NOx, VOC, and PM emissions from the source. Resource Concerns: Air Quality Impacts - Emissions of Ozone Precursors; Air Quality Impacts - Emissions of Particulate Matter (PM) and PM Precursors; Inefficient Energy Use - Equipment and Facilities; Inefficient Energy Use - Farming/Ranching Practices and Field Operations. Associated Practices include: 374 - Farmstead Energy Improvement; 533 - Pumping Plant; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 447 - Irrigation System, Tailwater Recovery; 449 - Irrigation Water Management; 516 - Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; 614 - Watering Facility; 642 - Water Well, CAP 126 Comprehensive Air Quality Management Plan, CAP 122 Agricultural Energy Management Plan - Headquarters, and CAP 124 Agricultural Energy Management Plan - Landscape.

Before Situation: Irrigation pump with IC engine withdraws water from a well and provides water through a center pivot irrigation system. The emissions of oxides of nitrogen and/or particulate matter from the engine are identified to contribute to an air quality resource concern OR based on an evaluation of the engine, the pump, the well, and the center pivot irrigation system, the engine is less than 50 percent efficient in delivering water to the system. Air Quality Impacts: The existing internal combustion engine emissions are identified to contribute to an air quality resource concern. Inefficient Energy Use: The existing internal combustion engine uses excess fuel to operate an existing irrigation pump. Plant Condition Impact: Poor plant condition and vigor is evident due to a lack of water during critical times in the growing season. Water Quality Impacts: Fuel tank and fuel line have potential to cause environmental damage with leaks. The existing internal combustion engine is inefficient in delivering water to the system; subsequently, the lack of plant growth and uptake of nutrients, nitrogen and phosphorus are not being fully utilized and are available to be lost to surface and ground waters.

After Situation: The electric motor replaces the existing older engine; the engine being replaced will be disabled and a certificate of inoperability submitted prior to certification of practice completion. The existing engine is supported by a concrete pad; no costs have been included for a new pad. Additional costs may be incurred if a concrete pad is not present. For Air Quality: The electric motor does not produce any on-farm emissions of oxides of nitrogen or particulate matter, resulting in a substantial emissions reduction on the farm. For Energy: Energy efficiency will be improved by at least 20%. For Plant Condition: Plant condition and vigor will be improved. For Water Quality: The potential for environmental damage due to leaks from the tanks and fuel lines has been eliminated. Plant uptake of available nutrients will be increased and less nutrients will be lost to surface and ground waters.

Scenario Feature Measure: Number of Combustion Units Replaced

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $48,972.08

Scenario Cost/Unit: $48,972.08

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	40	$1,250.55
Materials						
Motor, electric, NEMA Premium, 400 to 499 hp	1439	Premium NEMA approved Electric Motor and required appurtenances. 400 to 499 hp (296 - 372 kW). Includes materials and shipping only.	Horsepower	$119.30	400	$47,721.53

Practice: 372 - Combustion System Improvement

Scenario: #10 - Power Unit Modification

Scenario Description: Modification of an existing power unit (retrofitting or rebuilding) on an irrigation pumping plant that results in energy efficiency increase and meets the requirements in CPS 533, Pumping Plant. The increase in energy efficiency for the modified unit must be supported by an energy analysis.

Before Situation: Inefficient energy use by the existing power unit for an irrigation pumping plant due to a conversion of the irrigation system, reduction in required pump capacity, or age of the power unit.

After Situation: Efficient energy use by the retrofitted or rebuilt power unit meeting the requirements in CPS 533, Pumping Plant, and all current energy efficiency standards for internal combustion engines.

Scenario Feature Measure: Final size of power unit modified

Scenario Unit: Horsepower

Scenario Typical Size: 85

Total Scenario Cost: $5,501.52

Scenario Cost/Unit: $64.72

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	16	$500.22
Materials						
Diesel Engine Retrofit, fixed cost portion	2270	Engine replacement to the most current tier-level diesel or cleaner engine in mobile equipment. Fixed cost portion. Includes materials only.	Each	$925.49	0.5	$462.75
Diesel Engine Retrofit, variable cost portion	2271	Engine replacement to the most current tier-level diesel or cleaner engine in mobile equipment. Variable cost portion. Includes materials only.	Horsepower	$122.38	37.08708	$4,538.56

DRAFT

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

Total Scenario Cost: $1,396.67

Scenario Cost/Unit: $1,396.67

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	3	$93.79
Materials						
Fan, exhaust, 48" High Efficiency	1187	48 inch high efficiency exhaust fan, controls, wiring, and associated appurtenances. Materials only.	Each	$1,302.88	1	$1,302.88

DRAFT

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

Total Scenario Cost: $213.41

Scenario Cost/Unit: $213.41

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	2	$62.53
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	$150.89	1	$150.89

DRAFT

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

Total Scenario Cost: $4,978.51

Scenario Cost/Unit: $4,978.51

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	8	$250.11
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	$4,728.40	1	$4,728.40

DRAFT

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

Total Scenario Cost: $6,800.96

Scenario Cost/Unit: $6,800.96

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	8	$250.11
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	$6,550.86	1	$6,550.86

DRAFT

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: Horsepower

Scenario Typical Size: 1

Total Scenario Cost: $4,169.64

Scenario Cost/Unit: $4,169.64

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	4	$125.05
Materials						
Scroll Compressor - 5 HP	1183	Scroll compressor, 5 Horsepower, controls, wiring, and appurtenances. Materials only.	Each	$4,044.58	1	$4,044.58

DRAFT

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 appurtenances, 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 less 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: 1

Total Scenario Cost: $627.98

Scenario Cost/Unit: $627.98

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	8	$250.11
Materials						
Variable Speed Drive, 1 HP	2347	Variable speed drive for 1 Horsepower electric motor. Does not include motor. Materials only.	Horsepower	$377.87	1	$377.87

DRAFT

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

Total Scenario Cost: $1,468.89

Scenario Cost/Unit: $1,468.89

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	8	$250.11
Materials						
Switches and Controls, programmable controller	1193	Programmable logic controller (with or without wireless telecommunications) commonly used to control pumps and irrigation systems	Each	$160.35	1	$160.35
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	$627.96	1	$627.96
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	$430.47	1	$430.47

DRAFT

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: HP

Scenario Unit: Horsepower

Scenario Typical Size: 150

Total Scenario Cost: $23,784.32

Scenario Cost/Unit: $158.56

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	16	$500.22
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	$23,284.10	1	$23,284.10

DRAFT

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: HP

Scenario Unit: Horsepower

Scenario Typical Size: 50

Total Scenario Cost: $6,372.17

Scenario Cost/Unit: $127.44

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	8	$250.11
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	$6,122.06	1	$6,122.06

DRAFT

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: HP

Scenario Unit: Horsepower

Scenario Typical Size: 5

Total Scenario Cost: $891.49

Scenario Cost/Unit: $178.30

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	4	$125.05
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	$766.43	1	$766.43

DRAFT

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: Horsepower

Scenario Unit: Horsepower

Scenario Typical Size: 1

Total Scenario Cost: $594.58

Scenario Cost/Unit: $594.58

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	4	$125.05
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	$469.53	1	$469.53

DRAFT

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

Total Scenario Cost: $9,184.70

Scenario Cost/Unit: $1,530.78

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	16	$500.22
Materials						
Heater, radiant tube	1163	Radiant tube heater rated at 125,000 BTU/hour. Materials only.	Each	$1,447.41	6	$8,684.48

DRAFT

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: 1,000 BTU/Hour

Scenario Typical Size: 750

Total Scenario Cost: $9,293.34

Scenario Cost/Unit: $12.39

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	16	$500.22
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	$11.72	750	$8,793.12

DRAFT

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

Total Scenario Cost: $2,296.81

Scenario Cost/Unit: $164.06

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	24	$750.33
Materials						
Inlet, Attic Ceiling	2414	Poultry house attic air inlets. Includes materials only.	Each	$110.46	14	$1,546.48

DRAFT

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

Total Scenario Cost: $80,835.69

Scenario Cost/Unit: $93.99

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	16	$500.22
Materials						
Grain dryer, Axial 28'	1162	Grain dryer, 28 foot Axial with rated capacity of 990 bushels/hr. Materials only.	Bushel per Hour	$95.24	172	$16,381.77
Grain dryer, Axial, 12'	1158	Grain dryer, 12 foot Axial with rated capacity of 460 bushels/hour. Materials only.	Bushel per Hour	$98.47	172	$16,937.09
Grain dryer, Axial, 16'	1159	Grain dryer, 16 foot Axial with rated capacity of 600 bushels/hour. Materials only.	Bushel per Hour	$85.02	172	$14,623.28
Grain dryer, Centrifugal, 20'	1160	Grain dryer, 20 foot Centrifugal with rated capacity of 785 bushels/hour. Materials only.	Bushel per Hour	$90.94	172	$15,641.35
Grain dryer, Centrifugal, 24'	1161	Grain dryer, 24 foot Centrifugal with rated capacity of 860 bushels/hr. Materials only.	Bushel per Hour	$97.40	172	$16,751.98

Practice: 374 - FARMSTEAD ENERGY IMPROVEMENT

Scenario: #40 - Variable Speed Drive > 15 HP

Scenario Description: The typical scenario consists of a variable speed drive (VSD) and appurtenances, 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 15 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

Total Scenario Cost: $11,913.50

Scenario Cost/Unit: $238.27

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	8	$250.11
Materials						
Variable Speed Drive, 50 HP	1288	Variable speed drive for 50 Horsepower electric motor. Does not include motor. Materials only.	Horsepower	$233.27	50	$11,663.39

DRAFT

Practice: 374 - FARMSTEAD ENERGY IMPROVEMENT

Scenario: #41 - Variable Speed Drive, 5 - 15 HP

Scenario Description: The typical scenario consists of a variable speed drive (VSD) and appurtenances, 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 between 5 and 15 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: 10

Total Scenario Cost: $6,969.78

Scenario Cost/Unit: $696.98

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	8	$250.11
Materials						
Variable Speed Drive, 10 HP	1287	Variable speed drive for 10 Horsepower electric motor. Does not include motor. Materials only.	Horsepower	$671.97	10	$6,719.67

DRAFT

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: 3000

Total Scenario Cost: $7,808.83

Scenario Cost/Unit: $2.60

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$125.43	6	$752.58
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	$2.12	3000	$6,373.48
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	$27.55	6	$165.32
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

Practice: 378 - Pond

Scenario: #2 - Excavated Pond with Embankment

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 by excavation and impounds more than 3 feet against the embankment or spoil. Excavated material is placed in a designed embankment. Earthen spillway is constructed as needed, a trickle tube (pipe) is installed. 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 utilizing 1000 cy of excavated material to construct a compacted embankment which is approximately 800 CY. 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: 3000

Total Scenario Cost: $9,751.51

Scenario Cost/Unit: $3.25

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$125.43	10	$1,254.30
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic Yard	$3.29	800	$2,635.49
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	34	$180.10
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$2.12	2000	$4,248.99
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	$27.55	10	$275.54
Materials						
Pipe, PVC, 8", SDR 26	991	Materials: - 8" - PVC - SDR 26 160 psi - ASTM D2241	Foot	$10.66	60	$639.64
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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: 2000

Total Scenario Cost: $10,120.09

Scenario Cost/Unit: $5.06

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	2000	$8,030.02
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	$2.12	100	$212.45
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	$115.03	5	$575.16
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	$27.55	5	$137.77
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	1	$19.99
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	5	$156.32
Materials						
Pipe, PVC, 6", SDR 26	990	Materials: - 6" - PVC - SDR 26 160 psi - ASTM D2241	Foot	$5.89	80	$470.94
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

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: 4000

Total Scenario Cost: $23,837.75

Scenario Cost/Unit: $5.96

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	11	$251.42
Pipe, PVC, 18", SCH 40	1373	Materials: - 18" - PVC - SCH 40 - ASTM D1785	Foot	$37.78	90	$3,400.56
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic Yard	$58.46	22	$1,286.11
Equipment Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	29	$153.62
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	4000	$16,060.04
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	$115.03	10	$1,150.32
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	$27.55	10	$275.54
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	$19.99	9	$179.95
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	18	$562.75
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

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: 10000

Total Scenario Cost: $51,773.41

Scenario Cost/Unit: $5.18

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$386.95	2	$773.90
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	$122.61	1	$122.61
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	129	$683.34
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	10000	$40,150.11
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	$115.03	13	$1,495.41
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	11	$251.42
Pipe, CMP, 24", 12 Gauge	1417	24" Corrugated Metal Pipe, Galvanized, Uncoated, 12 gage. Material cost only.	Foot	$28.25	100	$2,825.22
Pipe, CMP, 30", 12 Gauge	1824	30" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$35.10	12	$421.21
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic Yard	$58.46	46	$2,689.13
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	$27.55	13	$358.20
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,	Hour	$19.99	18	$359.89

		herder, concrete placement, materials spreader, flagger, etc.				
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	36	$1,125.49

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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: 2000

Total Scenario Cost: $10,141.16

Scenario Cost/Unit: $5.07

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	2000	$8,030.02
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	$115.03	5	$575.16
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.90	260	$233.51
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	$27.55	5	$137.77
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	1	$19.99
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	5	$156.32
Materials						
Pipe, PVC, 6", SDR 26	990	Materials: - 6" - PVC - SDR 26 160 psi - ASTM D2241	Foot	$5.89	80	$470.94
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

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: 4000

Total Scenario Cost: $23,837.75

Scenario Cost/Unit: $5.96

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	11	$251.42
Pipe, PVC, 18", SCH 40	1373	Materials: - 18" - PVC - SCH 40 - ASTM D1785	Foot	$37.78	90	$3,400.56
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic Yard	$58.46	22	$1,286.11
Equipment Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	29	$153.62
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	4000	$16,060.04
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	$115.03	10	$1,150.32
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	$27.55	10	$275.54
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	$19.99	9	$179.95
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	18	$562.75
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

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: 10000

Total Scenario Cost: $51,801.15

Scenario Cost/Unit: $5.18

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$386.95	2	$773.90
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	$122.61	1	$122.61
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	129	$683.34
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	10000	$40,150.11
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	$115.03	13	$1,495.41
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	11	$251.42
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.92	30	$27.74
Pipe, CMP, 24", 12 Gauge	1417	24" Corrugated Metal Pipe, Galvanized, Uncoated, 12 gage. Material cost only.	Foot	$28.25	100	$2,825.22
Pipe, CMP, 30", 12 Gauge	1824	30" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$35.10	12	$421.21
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic Yard	$58.46	46	$2,689.13
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	$27.55	13	$358.20

General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	18	$359.89
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	36	$1,125.49

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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

Total Scenario Cost: $9,807.64

Scenario Cost/Unit: $891.60

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$386.95	11	$4,256.47
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	800	$3,212.01
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.39	46	$109.73
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	$115.03	5	$575.16
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	7.5	$171.43
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$23.75	14	$332.51
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	$27.55	5	$137.77
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	6	$119.96
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	$31.26	12	$375.16
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

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

Total Scenario Cost: $18,641.87

Scenario Cost/Unit: $53.26

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic Yard	$58.46	30	$1,753.78
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	1500	$6,022.52
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	$2.12	500	$1,062.25
Sheet piling, steel, 15'	1337	Steel sheet pile, panels or barrier driven up to 15 feet and left in place. Includes materials, equipment and labor.	Square Foot	$25.19	350	$8,815.38
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	$493.97	2	$987.94

DRAFT

Practice: 410 - Grade Stabilization Structure

Scenario: #8 - Gabion Rock Drop Structures

Scenario Description: A Straight Drop structure constructed of rock riprap held in place by galvanized wire, such as, gabion baskets, fence panels, or "sausage" baskets. These structures are used to stabilized the grade and control erosion in natural or artificial channels, to prevent the formation or advancing of gullies, and to enhance environmental quality and reduce pollution hazards. Applied in areas where the concentration and flow velocity of water require structures to stabilize the grade in channels or to control gully erosion. Cost estimate is based upon a gabion wall structure with a drop of 3ft and weir length of 18ft (54 square feet). The unit of payment measurement is defined as volume of rock used in the gabion basket or mat. 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 Gabion Rock

Scenario Unit: Cubic Yard

Scenario Typical Size: 72

Total Scenario Cost: $11,799.56

Scenario Cost/Unit: $163.88

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	250	$1,003.75
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$2.12	100	$212.45
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.39	60	$143.12
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
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	$137.82	72	$9,922.79

Practice: 410 - Grade Stabilization Structure

Scenario: #9 - Concrete Block Chute

Scenario Description: A trapezoidal structure constructed of concrete masonary blocks. 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 concrete block structure with a drop of 5 feet and a width of 20 feet on a 10% slope. The unit of payment measurement is defined as the area covered by the concrete blocks 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 Blocks

Scenario Unit: Square Foot

Scenario Typical Size: 1260

Total Scenario Cost: $7,999.57

Scenario Cost/Unit: $6.35

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	35	$799.99
Block, concrete	253	Concrete block, hollow, normal weight, 3500 psi. Includes both full and partial sizes. Material only	Each	$1.92	1400	$2,691.36
Geotextile, non-woven, heavy weight	1210	Non-woven greater than 8 ounce/square yard geotextile with staple anchoring. Materials and shipping only.	Square Yard	$4.15	140	$581.62
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	400	$1,606.00
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	$2.12	180	$382.41
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	35	$699.79
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	18	$720.95
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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

Total Scenario Cost: $11,860.87

Scenario Cost/Unit: $197.68

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	4	$91.43
Block, pre-cast concrete, modular	1496	Pre-cast concrete blocks, typically 2ft x 2ft x 6ft , includes installation and delivery.	Cubic Yard	$116.22	60	$6,973.00
Geotextile, non-woven, heavy weight	1210	Non-woven greater than 8 ounce/square yard geotextile with staple anchoring. Materials and shipping only.	Square Yard	$4.15	40	$166.18
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	28	$559.84
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	430	$1,726.45
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	$2.12	210	$446.14
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	$115.03	12	$1,380.38

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

Total Scenario Cost: $8,823.09

Scenario Cost/Unit: $61.27

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic Yard	$58.46	144	$8,418.15
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	$2.12	50	$106.22
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	2	$39.99
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

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: 1.02

Total Scenario Cost: $4,389.34

Scenario Cost/Unit: $4,303.28

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	4	$79.98
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	1	$40.05
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
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	$3.82	954	$3,641.46
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.90	411	$369.13

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: 1937

Total Scenario Cost: $7,513.02

Scenario Cost/Unit: $3.88

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$122.61	1	$122.61
Portable Welder	1407	Portable field welder. Equipment only. Labor not included.	Hour	$20.64	8	$165.14
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.24	1300	$1,618.17
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$22.03	8	$176.26
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	16	$319.91
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	8	$250.11
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
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	$1.88	1937	$3,641.08
Pipe, steel, smooth wall, galvanized, weight priced	1381	Steel manufactured into galvanized smooth wall pipe	Pound	$1.64	220	$360.14
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	$342.16	1	$342.16

DRAFT

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: Foot

Scenario Typical Size: 1300

Total Scenario Cost: $11,849.78

Scenario Cost/Unit: $9.12

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$122.61	1	$122.61
Portable Welder	1407	Portable field welder. Equipment only. Labor not included.	Hour	$20.64	8	$165.14
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.24	1300	$1,618.17
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$22.03	8	$176.26
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	16	$319.91
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	8	$250.11
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
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	$1.88	4157	$7,814.14
Pipe, steel, smooth wall, galvanized, weight priced	1381	Steel manufactured into galvanized smooth wall pipe	Pound	$1.64	320	$523.84
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	$342.16	1	$342.16

DRAFT

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: Foot

Scenario Typical Size: 1300

Total Scenario Cost: $16,058.74

Scenario Cost/Unit: $12.35

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$122.61	1	$122.61
Portable Welder	1407	Portable field welder. Equipment only. Labor not included.	Hour	$20.64	8	$165.14
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	$3,710.84
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$22.03	8	$176.26
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	16	$319.91
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	8	$250.11
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
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	$1.88	5248	$9,864.95
Pipe, steel, smooth wall, galvanized, weight priced	1381	Steel manufactured into galvanized smooth wall pipe	Pound	$1.64	360	$589.32
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	$342.16	1	$342.16

DRAFT

Practice: 430 - Irrigation Pipeline

Scenario: #33 - PVC, by pound, boring

Scenario 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. Includes boring 52 lineal feet under a heavily used road, such as a state or county highway which has an average of 12' wide lanes, 6' shoulder width, and 8' width sideslopes. 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 &Subsurfce; 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: 1937

Total Scenario Cost: $12,222.68

Scenario Cost/Unit: $6.31

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$122.61	1	$122.61
Horizontal Boring, Greater Than 3" diameter	1132	Includes equipment, labor and setup.	Foot	$86.79	52	$4,513.17
Portable Welder	1407	Portable field welder. Equipment only. Labor not included.	Hour	$20.64	8	$165.14
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.24	1250	$1,555.93
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$22.03	8	$176.26
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	16	$319.91
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	8	$250.11
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	3	$776.17
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	$1.88	1937	$3,641.08
Pipe, steel, smooth wall, galvanized, weight priced	1381	Steel manufactured into galvanized smooth wall pipe	Pound	$1.64	220	$360.14
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	$342.16	1	$342.16

Practice: 432 - Dry Hydrant

Scenario: #1 - PVC

Scenario Description: A non-pressurized permanent PVC pipe assembly system installed into an adequate water source with an all weather access that permits the withdrawal of water by suction for fire suppression. The location must have an adequate volume of water available, where transport vehicles can access the site, and where a source of water is needed for fire suppression. The resource concerns addressed include reduced visibility due to fire and lack of access to water for fire suppression.

Before Situation: A location where an adequate volume of water is available, where transport vehicles can access the site, and where an adequate source of water is needed for fire suppression.

After Situation: The typical dry hydrant will use 200 ft. of 6 inch PVC pipe, installed into an adequate water source with an all weather access that permits the withdrawal of water by suction for fire suppression. The pipe is fitted with an intake strainer and hydrant head with standard fire truck hose adapters acceptable to the local fire department, for quick connect/release. Plastic pipe is protected from ultraviolet rays. The dry hydrant is constructed by installing the pipe using a backhoe or other trenching equipment. Vegetation of disturbed areas will be completed under critical area planting (342). All weather access will use Heavy Use Area Protection (561). Erosion control during construction activities will use Stormwater Runoff Control (570). Other associated practices include Pond (378), Dam (402), Access Road (560), and Access Control (472).

Scenario Feature Measure: Number

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $2,640.61

Scenario Cost/Unit: $2,640.61

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	6	$143.45
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	16	$319.91
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	$115.03	5	$575.16
Materials						
Dry Hydrant head assembly, 6" PVC, 90 degree	2288	Dry Hydrant assembly for 6 inch PVC pipe consisting of 90º degree pipe elbow, bronze insert with 6-inch NST male thread, rubber "O" ring, threaded cap, conical strainer, and end cap. Material cost only.	Each	$174.08	1	$174.08
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	$1.65	30	$49.55
Pipe, PVC, 6", Coupling	2286	Pipe, PVC Schedule 40, 6" Diameter, Coupling. Material cost only.	Each	$14.32	4	$57.28
Pipe, PVC, 6", Elbow, 45 degree	2283	Pipe, PVC Schedule 40, 6" Diameter, Elbow, 45 Degree. Material cost only.	Each	$30.36	2	$60.73
Pipe, PVC, 6", SCH 40	980	Materials: - 6" - PVC - SCH 40 - ASTM D1785	Foot	$6.69	100	$668.59
Post, Rebar ½" x 8'	2294	Fabricated post consisting of 1/2" diameter rebar approximately 8' length. Material only.	Each	$2.77	2	$5.53
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$23.75	8	$190.01
Well Cap, 6"	1786	Well cap, 6". Materials only.	Each	$33.60	1	$33.60
Well Screen, plastic, 6"	1999	6" PVC well screen. Materials only.	Foot	$17.33	6	$104.00

Mobilization

DRAFT

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

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

Total Scenario Cost: $113,221.73

Scenario Cost/Unit: $1,887.03

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	$1,470.45	1	$1,470.45
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.24	6800	$8,464.28
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	$174.01	1	$174.01
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	$0.10	824108	$81,901.50
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	$1,323.03	1	$1,323.03
Micro Irrigation, Media Filter, 30" to 48" Dia. tank, Equipped for Automatic Flush	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	$5,211.81	2	$10,423.63
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	$336.75	1	$336.75
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	$1.88	4856	$9,128.09

Practice: 441 - Irrigation System, Microirrigation

Scenario: #2 - Surface PE, with emitters, trees and shrubs

Scenario Description: A micro-irrigation system, utilizing surface PE tubing (can be placed on trellis or above ground) with emitters to provide irrigation for an orchard, vineyard, windbreak, or other specialty crop grown in a grid pattern. The typical system is a permanent system, installed on a 3 row 1000' windbreak on the ground surface (total of 3000' lf). The windbreak has a plant spacing of 8 feet between trees. This system utilizes emitters at each tree or plant as the water application device, amounting to 375 emitters for this system. This system typically includes a filter system, PE tubing, HDPE or PVC manifolds, emitters, etc. This practice applies to systems designed to discharge < 60 gal/hr at each individual lateral discharge point. Does not include Pump, Power source, Water source (well or reservoir). Resource Concerns: Insufficient Water - Inefficient use of irrigation water, Degraded Plant Condition - Undesirable plant productivity and health, Water Quality Degradation - Excessive sediment in surface waters, and Inefficient Energy Use - Equipment and facilities. Associated Practices: 380-Windbreak/Shelterbelt Establishment, 533-Pumping Plant, 449- Irrigation Water Management, 430 - Irrigation Pipeline, 433 - Irrigation Flow Measurement, 610 - Salinity &Sodic Soil Management, 434 - Soil Moisture Measurement, 328-Conservation Crop Rotation, and 590 Nutrient Management.

Before Situation: A tree row has an insufficient available water source causing plant health (establishment and persistence) concerns.

After Situation: A surface placed microirrigation system is utilized to provide highly efficient irrigation to a tree row to address plant health concerns.

Scenario Feature Measure: Number of trees or shrubs watered

Scenario Unit: Each

Scenario Typical Size: 375

Total Scenario Cost: $1,303.34

Scenario Cost/Unit: $3.48

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	8	$159.95
Materials						
Micro Irrigation, screen filter, < 100 gpm	1617	Screen filter for Micro Irrigation used in small systems. Includes filter. No controls are included or needed.	Each	$49.31	1	$49.31
Micro Irrigation, surface drip tubing	1488	Tubing is installed above ground for surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tubing has emitters built in.	Foot	$0.34	3000	$1,019.18
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.23	33.6	$74.90

Practice: 441 - Irrigation System, Microirrigation

Scenario: #3 - Surface PE, with emitters, high tunnel

Scenario Description: A micro-irrigation system, utilizing surface PE tubing (can be placed on trellis or above ground) with emitters to provide irrigation in a seasonal high tunnel used for various vegetables or specialty crops grown in a grid pattern. The typical system is a permanent system, installed in a 30 ft by 72 ft high tunnel, with crop rows spaced at 12" to 18" with narrow alley walkways every other row. This system utilizes emitters at or near each plant as the water application device. This system typically includes a filter system, PE tubing, HDPE or PVC manifolds, emitters, etc. This practice applies to systems designed to discharge < 60 gal/hr at each individual lateral discharge point. Does not include Pump, Power source, Water source (well or reservoir). 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: 798-Seasonal High Tunnel System for Crops, 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: Vegetable or specialty crop has an insufficient available water source causing plant health (establishment and persistence) concerns.

After Situation: A surface placed microirrigation system is utilized to provide highly efficient irrigation to vegetable or specialty crop to address plant health concerns.

Scenario Feature Measure: Area inside high tunnel system

Scenario Unit: Square Foot

Scenario Typical Size: 2160

Total Scenario Cost: $1,443.21

Scenario Cost/Unit: $0.67

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	16	$319.91
Materials						
Micro Irrigation, emitters or sprays and tubing	1489	Emitters or sprays that are installed above ground for micro or drip irrigation. Includes installation and connections to the supply and flushing laterals. Tubing for the emitters is included in this item.	Foot	$1.00	1050	$1,047.24
Micro Irrigation, screen filter, < 100 gpm	1617	Screen filter for Micro Irrigation used in small systems. Includes filter. No controls are included or needed.	Each	$49.31	1	$49.31
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.23	12	$26.75

DRAFT

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: Foot

Scenario Typical Size: 1300

Total Scenario Cost: $98,478.52

Scenario Cost/Unit: $75.75

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Irrigation, Center pivot system with appurtenances, fixed cost portion	317	Fixed cost portion of the center pivot system with appurtenances. This portion includes the following items: pivot point, pipe, towers, pad, controls, sprinklers, installation.	Each	$6,441.55	1	$6,441.55
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	$70.54	1300	$91,706.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
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	$71.44	1	$71.44

DRAFT

Practice: 442 - Sprinkler System

Scenario: #2 - Linear Move System

Scenario Description: This practice includes converting from a gravity irrigated system to a linear irrigation system (lateral move). Resource concerns include: Soil Erosion (Concentrated flow erosion e.g. irrigation induced), Insufficient Water (Inefficient use of irrigation water), Water Quality Degradation (Excess nutrients in surface and ground waters, Excessive salts in surface and ground waters, Excess pathogens and chemicals from manure, bio-solids or compost applications), Inefficient Energy Use (Equipment and facilities e.g. pumping) Associated Practices: Irrigation Pipeline (430), Pumping Plant (533), Irrigation Water Management (449) Payment rate is figured per foot of installed hardware length.

Before Situation: A 76 acre field is flood irrigated. Application of irrigation water is inefficient and non-uniform. Irrigation water is typically over applied in some parts of the field, and under applied in others. Deep percolation from the excess irrigation delivers excess nutrients salts, and chemicals to the ground water. Runoff from the field contains excess nutrients and degrades the receiving waters. Irrigated induced erosion is excessive.

After Situation: A typical unit is approximately 76 acres in size with the sprinkler system typically 1280 feet in length. Irrigation water is efficiently and uniformly applied to maintain adequate soil water for the desired level of plant growth. Deep percolation and field runoff is eliminated and there are no excess nutrients, salts or pathogens delivered to the receiving waters. Irrigation induced runoff is eliminated.

Scenario Feature Measure: Length of Linear Move Lateral

Scenario Unit: Foot

Scenario Typical Size: 1280

Total Scenario Cost: $126,874.43

Scenario Cost/Unit: $99.12

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Linear Move System with appurtenances	322	Linear/lateral move system including: central tower, lateral towers, pipes, sprinklers, controllers, installation.	Acre	$1,660.71	76	$126,214.10
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$71.44	2	$142.88

DRAFT

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: 1300

Total Scenario Cost: $118,594.97

Scenario Cost/Unit: $91.23

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Global Position System	2454	GPS installed on the irrigation system to transmit location in the field back to the controller.	Each	$2,395.83	1	$2,395.83
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	$6,441.55	1	$6,441.55
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	$70.54	1300	$91,706.80
Nodes, Expansion, Variable Rate Irrigation	2464	Expansion Nodes that provide both power and control signals to valves.	Each	$632.23	4	$2,528.94
Tubing	2455	Valve tubing used to neumatically control variable rate valves.	Foot	$0.63	1300	$824.35
Valve, Pressure Regulating	2452	Valve installed between pump and pivot to reduce flow as pressure increases.	Each	$1,597.22	1	$1,597.22
Valve, Variable Rate	2456	Valves required for controlling flow at individual drop nozzles.	Each	$106.42	120	$12,770.11
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
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	$71.44	1	$71.44

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: 1300

Total Scenario Cost: $25,119.79

Scenario Cost/Unit: $19.32

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	24	$573.81
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	24	$479.86
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	24	$750.33
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
Equipment Installation						
Aerial lift, telescoping bucket	1893	Aerial lift, bucket truck or cherry picker, typical 40' boom. Equipment only.	Hour	$42.66	24	$1,023.95
Materials						
Global Position System	2454	GPS installed on the irrigation system to transmit location in the field back to the controller.	Each	$2,395.83	1	$2,395.83
Nodes, Expansion, Variable Rate Irrigation	2464	Expansion Nodes that provide both power and control signals to valves.	Each	$632.23	4	$2,528.94
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	$1,916.67	1	$1,916.67
Tubing	2455	Valve tubing used to neumatically control variable rate valves.	Foot	$0.63	1300	$824.35

Valve, Pressure Regulating	2452	Valve installed between pump and pivot to reduce flow as pressure increases.	Each	$1,597.22	1	$1,597.22
Valve, Variable Rate	2456	Valves required for controlling flow at individual drop nozzles.	Each	$106.42	120	$12,770.11

DRAFT

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: 1300

Total Scenario Cost: $4,312.50

Scenario Cost/Unit: $3.32

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Global Position System	2454	GPS installed on the irrigation system to transmit location in the field back to the controller.	Each	$2,395.83	1	$2,395.83
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	$1,916.67	1	$1,916.67

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

Total Scenario Cost: $640.33

Scenario Cost/Unit: $5.12

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	16	$319.91
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	8	$320.42

DRAFT

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

Total Scenario Cost: $1,409.94

Scenario Cost/Unit: $1,409.94

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	12	$239.93
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	8	$320.42
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	$71.44	2	$142.88
Materials						
Data Logger	1453	Data Logger W/Graphic Output for water management. Materials only.	Each	$596.50	1	$596.50
Soil Moisture Sensor	1456	Soil moisture resistance sensor W/10' cables. Equipment only.	Each	$36.74	3	$110.21

DRAFT

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

Total Scenario Cost: $703.24

Scenario Cost/Unit: $5.63

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	12	$239.93
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	8	$320.42
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	$71.44	2	$142.88

DRAFT

Practice: 449 - Irrigation Water Management

Scenario: #4 - IWM, Advanced Technique

Scenario Description: A high intensity irrigation water management system for producers using a checkbook method with advanced methods of determining irrigation water applied, and estimating crop evapotranspiration, monitoring field soil moisture, or monitoring crop temperature stress. Typical methods include flow measurement, daily record keeping, and use of real-time evapotranspiration estimates (such as those provided dedicated weather stations) and/or soil moisture sensors with automated data logging to monitor field soil moisture content and/or crop temperature. For this scenario, soil moisture is determined by automated soil moisture monitoring stations equipped with telemetry data. Irrigation amounts are recorded from a flow meter near the pump. Telemetry data is automatically sent to a computer with irrigation software. Irrigator also receives real time data via mobile phone applications. Some data such as total water applied may be entered into computer software manually. Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities. Associated Practices: 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: The farmer decides when to irrigate based on general crop or soil appearance or limited soil moisture monitoring. System run times are based on past apparent success. The typical irrigated field is a 125 acre corn field with sprinkler irrigation.

After Situation: Irrigations are scheduled based on measured crop water requirements. Records are used to evaluate results of past irrigation events and influence future irrigations. The irrigator keeps records of soil moisture, crop water use, rainfall amounts and irrigation timing and amounts. At the end of the irrigation season all the data has been reviewed and evaluated. Improvements planned for the next season have been determined.

Scenario Feature Measure: Irrigation system

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $2,562.35

Scenario Cost/Unit: $2,562.35

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	32	$639.81
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	48	$1,922.54

Practice: 466 - Land Smoothing

Scenario: #1 - Minor Shaping

Scenario Description: Removing irregularities on the land surface of cropland by use of heavy equipment.

Before Situation: Field damaged by flooding (resulting in gullies), past agricultural practices, or other topographic issues causing drainage or field workability issues.

After Situation: Land levelling by backhoe, dozer, scraper or other heavy equipment to correct irregularities and address drainage or workability issues. Typically consists of moving less than 100 cy/acre of material.

Scenario Feature Measure: Acres of land treated

Scenario Unit: Acre

Scenario Typical Size: 2

Total Scenario Cost: $744.10

Scenario Cost/Unit: $372.05

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	5	$137.77
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	$125.43	2	$250.86
Scraper, pull, 7 CY	1206	Pull type earthmoving scraper with 7 CY capacity. Does not include pulling equipment or labor. Add Tractor or Dozer, 160 HP typically required for single scraper.	Hour	$16.19	1	$16.19
Tractor, agricultural, 160 HP	1203	Agricultural tractor with horsepower range of 140 to 190. Equipment and power unit costs. Labor not included.	Hour	$80.55	1	$80.55
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

Practice: 466 - Land Smoothing

Scenario: #2 - Field Shaping

Scenario Description: Removing irregularities on the land surface of cropland by use of heavy equipment.

Before Situation: Depressions, mounds, old terraces, turn rows, and other surface irregularities interfere with the application of needed soil and water conservation and management practices, such as new terraces.

After Situation: Motor grader or other heavy equipment used to correct irregularities and address drainage or workability issues. Typically less than 100 cy/acre material moved, or about 150 cy per 1000 LF of terrace.

Scenario Feature Measure: Feet of land leveled

Scenario Unit: Foot

Scenario Typical Size: 10000

Total Scenario Cost: $4,424.58

Scenario Cost/Unit: $0.44

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	22	$606.19
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	$493.97	1	$493.97
Equipment Installation						
Motor Grader, 200 HP	1782	Motor Grader or Maintainer, 200 hp. Typical of equipment with HP in range of 170-225. Equipment cost, does not include labor.	Hour	$166.22	20	$3,324.43

DRAFT

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: 1340

Total Scenario Cost: $2,469.95

Scenario Cost/Unit: $1.84

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic Yard	$3.29	60	$197.66
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	60	$240.90
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$2.12	118	$250.69
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	8	$320.42
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Materials						
Turf reinforcement mat	1212	Synthetic turf reinforcement mat with staple anchoring. Includes materials, equipment and labor.	Square Yard	$6.33	149	$942.83

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: 2215

Total Scenario Cost: $5,196.80

Scenario Cost/Unit: $2.35

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic Yard	$3.29	146	$480.98
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	90	$361.35
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$2.12	234	$497.13
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	16	$640.85
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
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	$10.97	246	$2,699.05

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: 4710

Total Scenario Cost: $13,049.77

Scenario Cost/Unit: $2.77

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic Yard	$58.46	205	$11,984.18
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	$2.12	295	$626.73
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	3	$59.98
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	3	$120.16
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

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: 4710

Total Scenario Cost: $28,801.58

Scenario Cost/Unit: $6.11

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic Yard	$58.46	465	$27,183.63
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	$2.12	555	$1,179.09
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	3	$59.98
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	3	$120.16
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

Practice: 468 - Lined Waterway or Outlet

Scenario: #5 - Concrete

Scenario Description: Install 300 ' long by 15' wide by 1.5' deep with 2:1 sides slopes trapezoidal or parabolic shaped waterway lined with concrete. 1/2 the channel is excavated, before excavation for concrete and subgrade material. Excess excavation is spoiled in the immediate area. Concrete is installed over 100% of the width of the waterway to prevent scour. Cost include excavation, spoiling of excess material, 6" of clean sand or gravel subgrade, and 5" reinforced concrete slab. Lined waterway width is measured from top of bank to top of bank. (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: Concrete lined waterway is 300 ' long by 15' wide by 1.5' deep with 2:1 side slopes. Waterway is excavated using a hydraulic excavator. Concrete slab is placed on 6" of clean sand or #57 stone. Concrete is placed, graded and screeded by laborers. Associated practices are Subsurface Drain (606), Underground Outlet (620), Structure for Water Control (587), and Critical Area Seeding (342).

Scenario Feature Measure: Square Foot of Waterway

Scenario Unit: Square Foot

Scenario Typical Size: 4710

Total Scenario Cost: $23,486.23

Scenario Cost/Unit: $4.99

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$248.80	80	$19,904.14
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	$2.12	280	$594.86
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	110	$2,548.37
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	3	$59.98
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	3	$120.16
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

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: 4710

Total Scenario Cost: $33,874.91

Scenario Cost/Unit: $7.19

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	45	$1,028.55
Articulated precast concrete planking, 5 Foot Wide block	1906	Articulated precast concrete blocks with a typical thickness of 4.5 inches. Includes materials only.	Square Foot	$5.40	4710	$25,434.00
Equipment Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$2.12	200	$424.90
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$63.45	22.5	$1,427.65
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	$89.16	22.5	$2,006.08
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	51	$1,219.35
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	51	$1,019.70
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	25.5	$797.22
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

Practice: 468 - Lined Waterway or Outlet

Scenario: #7 - Splash Pad

Scenario Description: Install a 10'x10', 1' thick rock riprap pad at outlet into streams. Excess excavation is spoiled in the immediate area. Costs include 12" and smaller rock riprap installed. It does not include the cost of the required vegetation. 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 concentrated water flow. Velocities are generally too high or saturated soil conditions make it difficult to maintain a stable outlet.

After Situation: Runoff water is released through a stable outlet into streams or water courses without erosion or sedimentation. 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: Area of Splash Pad

Scenario Unit: Square Foot

Scenario Typical Size: 100

Total Scenario Cost: $628.44

Scenario Cost/Unit: $6.28

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic Yard	$58.46	3.7	$216.30
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	2	$47.82
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	1	$19.99
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	2	$80.11
Equipment Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	2	$90.21
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	$174.01	1	$174.01

DRAFT

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: Foot

Scenario Typical Size: 300

Total Scenario Cost: $1,031.84

Scenario Cost/Unit: $3.44

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	6	$143.45
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	6	$119.96
Equipment Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	5	$225.52
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$22.03	5	$110.16
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
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	$174.01	1	$174.01

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: Foot

Scenario Typical Size: 2640

Total Scenario Cost: $2,697.44

Scenario Cost/Unit: $1.02

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	21	$502.09
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	21	$419.88
Equipment Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	20	$902.09
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$22.03	20	$440.65
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
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	$174.01	1	$174.01

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: Foot

Scenario Typical Size: 2640

Total Scenario Cost: $8,672.25

Scenario Cost/Unit: $3.28

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	42	$1,157.26
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	42	$1,004.17
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	21	$419.88
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	$66.88	20	$1,337.59
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	20	$902.09
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$123.02	20	$2,460.42
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$22.03	20	$440.65
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	3	$776.17
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	$174.01	1	$174.01

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 Foot

Scenario Typical Size: 2000

Total Scenario Cost: $25,387.79

Scenario Cost/Unit: $12.69

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	153	$4,215.75
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	51	$1,019.70
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	$196.35	50	$9,817.30
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	$63.45	50	$3,172.57
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$123.02	50	$6,151.06
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	$493.97	1	$493.97
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

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 Foot

Scenario Typical Size: 2000

Total Scenario Cost: $13,250.93

Scenario Cost/Unit: $6.63

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	78	$2,149.21
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	26	$519.85
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	$196.35	25	$4,908.65
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	$63.45	25	$1,586.28
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$123.02	25	$3,075.53
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	$493.97	1	$493.97
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

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 Foot

Scenario Typical Size: 225

Total Scenario Cost: $1,325.12

Scenario Cost/Unit: $5.89

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	3	$82.66
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	2	$47.82
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	2	$39.99
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	$115.03	2	$230.06
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	2	$90.21
Truck, dump, 8 CY	1401	Dump truck for moving bulk material. Typically capacity is 12 ton or 8 cubic yards. Includes equipment only.	Hour	$58.21	1	$58.21
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	3	$776.17

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

Total Scenario Cost: $2,221.28

Scenario Cost/Unit: $1,110.64

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	9	$215.18
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	9	$179.95
Equipment Installation						
Brush Chipper, 6" capacity	938	Brush Chipper, 6" capacity, typically 35 HP. Includes chipper and power unit. Labor not included.	Hour	$21.49	8	$171.89
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$125.43	8	$1,003.44
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$22.03	2	$44.06
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
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	$174.01	2	$348.02

DRAFT

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

Total Scenario Cost: $4,159.75

Scenario Cost/Unit: $2,079.87

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	11	$303.09
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	11	$263.00
Equipment Installation						
Brush Chipper, 15" capacity	1868	Brush Chipper, 15" capacity, typically 165 HP. Includes chipper and power unit. Does not include labor.	Hour	$65.94	10	$659.43
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$196.35	10	$1,963.46
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$22.03	2	$44.06
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	$493.97	1	$493.97
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
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	$174.01	1	$174.01

Practice: 516 - Livestock Pipeline

Scenario: #2 - Standard Installation, 2" dia. or less (KS/NE)

Scenario Description: Description: The 1,500 foot 1 1/4" PE pipeline installed at a depth of 48" will meet the needs of domestic animals. This type of installation is only appropriate in the warmer climate of the northern plains region (KS &NE). This item includes installation, all materials, appurtenances, and labor required to construct and install the pipeline. Appurtenances include: 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 warmer climate of the northern plains region (KS &NE).

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 NE and KS (warmer climate). The 1,500 feet of 1 1/4" diameter PE pipe will be installed below ground at a depth of 48" to 60" to meet the water quantity requirements of domestic animals.

Scenario Feature Measure: Length of Pipe Installed

Scenario Unit: Foot

Scenario Typical Size: 1500

Total Scenario Cost: $3,610.32

Scenario Cost/Unit: $2.41

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	12	$239.93
Materials						
Freeze Proof Hydrant, <= 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$78.59	1	$78.59
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$0.81	1650	$1,333.78
Equipment Installation						
Trenching, Pipeline Plowing	1096	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	$1.13	1500	$1,699.30
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

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: Foot

Scenario Typical Size: 5000

Total Scenario Cost: $21,265.50

Scenario Cost/Unit: $4.25

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	32	$765.08
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	$19.99	64	$1,279.62
Materials						
Freeze Proof Hydrant, <= 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$78.59	4	$314.36
Pipe, PVC, 3", SCH 40	977	Materials: - 3" - PVC - SCH 40 - ASTM D1785	Foot	$2.86	5500	$15,740.25
Equipment Installation						
Trencher, 8"	936	Equipment and power unit costs. Labor not included.	Hour	$90.86	32	$2,907.46
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

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: Foot

Scenario Typical Size: 2640

Total Scenario Cost: $13,271.47

Scenario Cost/Unit: $5.03

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	80	$1,912.71
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	84	$1,679.51
Materials						
Earthfill Material, purchased, common	2060	Purchased earthfill materials includes both silt or clay. Material only.	Cubic Yard	$13.49	50	$674.31
Freeze Proof Hydrant, <= 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$78.59	2	$157.18
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.40	2904	$4,054.07
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	$56.69	80	$4,534.97
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

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: Foot

Scenario Typical Size: 2640

Total Scenario Cost: $17,528.25

Scenario Cost/Unit: $6.64

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	80	$1,912.71
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	84	$1,679.51
Materials						
Earthfill Material, purchased, common	2060	Purchased earthfill materials includes both silt or clay. Material only.	Cubic Yard	$13.49	50	$674.31
Freeze Proof Hydrant, <= 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$78.59	2	$157.18
Pipe, PVC, 3", SCH 40	977	Materials: - 3" - PVC - SCH 40 - ASTM D1785	Foot	$2.86	2904	$8,310.85
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	$56.69	80	$4,534.97
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

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: Foot

Scenario Typical Size: 200

Total Scenario Cost: $12,167.67

Scenario Cost/Unit: $60.84

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Freeze Proof Hydrant, <= 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$78.59	1	$78.59
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.40	200	$279.21
Equipment Installation						
Horizontal Boring, Less Than Equal 3" diameter	1131	Includes equipment, labor and setup.	Foot	$57.76	200	$11,551.15
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

Practice: 521A - Pond Sealing or Lining, Flexible Membrane

Scenario: #3 - Flexible Membrane - Covered without liner drainage or venting

Scenario Description: Installation of a flexible geosynthetic membrane liner to reduce seepage from ponds or waste storage impoundment structures. Practice implementation includes 1 foot of soil cover for liner protection, and a geotextile or soil cushion to protect liner from subgrade damage. Associated practices include PS378 Pond, PS313 Waste Storage Facility.

Before Situation: In-place soils at site exhibit seepage rates in excess of acceptable limits.

After Situation: Water conservation and enviromental protection provided by limiting seepage losses from ponds or waste storage impoundments.

Scenario Feature Measure: Surface area of Liner Material (including anchorage)

Scenario Unit: Square Yard

Scenario Typical Size: 2420

Total Scenario Cost: $25,240.52

Scenario Cost/Unit: $10.43

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	807	$3,240.11
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.39	2420	$5,772.54
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	$31.26	40	$1,250.55
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$174.01	1	$174.01
Materials						
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Yard	$6.12	2420	$14,803.30

DRAFT

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: 2420

Total Scenario Cost: $30,208.14

Scenario Cost/Unit: $12.48

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	807	$3,240.11
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	40	$1,250.55
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	$98.96	32	$3,166.62
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$174.01	1	$174.01
Materials						
Geonet	1778	Geosynthetic drainage liner, typically HDPE of 300 mil thickness. Includes materials and shipping only.	Square Yard	$3.13	2420	$7,573.54
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Yard	$6.12	2420	$14,803.30

DRAFT

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: 2420

Total Scenario Cost: $17,190.25

Scenario Cost/Unit: $7.10

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	2420	$9,716.33
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$16.79	6	$100.76
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$58.35	20	$1,167.10
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	20	$478.18
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	$98.96	3	$296.87
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	8	$320.42
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	$493.97	1	$493.97
Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been included in the component price.	Dollar	$1.00	1200	$1,200.00
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
Materials						
Soil Dispersant	1490	Soil Amendment (tetrasodium pyrophosphate (TSPP), sodium tripolyphosphate (STPP), or soda ash or approved equivalent)	Ton	$483.60	6.53	$3,157.91

DRAFT

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: 3227

Total Scenario Cost: $143,911.38

Scenario Cost/Unit: $44.60

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Bentonite	41	Bentonite, includes materials (50# bag)	Each	$24.76	5227	$129,403.53
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	3227	$12,956.44
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$16.79	4	$67.17
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$58.35	6	$350.13
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	6	$143.45
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	$98.96	2	$197.91
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	1	$40.05
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	$493.97	1	$493.97
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

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: 1613

Total Scenario Cost: $12,409.50

Scenario Cost/Unit: $7.69

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	1613	$6,476.21
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	$6.42	807	$5,180.60
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$493.97	1	$493.97
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

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: 2420

Total Scenario Cost: $15,068.06

Scenario Cost/Unit: $6.23

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic Yard	$3.29	807	$2,658.55
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	1613	$6,476.21
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	$6.42	807	$5,180.60
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$493.97	1	$493.97
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

Practice: 533 - Pumping Plant

Scenario: #1 - Irrigation, Modify Pump

Scenario Description: Description: This scenario includes the modification and/or replacement of vertical turbine pumps in new or existing active wells when done in conjunction with an irrigation conversion practice to ensure energy and water savings are realized. This includes an inventory of existing pump data and performing a pump test if sufficient performance data of the existing pump cannot be provided. This scenario includes all materials, equipment and labor to test and repair the inner column of the pump assembly and rebowling. 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: 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.

After Situation: 160 acres of cropland that has undergone an irrigation conversion practice to use a more efficient method of irrigation, which has had the pump modified to realize maximum water and energy savings.

Scenario Feature Measure: Number of pumps

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $14,286.07

Scenario Cost/Unit: $14,286.07

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	32	$639.81
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	16	$640.85
Equipment Installation						
Aerial lift, telescoping bucket	1893	Aerial lift, bucket truck or cherry picker, typical 40' boom. Equipment only.	Hour	$42.66	16	$682.63
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$22.03	16	$352.52
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Materials						
Pump, Bowl replacement, 30 to 100 HP	1984	Includes all material and shop labor to replace/service the entire set of bowls for a vertical turbine pump, install new bowls as necessary, and all appurtenances and materials to connect to the existing well column. Typical of 100 to 300 feet of column depth, 400 to 800 gpm discharge at 30 to 50 psi. Does not include labor and equipment to remove and install the assembled pump from the well.	Horsepower	$97.10	100	$9,710.05
Swing Check Valve, metal, 8"	2080	8" swing check valve for back flow prevention, ductile iron metal body with flange mount and lever shaft. Materials only.	Each	$1,742.76	1	$1,742.76

DRAFT

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

Total Scenario Cost: $12,073.45

Scenario Cost/Unit: $12,073.45

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	8	$159.95
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	8	$250.11
Materials						
Variable Speed Drive, 50 HP	1288	Variable speed drive for 50 Horsepower electric motor. Does not include motor. Materials only.	Horsepower	$233.27	50	$11,663.39

DRAFT

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

Total Scenario Cost: $16,215.41

Scenario Cost/Unit: $16,215.41

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$248.80	5	$1,244.01
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$115.03	16	$1,840.51
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	$27.55	16	$440.86
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	$19.99	48	$959.72
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	24	$961.27
Materials						
Manhole, 6' x 10'	2107	Precast Manhole with base and top delivered. 6' diameter x 10' depth. Materials, equipment and labor included.	Each	$6,661.44	1	$6,661.44
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	$1,968.95	1	$1,968.95
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	$125.33	15	$1,879.93
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

Practice: 533 - Pumping Plant

Scenario: #6 - Livestock, w/ Pressure Tank, = 0.5 hp

Scenario Description: Descriptions: A submersible electric-powered pump, equal to or less than 0.5 HP is installed in a well or structure. It is used to provide water for 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 herd requirements of a prescribed grazing system. Irrigation: A properly designed pump is installed to improve irrigation efficiency and reduce energy usage.

Scenario Feature Measure: No. of Pumps Installed

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $3,100.90

Scenario Cost/Unit: $3,100.90

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	8	$191.27
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	8	$159.95
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	8	$320.42
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	$56.69	8	$453.50
Materials						
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$0.81	150	$121.25
Pressure Tank, 40 gallon	1038	Pressure Tank, 40 gallon. Includes materials and shipping only.	Each	$463.67	1	$463.67
Pump, <= 5 HP, pump and motor, fixed cost portion	1009	Fixed cost portion of a pump less than or equal to 5 HP pump and motor. This portion is a base cost and is not dependant on horsepower. The total cost of any pump will include this fixed cost plus a variable cost portion. The completed pump and motor will	Each	$549.88	1	$549.88
Pump, <= 5 HP, pump and motor, variable cost portion	1010	Variable cost portion of a pump less than or equal to 5 HP pump and motor. This portion IS dependent on the total horsepower for the pump. The total cost of any pump will include this variable cost plus the fixed cost portion. The completed pump and moto	Horsepower	$413.86	0.5	$206.93
Pumping Plant Pit, Concrete, 1200 Gallon	1922	Precast concrete septic tank structure, 1200 gal capacity, with access port and ladder. Materials only.	Each	$1,501.20	0.25	$375.30
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

Practice: 533 - Pumping Plant

Scenario: #7 - Livestock, w/ Pressure Tank, 0.5 < hp < 2

Scenario Description: Descriptions: A submersible electric-powered pump, greater than 0.5 HP and less than 2 HP is installed in a well or structure. It is used to provide water for 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: No. of Pumps Installed

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $3,424.21

Scenario Cost/Unit: $3,424.21

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	8	$191.27
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	8	$159.95
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	8	$320.42
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	$56.69	8	$453.50
Materials						
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$0.81	175	$141.46
Pressure Tank, 40 gallon	1038	Pressure Tank, 40 gallon. Includes materials and shipping only.	Each	$463.67	0.5	$231.83
Pressure Tank, 80 gallon	1039	Pressure Tank, 80 gallon. Includes materials and shipping only.	Each	$656.01	0.5	$328.01
Pump, <= 5 HP, pump and motor, fixed cost portion	1009	Fixed cost portion of a pump less than or equal to 5 HP pump and motor. This portion is a base cost and is not dependant on horsepower. The total cost of any pump will include this fixed cost plus a variable cost portion. The completed pump and motor will	Each	$549.88	1	$549.88
Pump, <= 5 HP, pump and motor, variable cost portion	1010	Variable cost portion of a pump less than or equal to 5 HP pump and motor. This portion IS dependent on the total horsepower for the pump. The total cost of any pump will include this variable cost plus the fixed cost portion. The completed pump and moto	Horsepower	$413.86	1	$413.86
Pumping Plant Pit, Concrete, 1200 Gallon	1922	Precast concrete septic tank structure, 1200 gal capacity, with access port and ladder. Materials only.	Each	$1,501.20	0.25	$375.30
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

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

Total Scenario Cost: $1,405.16

Scenario Cost/Unit: $1,405.16

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	8	$159.95
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	4	$160.21
Materials						
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$0.81	150	$121.25
Pump, <= 5 HP, pump and motor, fixed cost portion	1009	Fixed cost portion of a pump less than or equal to 5 HP pump and motor. This portion is a base cost and is not dependant on horsepower. The total cost of any pump will include this fixed cost plus a variable cost portion. The completed pump and motor will	Each	$549.88	1	$549.88
Pump, <= 5 HP, pump and motor, variable cost portion	1010	Variable cost portion of a pump less than or equal to 5 HP pump and motor. This portion IS dependent on the total horsepower for the pump. The total cost of any pump will include this variable cost plus the fixed cost portion. The completed pump and moto	Horsepower	$413.86	1	$413.86

DRAFT

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

Total Scenario Cost: $7,052.83

Scenario Cost/Unit: $7,052.83

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$248.80	2	$497.60
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$22.03	8	$176.26
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	16	$319.91
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	8	$320.42
Materials						
Windmill, 6 or 8', fan diameter	1035	Includes materials costs for windmill head and 27' tower	Each	$5,738.64	1	$5,738.64

DRAFT

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

Total Scenario Cost: $6,052.73

Scenario Cost/Unit: $6,052.73

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	20	$625.27
Materials						
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$0.81	100	$80.84
Pump, <= 5 HP, pump and motor, fixed cost portion	1009	Fixed cost portion of a pump less than or equal to 5 HP pump and motor. This portion is a base cost and is not dependant on horsepower. The total cost of any pump will include this fixed cost plus a variable cost portion. The completed pump and motor will	Each	$549.88	1	$549.88
Pump, <= 5 HP, pump and motor, variable cost portion	1010	Variable cost portion of a pump less than or equal to 5 HP pump and motor. This portion IS dependent on the total horsepower for the pump. The total cost of any pump will include this variable cost plus the fixed cost portion. The completed pump and moto	Horsepower	$413.86	0.5	$206.93
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	$460.51	1	$460.51
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	$8,258.60	0.5	$4,129.30

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

Total Scenario Cost: $10,469.80

Scenario Cost/Unit: $10,469.80

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	20	$625.27
Materials						
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$0.81	200	$161.67
Pump, <= 5 HP, pump and motor, fixed cost portion	1009	Fixed cost portion of a pump less than or equal to 5 HP pump and motor. This portion is a base cost and is not dependant on horsepower. The total cost of any pump will include this fixed cost plus a variable cost portion. The completed pump and motor will	Each	$549.88	1	$549.88
Pump, <= 5 HP, pump and motor, variable cost portion	1010	Variable cost portion of a pump less than or equal to 5 HP pump and motor. This portion IS dependent on the total horsepower for the pump. The total cost of any pump will include this variable cost plus the fixed cost portion. The completed pump and moto	Horsepower	$413.86	1	$413.86
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	$460.51	1	$460.51
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	$8,258.60	1	$8,258.60

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

Total Scenario Cost: $19,223.09

Scenario Cost/Unit: $19,223.09

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	20	$625.27
Materials						
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$0.81	300	$242.51
Pump, <= 5 HP, pump and motor, fixed cost portion	1009	Fixed cost portion of a pump less than or equal to 5 HP pump and motor. This portion is a base cost and is not dependant on horsepower. The total cost of any pump will include this fixed cost plus a variable cost portion. The completed pump and motor will	Each	$549.88	1	$549.88
Pump, <= 5 HP, pump and motor, variable cost portion	1010	Variable cost portion of a pump less than or equal to 5 HP pump and motor. This portion IS dependent on the total horsepower for the pump. The total cost of any pump will include this variable cost plus the fixed cost portion. The completed pump and moto	Horsepower	$413.86	2	$827.72
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	$460.51	1	$460.51
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	$8,258.60	2	$16,517.19

Practice: 533 - Pumping Plant

Scenario: #15 - Wind Turbine-Powered Pump, 1.5 hp

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

Total Scenario Cost: $3,559.02

Scenario Cost/Unit: $3,559.02

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	16	$319.91
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	12	$480.64
Materials						
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$0.81	200	$161.67
Pump, <= 5 HP, pump and motor, fixed cost portion	1009	Fixed cost portion of a pump less than or equal to 5 HP pump and motor. This portion is a base cost and is not dependant on horsepower. The total cost of any pump will include this fixed cost plus a variable cost portion. The completed pump and motor will	Each	$549.88	1	$549.88
Pump, <= 5 HP, pump and motor, variable cost portion	1010	Variable cost portion of a pump less than or equal to 5 HP pump and motor. This portion IS dependent on the total horsepower for the pump. The total cost of any pump will include this variable cost plus the fixed cost portion. The completed pump and moto	Horsepower	$413.86	1.5	$620.79
Wind Turbine	2596	Wind generator, 1.5 kW maximum, 48 volt system. Includes materials and shipping only.	Each	$1,426.14	1	$1,426.14

Practice: 558 - Roof Runoff Structure

Scenario: #1 - Roof Gutter

Scenario Description: A roof runoff structure, consisting of gutter(s), downspout(s), and appropriate outlet facilities on a 200 feet long building by 10 feet tall side walls. Used to keep roof clean water runoff uncontaminated and provide a stable outlet to ground surface. Facilitates waste management and protects environment by minimizing clean water additions to waste systems and addresses water quality concerns. Associated practices include Waste Storage Facility (313), Composting Facility (317), Heavy Use Area Protection (561), Watering Facility (614), Underground Outlet (620), Diversion (362), Roofs and Covers (367), and any relevant irrigation practices.

Before Situation: Applicable where: (1) a roof runoff management facility is included in an overall plan for an overall plan for a waste management system; (2) roof runoff needs to be diverted away from structures or contaminated areas; (3) there is a need to collect, control, and transport runoff from roofs to a stable outlet.

After Situation: A gutter, downspout, and outlet system servicing the portion of the building roof that would otherwise drain into a waste management system or create erosion. Roof line of 200 feet serviced with gutter, downspouts, and appurtenances.

Scenario Feature Measure: Linear Length of Roof to be Guttered

Scenario Unit: Foot

Scenario Typical Size: 200

Total Scenario Cost: $885.70

Scenario Cost/Unit: $4.43

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	12	$239.93
Materials						
Downspout, Aluminum, Small	1700	Aluminum downspout (3" to 5") in width with hangers. Materials only.	Foot	$2.77	30	$83.17
Gutter, Aluminum, Small	1689	Aluminum gutter (4" to 6") in width with hangers. Materials only.	Foot	$2.81	200	$562.60

DRAFT

Practice: 560 - Access Road

Scenario: #1 - New 6 inch gravel road without Geotextile, Less than 2.5 Ft.

Scenario Description: Newly Constructed gravel road with min. 6 inch thick compacted gravel surface on relatively level ground. A properly constructed, well defined access road will address resource concerns related with compaction, emissions of fugitive dust, and excessive sediment in surface water. It also improves the plant productivity, vigor and health and substantially reduces the chance of wild fire hazards. Short term air quality deterioration may result if proper dust control measures are not implemented during the practice installation. Costs include excavation, shaping, grading, and all equipment, labor and incidental materials necessary to install the practice.

Before Situation: An agricultural enterprise which requires, but does not have, a fixed travel way for equipment and vehicles for various resource activities and where use of equipment and vehicles within the enterprise without a defined access road would result in compaction, excessive sediment and turbidity in surface water, reduced visibility, and emissions of fugitive dust. This scenario is applicable where the resource activity areas consist of relatively level, dry terrain lands.

After Situation: The road will be 16 feet wide with 6 inch gravel surfacing at the top. It is mostly in embankment less than 2.5 feet in height, (average 1.5 ft) typical side slopes 3:1. A properly constructed, well defined access road will greatly reduce sheet, rill and wind erosion, eliminate compaction in land use areas where it is harmful, reduce emissions of particulate matter (PM) and PM precursors and also reduce excessive sediment in surface water by reducing uncontrolled sediment transport. Planned grades will include all dips and water bars. If clearing and grubbing of land in the alignment area is required, use Land Clearing (460). Pipe culverts installed as part of access road should be covered by either Structures for Water Control (587) or Stream Crossings (578) depending on the type of structure. Earthfill embankment above the culvert structure would still be covered by this Practice. Diversions constructed as part of access road should be covered by Diversion (362). When seeding or revegetation is required, use Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of Roadway

Scenario Unit: Foot

Scenario Typical Size: 1000

Total Scenario Cost: $10,738.78

Scenario Cost/Unit: $10.74

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	1140	$4,577.11
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.90	926	$831.67
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	11	$343.90
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic Yard	$15.97	296	$4,727.38
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

Practice: 560 - Access Road

Scenario: #3 - New 6 inch gravel road without Geotextile, 2. ft. or higher

Scenario Description: Newly Constructed gravel road with min. 6 inch thick compacted gravel surface on relatively level ground. A properly constructed, well defined access road will address resource concerns related with compaction, emissions of fugitive dust, and excessive sediment in surface water. It also improves the plant productivity, vigor and health and substantially reduces the chance of wild fire hazards. Short term air quality deterioration may result if proper dust control measures are not implemented during the practice installation. Costs include excavation, shaping, grading, and all equipment, labor and incidental materials necessary to install the practice.

Before Situation: An agricultural enterprise which requires, but does not have, a fixed travel way for equipment and vehicles for various resource activities and where use of equipment and vehicles within the enterprise without a defined access road would result in compaction, excessive sediment and turbidity in surface water, reduced visibility, and emissions of fugitive dust. This scenario is applicable where the resource activity areas consist of relatively level, dry terrain lands.

After Situation: The road will be 16 feet wide with 6 inch gravel surfacing at the top. It is mostly in embankment equal to or greater than 2.5 feet in height, (average 3.0 ft) typical side slopes 3:1. A properly constructed, well defined access road will greatly reduce sheet, rill and wind erosion, eliminate compaction in land use areas where it is harmful, reduce emissions of particulate matter (PM) and PM precursors and also reduce excessive sediment in surface water by reducing uncontrolled sediment transport. Planned grades will include all dips and water bars. If clearing and grubbing of land in the alignment area is required, use Land Clearing (460). Pipe culverts installed as part of access road should be covered by either Structures for Water Control (587) or Stream Crossings (578) depending on the type of structure. Earthfill embankment above the culvert structure would still be covered by this Practice. Diversions constructed as part of access road should be covered by Diversion (362). When seeding or revegetation is required, use Critical Area Planting (342). Dust control must be addressed under Dust Control on Unpaved Roads and Surfaces (373).

Scenario Feature Measure: Length of Roadway

Scenario Unit: Foot

Scenario Typical Size: 1000

Total Scenario Cost: $17,623.37

Scenario Cost/Unit: $17.62

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	2780	$11,161.73
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.90	1260	$1,131.64
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	$31.26	11	$343.90
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic Yard	$15.97	296	$4,727.38
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

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

Total Scenario Cost: $3,380.05

Scenario Cost/Unit: $307.28

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$248.80	11	$2,736.82
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	$2.12	25	$53.11
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	11	$251.42
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	4	$79.98
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

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

Total Scenario Cost: $1,290.83

Scenario Cost/Unit: $43.03

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$2.12	43	$91.35
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.39	160	$381.66
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	4	$79.98
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic Yard	$15.97	30	$479.13
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

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

Total Scenario Cost: $4,630.84

Scenario Cost/Unit: $17.15

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	3	$59.98
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic Yard	$15.97	270	$4,312.14
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

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

Total Scenario Cost: $3,418.73

Scenario Cost/Unit: $3,418.73

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$56.69	8	$453.50
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.39	10	$23.85
Trencher, 8"	936	Equipment and power unit costs. Labor not included.	Hour	$90.86	8	$726.86
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	10	$228.57
Pipe, CMP, 48", 14 Gauge	1280	48" Corrugated Metal Pipe, Galvanized, Uncoated, 14 gage. Material cost only.	Foot	$41.09	6	$246.56
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
Pipe, PVC, 1 ½", SCH 40	975	Materials: - 1 1/2" - PVC - SCH 40 - ASTM D1785	Foot	$1.06	100	$106.20
Pipe, PVC, 4", SCH 40	978	Materials: - 4" - PVC - SCH 40 - ASTM D1785	Foot	$4.10	50	$204.92
Poly film, 6 mil.	245	6 mil, polyethylene, black	Square Foot	$0.08	240	$18.97
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	$175.61	1	$175.61
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	16	$382.54
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	$19.99	16	$319.91
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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

Total Scenario Cost: $5,240.87

Scenario Cost/Unit: $5,240.87

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$56.69	16	$906.99
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.39	30	$71.56
Trencher, 8"	936	Equipment and power unit costs. Labor not included.	Hour	$90.86	8	$726.86
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	30	$685.70
Pipe, CMP, 48", 14 Gauge	1280	48" Corrugated Metal Pipe, Galvanized, Uncoated, 14 gage. Material cost only.	Foot	$41.09	8	$328.75
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	$41.39
Pipe, PVC, 1 ½", SCH 40	975	Materials: - 1 1/2" - PVC - SCH 40 - ASTM D1785	Foot	$1.06	100	$106.20
Pipe, PVC, 4", SCH 40	978	Materials: - 4" - PVC - SCH 40 - ASTM D1785	Foot	$4.10	100	$409.83
Poly film, 6 mil.	245	6 mil, polyethylene, black	Square Foot	$0.08	720	$56.90
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	$175.61	1	$175.61
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	24	$573.81
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	32	$639.81
Mobilization						
Mobilization, medium	1139	Equipment with 70-150 HP or typical weights between 14,000 and	Each	$258.72	2	$517.44

DRAFT

equipment		30,000 pounds.				

DRAFT

Practice: 575 - Trails and Walkways

Scenario: #1 - Earthfill Walkway, 4 Ft high or less

Scenario Description: Layout and construct a lane or travel way of earthfill four feet high or less. Walkway will facilitate animal movement, to provide or improve access to forage, water, working/handling facilities, and/or shelter, Improve grazing efficiency and distribution, and/or protect ecologically sensitive, erosive and/or potentially erosive sites and address soil erosion and water quality resource concerns. Costs include Earthfill, shaping, grading, and all equipment, labor and incidental materials necessary to install the practices.

Before Situation: On farmstead area and pastureland and rangeland areas where control of animal movement is needed to address soil erosion, forage availability, and water quality resource concerns.

After Situation: The typical trail or walkway will be a 12 foot wide 200 foot long, with an average fill height of 3 feet. All excavation, earthfill, grading and shaping necessary to provide a smooth permanent travel surface for livestock. No surface materials are included with this practice. If the lane is vegetated and requires planting, the vegetation shall be planted according to Critical Area Planting, Code 342. Where vegetation is not practical, Heavy Use Area Protection, Code 561,shall be used to provide adequate surface protection. Structure for Water Control, Code 587, will be used when the trail or lane crosses water areas. Consider the use of water bars or culverts to control and direct water flow. Fencing, Code 382, will be used when needed to control animal movement.

Scenario Feature Measure: Length of Walkway created

Scenario Unit: Foot

Scenario Typical Size: 200

Total Scenario Cost: $2,254.53

Scenario Cost/Unit: $11.27

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	11	$303.09
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	11	$219.94
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	11	$343.90
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	$125.43	9	$1,128.87
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

Practice: 575 - Trails and Walkways

Scenario: #2 - Earthfill Walkway, Higher than 4 Ft.

Scenario Description: Layout and construct a lane or travel way of earthfill greater than four feet high. Walkway will facilitate animal movement, to provide or improve access to forage, water, working/handling facilities, and/or shelter, Improve grazing efficiency and distribution, and/or protect ecologically sensitive, erosive and/or potentially erosive sites and address soil erosion and water quality resource concerns. Costs include Earthfill, shaping, grading, and all equipment, labor and incidental materials necessary to install the practices.

Before Situation: On farmstead area and pastureland and rangeland areas where control of animal movement is needed to address soil erosion, forage availability, and water quality resource concerns.

After Situation: The typical trail or walkway will be a 12 foot wide 300 foot long, with an average fill height of 6 feet. All excavation, earthfill, grading and shaping necessary to provide a smooth permanent travel surface for livestock. No surface materials are included with this practice. If the lane is vegetated and requires planting, the vegetation shall be planted according to Critical Area Planting, Code 342. Where vegetation is not practical, Heavy Use Area Protection, Code 561,shall be used to provide adequate surface protection. Structure for Water Control, Code 587, will be used when the trail or lane crosses water areas. Consider the use of water bars or culverts to control and direct water flow. Fencing, Code 382, will be used when needed to control animal movement.

Scenario Feature Measure: Length of walkway

Scenario Unit: Foot

Scenario Typical Size: 300

Total Scenario Cost: $7,564.82

Scenario Cost/Unit: $25.22

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	37	$1,019.50
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	37	$739.78
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	37	$1,156.76
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	$125.43	35	$4,390.06
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

Practice: 576 - Livestock Shelter Structure

Scenario: #1 - Portable Wind Shelter

Scenario Description: Portable Livestock Fabricated Wind Shelter is installed to provide protection for livestock. The shelter can be moved around the grazing unit in order to prevent heavy use resource concerns at any one location.

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 degrades streambanks, causes excessive sedimentation, damages woody vegetation, overgrazes herbacious vegetation, in addition to degrading water quality through manure deposition and erosion. Resource concerns are water quality, animal health, plant productivity, health, and vigor, and inadequate shelter.

After Situation: Portable fabricated wind shelters are utilized to provide shelter for livestock in upland grazing areas from the riparian zones. The portable shelters are moved in rotation with feeding areas thereby limiting soil disturbance and reducing the impacts of heavy use at any one location. As a result of implementing this practice, the herd can be moved out of the impacted area and water quality and vegetation health resource concerns will be addressed. A typical portable wind shelter involves a series of steel framed panels faced with corrugated metal. Each unit is approximately 8 feet tall and 24 feet long, 80% solid faced. Four panels (96 - feet) would be utilized to provide shelter to a herd size of 190 animals.

Scenario Feature Measure: Length of Wind Shelter

Scenario Unit: Foot

Scenario Typical Size: 96

Total Scenario Cost: $1,209.03

Scenario Cost/Unit: $12.59

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	4	$95.64
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	$19.99	4	$79.98
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	8	$250.11
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	1	$31.26
Equipment Installation						
Portable Welder	1407	Portable field welder. Equipment only. Labor not included.	Hour	$20.64	1	$20.64
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$25.05	4	$100.22
Materials						
Drill Stem, steel, used	1393	Used drill stem typically 2-3/8" or 2-7/8" diameter. Materials only.	Foot	$1.79	352	$631.19

DRAFT

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: Foot

Scenario Typical Size: 200

Total Scenario Cost: $5,449.15

Scenario Cost/Unit: $27.25

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Corrugated Steel, 22 gauge	224	Corrugated or ribbed, galvanized, 22 gauge, includes fasteners, materials only.	Square Foot	$2.34	1360	$3,184.52
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.92	400	$369.91
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	$26.98	26	$701.37
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	21	$419.88
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	$7.39	5	$36.96
Tractor, agricultural, 60 HP	963	Agricultural tractor with horsepower range of 50 to 90. Equipment and power unit costs. Labor not included.	Hour	$25.05	5	$125.27
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$22.03	16	$352.52
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

Practice: 578 - Stream Crossing

Scenario: #1 - Bridge

Scenario Description: Install a bridge to allow stream flows to cross under access road or animal trail. Bridge opening determined by sizing for storm event dictated in standard. Scenario includes dewatering, abutments, girders, decking. Work consists of site preparation, dewatering, acquiring and installing abutments, girders, decking with necessary hardware, backfilling abutments, and armoring with geotextile and riprap. Riprap and geotextile are used to stabilize and protect abutments as needed. Scenario based on cast in place concrete abutments, steel girders, and timber deck. Travel surface shall be wooden deck surface. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Span is less than 14 feet. Load is H-20. Width is 14 feet including curbs. Abutments are <= 6 feet. Use (396) Aquatic Organism Passage instead, when the primary intent is biological concerns, not hydrologic.

Before Situation: Water flow could not cross access road or trail without erosion; or access road or trail could not cross channel.

After Situation: Access and waterflow are able to cross each other in a stable manner. Stream flow is not impeded and a stable base exists for equipment, people and/or animals to cross. Associated practices could be (342) Critical Area Planting, (560) Access Road, (575) Animal Trails and Walkways, (566) Recreational Trails and Walkways, (500) Obstruction Removal, or (584) Channel Stabilization.

Scenario Feature Measure: square footage of bridge deck

Scenario Unit: Square Foot

Scenario Typical Size: 252

Total Scenario Cost: $10,747.05

Scenario Cost/Unit: $42.65

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	20	$463.34
Block, pre-cast concrete, modular	1496	Pre-cast concrete blocks, typically 2ft x 2ft x 6ft , includes installation and delivery.	Cubic Yard	$116.22	18	$2,091.90
Dimension Lumber, untreated	1045	Untreated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners.	Board Foot	$0.82	2000	$1,636.13
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic Yard	$58.46	20	$1,169.19
Steel, structural steel members	1779	Structural steel, includes materials and fabrication.	Pound	$1.00	1500	$1,495.87
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	$27.55	8	$220.43
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	80	$2,501.10
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
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	$1.70	75	$127.83
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.82	8	$782.54

DRAFT

Practice: 578 - Stream Crossing

Scenario: #2 - Culvert installation

Scenario Description: Install a new culvert. Work includes dewatering, site preparation and removing any old crossing, acquiring and installing culvert pipe with gravel bedding and fill (compacted), and building headwalls. If a different travel surface is needed, refer to another appropriate standard for the surfacing. 48 inch Culvert installation with > 75 cy of fill needed and > 2 yds rock riprap for headwalls. Pipe is 50 feet long. Use (396) Aquatic Organism Passage instead, when the primary intent is biological concerns, not hydrologic. Use (587) Structure for Water Control instead, for ditch cross culverts and other intermittent flows.

Before Situation: Water flow could not cross access road or trail without erosion; or access road or trail could not cross channel.

After Situation: Access road and waterflow are able to cross each other in a stable manner. Stream flow is not impeded and a stable base exists for equipment, people and/or animals to cross. Associated practices could be (342) Critical Area Planting, (560) Access Road, (575) Animal Trails and Walkways, (566) Recreational Trails and Walkways.

Scenario Feature Measure: Culvert

Scenario Unit: Diameter Inch Foot

Scenario Typical Size: 2400

Total Scenario Cost: $6,892.97

Scenario Cost/Unit: $2.87

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Pipe, CMP, 48", 14 Gauge	1280	48" Corrugated Metal Pipe, Galvanized, Uncoated, 14 gage. Material cost only.	Foot	$41.09	50	$2,054.71
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic Yard	$58.46	12	$701.51
Equipment Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	3	$15.89
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	460	$1,846.91
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	$115.03	10	$1,150.32
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	$27.55	22	$606.19
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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

Total Scenario Cost: $3,524.86

Scenario Cost/Unit: $3.92

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic Yard	$58.46	41.7	$2,437.76
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$27.55	4	$110.22
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
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	$1.70	40	$68.18
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.82	4	$391.27

DRAFT

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

Total Scenario Cost: $5,856.22

Scenario Cost/Unit: $7.39

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$248.80	19.3	$4,801.87
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	$1.70	70	$119.31
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.82	2	$195.64
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	7.3	$166.85
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	$27.55	2	$55.11
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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

Total Scenario Cost: $6,108.64

Scenario Cost/Unit: $7.71

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	2	$55.11
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	4	$125.05
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	$1.70	70	$119.31
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	$115.03	2	$230.06
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.82	2	$195.64
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Materials						
Articulated precast concrete planking, 5 Foot Wide block	1906	Articulated precast concrete blocks with a typical thickness of 4.5 inches. Includes materials only.	Square Foot	$5.40	882	$4,762.80
Geotextile, non-woven, light weight	1209	Non-woven less than 8 ounce/square yard geotextile with staple anchoring. Materials and shipping only.	Square Yard	$1.17	88	$103.23

DRAFT

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

Total Scenario Cost: $4,053.78

Scenario Cost/Unit: $5.12

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	25	$579.18
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	$27.35	98	$2,680.07
Geotextile, non-woven, light weight	1209	Non-woven less than 8 ounce/square yard geotextile with staple anchoring. Materials and shipping only.	Square Yard	$1.17	88	$103.23
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	$27.55	2	$55.11
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	2	$62.53
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
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	$1.70	70	$119.31
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$97.82	2	$195.64

DRAFT

Practice: 580 - Streambank and Shoreline Protection

Scenario: #1 - Shaping

Scenario Description: Protection of streambanks consisting of conventional plantings of vegetation to stabilize and protect against scour and erosion. The purpose of this practice is to maintain, improve, or restore physical, chemical, and biological functions of a stream to provide diverse aquatic communities to improve habitat for desired aquatic species. Payment cost include shaping bank; 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 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 - Stormwater Runoff Control.

Before Situation: A stream bisects the agricultural property and has had all of the woody vegetation removed due to overgrazing or human manipulation; the stream has marginally degraded streambanks that are unstable and show signs of active erosion. Soil Erosion: The streambank is unstable. Water Quality Degradation: The sediment load has increased in the stream resulting in elevated water temperatures. Excess/Insufficient Water: The excessive sediment load has reduced the water conveyance capacity, storage capacity and flow within the stream. Inadequate Habitat for Fish and Wildlife: The deficiencies in the stream's habitat limit survival, growth, reproduction, and/or diversity of aquatic organisms within the stream.

After Situation: The streambank is stable against further erosion and encourages natural sediment transport and deposition. Loss of riparian areas and sediment load is reduced in the stream. For Soil Erosion: The streambank is stable. For Water Quality Degradation: The sediment load has decreased in the stream resulting in improved aquatic habitat. For Excess/Insufficient Water: The water conveyance capacity, storage capacity and flow within the stream has been stabilized. For Inadequate Habitat for Fish and Wildlife: The reduction in the sediment load promotes survival, growth, reproduction, and/or diversity of aquatic organisms within the stream's habitat.

Scenario Feature Measure: Linear Feet of Streambank/Shoreline Protected

Scenario Unit: Foot

Scenario Typical Size: 1000

Total Scenario Cost: $8,082.35

Scenario Cost/Unit: $8.08

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$66.88	16	$1,070.08
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	$2.12	2500	$5,311.23
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	16	$382.54
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	20	$801.06
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

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

DRAFT

Scenario Unit: Foot

Scenario Typical Size: 1000

Total Scenario Cost: $25,459.40

Scenario Cost/Unit: $25.46

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$66.88	16	$1,070.08
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	$2.12	2500	$5,311.23
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	$166.31	25	$4,157.85
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	$27.55	75	$2,066.54
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	16	$382.54
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	$19.99	380	$7,597.76
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	$40.05	90	$3,604.76

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	3	$776.17

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	$492.46

DRAFT

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: 1117

Total Scenario Cost: $73,532.87

Scenario Cost/Unit: $65.83

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic Yard	$58.46	1117	$65,299.16
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	16	$382.54
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	50	$2,002.65
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	$66.88	16	$1,070.08
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	$1.70	2500	$4,261.01
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

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: Foot

Scenario Typical Size: 48

Total Scenario Cost: $22,909.78

Scenario Cost/Unit: $477.29

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$66.88	16	$1,070.08
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic Yard	$3.29	100	$329.44
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	$1.70	150	$255.66
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	16	$382.54
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	$19.99	20	$399.88
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	50	$2,002.65
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Materials						
Gabion basket or mat	1378	Gabion baskets or mats installed and filled on grade, includes	Cubic Yard	$137.82	128	$17,640.51

		materials, transport, equipment, and labor, does not include geotextile fabric.				
Geotextile, non-woven, heavy weight	1210	Non-woven greater than 8 ounce/square yard geotextile with staple anchoring. Materials and shipping only.	Square Yard	$4.15	75	$311.58

DRAFT

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: 1680

Total Scenario Cost: $5,789.85

Scenario Cost/Unit: $3.45

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	15	$79.46
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	$63.45	4	$253.81
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	$27.55	4	$110.22
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	16	$319.91
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
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	$71.44	1	$71.44
Materials						
Pipe, PVC, 18", SCH 40	1373	Materials: - 18" - PVC - SCH 40 - ASTM D1785	Foot	$37.78	70	$2,644.88
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	$312.56	1	$312.56
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	$12.08	144	$1,738.86

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

Total Scenario Cost: $3,336.71

Scenario Cost/Unit: $3.48

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	5	$115.84
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	$18.97	40	$758.64
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic Yard	$58.46	22	$1,286.11
Equipment Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	20	$105.94
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	$63.45	7	$444.16
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	7	$167.36
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	10	$199.94
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

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

Total Scenario Cost: $3,995.66

Scenario Cost/Unit: $4.16

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	5	$115.84
Pipe, CMP, 24", 12 Gauge	1417	24" Corrugated Metal Pipe, Galvanized, Uncoated, 12 gage. Material cost only.	Foot	$28.25	40	$1,130.09
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic Yard	$58.46	22	$1,286.11
Equipment Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	20	$105.94
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	$63.45	9	$571.06
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$27.55	9	$247.99
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	14	$279.92
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

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

Total Scenario Cost: $2,392.28

Scenario Cost/Unit: $49.84

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	50	$264.86
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	$63.45	7	$444.16
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	$27.55	7	$192.88
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	14	$279.92
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
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	$11.28	48	$541.34
Slide gate, steel, 2' diameter, low head	1829	2' diameter steel slide gate for low head installations	Each	$410.40	1	$410.40

DRAFT

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

Total Scenario Cost: $1,004.03

Scenario Cost/Unit: $1,004.03

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	3	$82.66
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	2	$39.99
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	1	$40.05
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	$115.03	3	$345.10
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
Materials						
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$23.75	10	$237.51

DRAFT

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

Total Scenario Cost: $691.96

Scenario Cost/Unit: $691.96

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic Yard	$3.29	10	$32.94
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	10	$52.97
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	$89.16	2	$178.32
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	$27.55	2	$55.11
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
Materials						
Turf reinforcement mat	1212	Synthetic turf reinforcement mat with staple anchoring. Includes materials, equipment and labor.	Square Yard	$6.33	18	$113.90

DRAFT

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: Foot

Scenario Typical Size: 6000

Total Scenario Cost: $13,332.22

Scenario Cost/Unit: $2.22

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	78	$2,149.21
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	8	$320.42
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	$125.43	70	$8,780.13
Motor Grader, 200 HP	1782	Motor Grader or Maintainer, 200 hp. Typical of equipment with HP in range of 170-225. Equipment cost, does not include labor.	Hour	$166.22	8	$1,329.77
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	$493.97	1	$493.97
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

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: Foot

Scenario Typical Size: 2600

Total Scenario Cost: $4,711.04

Scenario Cost/Unit: $1.81

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	15	$413.31
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	6	$240.32
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	$125.43	7	$878.01
Motor Grader, 200 HP	1782	Motor Grader or Maintainer, 200 hp. Typical of equipment with HP in range of 170-225. Equipment cost, does not include labor.	Hour	$166.22	2	$332.44
Scraper, Self Propelled, 14 CY	2306	Self propelled earthmoving scraper with 14 CY capacity. Does not include labor.	Hour	$266.72	6	$1,600.30
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	$493.97	2	$987.94
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

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: Foot

Scenario Typical Size: 2500

Total Scenario Cost: $8,581.00

Scenario Cost/Unit: $3.43

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	48	$1,322.59
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	6	$240.32
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	$125.43	42	$5,268.08
Motor Grader, 200 HP	1782	Motor Grader or Maintainer, 200 hp. Typical of equipment with HP in range of 170-225. Equipment cost, does not include labor.	Hour	$166.22	6	$997.33
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	$493.97	1	$493.97
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

Practice: 606 - Subsurface Drain

Scenario: #1 - Corrugated Plastic Pipe (CPP), Single-Wall, <= 6 inch

Scenario Description: Description: Below ground installation of perforated HDPE (Corrugated Plastic Pipe) pipeline, using a drainage plow. HDPE (CPP) Single-Wall is manufactured in sizes (nominal diameter) from 3-inch to 24-inch; typical practice sizes range from 3-inch to 12-inch; and typical scenario size is 5-inch. Construct 2,000 feet of 5-inch, Single-Wall, perforated HDPE Corrugated Plastic Pipe (CPP), installed below ground to a minimum depth 5 feet. The typical number of mainline connections for 2,000 feet of subsurface drainline is a total of 3 each. Consideration must be given to Section 404 of Clean Water Act and Food Security Act regarding wetlands. Resource Concerns: Excess Water (Seasonal High Water Table); Degraded Plant Condition; Water Quality Degradation (Nutrients). Associated Practices: 608 - Surface Drain, Main or Lateral; 587 - Structure for Water Control, 533 - Pumping Plant; and 554 - Drainage Water Management,412-Grassed Waterway, 410- Grade Stabilization Structure, 313- Waste Storage Facility, 412-Grassed Waterway, 410- Grade Stabilization Structure, 313- Waste Storage Facility.

Before Situation: Before installation soil conditions are excessively wet in the spring due to poor internal soil drainage. Excess soil water is causing crop stress and delay of field operations (seed bed preparation, planting, etc.).

After Situation: The drainage modifications result in reduced plant stress due to excessive wetness caused by a seasonal high water table, or improved drainage water quality due to system retrofit enabling drainage water management.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Foot

Scenario Typical Size: 2000

Total Scenario Cost: $7,168.89

Scenario Cost/Unit: $3.58

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	3	$82.66
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	$56.69	3	$170.06
Trenching, tile line plowing, earth, 60"	1457	Plowing in 3"-15" CPP drain line into earth, 60" depth, includes equipment and labor for trenching, laying, and backfilling.	Foot	$2.43	2000	$4,858.06
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
Materials						
Drainage Lateral Connection	1458	Connect 3"-6" drainage lateral to main drain, includes excavation to 6' depth, install tee on main line, connect lateral, and backfill. Includes material cost for tee.	Each	$29.80	3	$89.40
Pipe, HDPE, corrugated single wall, <= 12" weight priced Compound	1380	High Density Polyethylene (HDPE) compound manufactured into single wall corrugated pipe or tubing. Materials only.	Pound	$1.71	1000	$1,709.98

DRAFT

Practice: 606 - Subsurface Drain

Scenario: #2 - Enveloped Corrugated Plastic Pipe (CPP), Single-Wall, <= 6 inch

Scenario Description: Description: Below ground installation of perforated HDPE (Corrugated Plastic Pipe) pipeline with Sand-Gravel envelope, using a drainage trencher. HDPE (CPP) Single-Wall is manufactured in sizes (nominal diameter) from 3-inch to 24-inch; typical practice sizes range from 3-inch to 12-inch; and typical scenario size is 5-inch. Construct 2,000 feet of 5-inch, Single-Wall, perforated HDPE Corrugated Plastic Pipe (CPP), installed below ground to a minimum depth of 5 feet, and surrounded with a sand-gravel envelope. The typical volume sand-gravel for 2,000 feet of 12"wide x 12" high envelope is 64 cubic yards. The typical number of mainline connections for 2,000 feet of subsurface drainline is a total of 3 each. Consideration must be given to Section 404 of Clean Water Act and Food Security Act regarding wetlands. Resource Concerns: Excess Water (seasonal High Water Table); Degraded Plant Condition; Water Quality Degradation (Nutrients). Associated Practices: 608 - Surface Drain, Main or Lateral; 587 - Structure for Water Control, 533 - Pumping Plant; and 554 - Drainage Water Management, 412-Grassed Waterway, 410- Grade Stabilization Structure, 313-Waste Storage Facility.

Before Situation: Before installation soil conditions are excessively wet in the spring due to poor internal soil drainage. Excess soil water is causing crop stress and delay of field operations (seed bed preparation, planting, etc.).

After Situation: The drainage modifications result in reduced plant stress due to excessive wetness caused by a seasonal high water table, or improved drainage water quality due to system retrofit enabling drainage water management.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Foot

Scenario Typical Size: 2000

Total Scenario Cost: $8,675.00

Scenario Cost/Unit: $4.34

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	64	$1,482.69
Drainage Lateral Connection	1458	Connect 3"-6" drainage lateral to main drain, includes excavation to 6' depth, install tee on main line, connect lateral, and backfill. Includes material cost for tee.	Each	$29.80	3	$89.40
Pipe, HDPE, corrugated single wall, <= 12" weight priced Compound	1380	High Density Polyethylene (HDPE) compound manufactured into single wall corrugated pipe or tubing. Materials only.	Pound	$1.71	1000	$1,709.98
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	$27.55	11	$303.09
Equipment Installation						
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	$89.16	10	$891.59
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	$1.97	2000	$3,939.52
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

Practice: 606 - Subsurface Drain

Scenario: #3 - Corrugated Plastic Pipe (CPP), Single-Wall, >= 8 inch

Scenario Description: Description: Below ground installation of HDPE (Corrugated Plastic Pipe) pipeline, using a drainage plow. HDPE (CPP) Single-Wall is manufactured in sizes (nominal diameter) from 3-inch to 24-inch; typical practice sizes range from 3-inch to 12-inch; and typical scenario size is 10-inch. Construct 1,000 feet of 10-inch, Single-Wall, HDPE Corrugated Plastic Pipe (CPP), installed below ground to a minimum depth 5 feet. Consideration must be given to Section 404 of Clean Water Act and Food Security Act regarding wetlands. Resource Concerns: Excess Water (Seasonal High Water Table); Degraded Plant Condition; Water Quality Degradation (Nutrients). Associated Practices: 607 - Surface Drain, Field Ditch; 608 - Surface Drain, Main or Lateral; 587 - Structure for Water Control, 533 - Pumping Plant; and 554 - Drainage Water Management, 412-Grassed Waterway, 410- Grade Stabilization Structure, 313- Waste Storage Facility.

Before Situation: Before installation soil conditions are excessively wet in the spring due to poor internal soil drainage. Excess soil water is causing crop stress and delay of field operations (seed bed preparation, planting, etc.).

After Situation: The drainage modifications result in reduced plant stress due to excessive wetness caused by a seasonal high water table, or improved drainage water quality due to system retrofit enabling drainage water management.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Foot

Scenario Typical Size: 1000

Total Scenario Cost: $5,507.00

Scenario Cost/Unit: $5.51

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Pipe, HDPE, corrugated single wall, <= 12" weight priced Compound	1380	High Density Polyethylene (HDPE) compound manufactured into single wall corrugated pipe or tubing. Materials only.	Pound	$1.71	1800	$3,077.97
Equipment Installation						
Trenching, tile line plowing, earth, 60"	1457	Plowing in 3"-15" CPP drain line into earth, 60" depth, includes equipment and labor for trenching, laying, and backfilling.	Foot	$2.43	1000	$2,429.03

DRAFT

Practice: 606 - Subsurface Drain

Scenario: #4 - Corrugated Plastic Pipe (CPP), Twin-Wall, >= 8 inch

Scenario Description: Description: Below ground installation of HDPE (Corrugated Plastic Pipe) pipeline, using a drainage plow. HDPE (CPP) Twin-Wall is manufactured in sizes (nominal diameter) from 4-inch to 60-inch; typical practice sizes range from 8-inch to 15-inch; and typical scenario size is 12-inch. Construct 1,000 feet of 12-inch, Twin-Wall, HDPE Corrugated Plastic Pipe (CPP), installed below ground to a minimum depth 5 feet. Consideration must be given to Section 404 of Clean Water Act and Food Security Act regarding wetlands. Resource Concerns: Excess Water (Seasonal High Water Table); Degraded Plant Condition; Water Quality Degradation (Nutrients). Associated Practices: 607 - Surface Drain, Field Ditch; 608 - Surface Drain, Main or Lateral; 587 - Structure for Water Control, 533 - Pumping Plant; and 554 - Drainage Water Management, 412-Grassed Waterway, 410- Grade Stabilization Structure, 313- Waste Storage Facility.

Before Situation: Before installation soil conditions are excessively wet in the spring due to poor internal soil drainage. Excess soil water is causing crop stress and delay of field operations (seed bed preparation, planting, etc.).

After Situation: The drainage modifications result in reduced plant stress due to excessive wetness caused by a seasonal high water table, or improved drainage water quality due to system retrofit enabling drainage water management.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Foot

Scenario Typical Size: 1000

Total Scenario Cost: $12,967.42

Scenario Cost/Unit: $12.97

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	68	$1,359.60
Equipment Installation						
Trenching, Earth, 24" x 60"	1460	Trenching, earth, 24" wide x 60" depth, includes equipment and labor for trenching and backfilling.	Foot	$3.85	1000	$3,847.66
Materials						
Pipe, HDPE, corrugated double wall, LTE-12", soil tight, weight priced	1587	High Density Polyethylene (HDPE) compound manufactured into double wall corrugated pipe LTE-12" diameter. Materials only.	Pound	$2.43	3200	$7,760.16

DRAFT

Practice: 606 - Subsurface Drain

Scenario: #5 - Secondary Main Retrofit for DWM

Scenario Description: An agricultural field has existing patterned tile system installed at 75 foot spacings. The field is 75 acres in size: 2475' x 1320', with a single main line at the low end of the field (2475'). The laterals are installed perpendicular to the topographic contours. The field has 3.5 feet of fall in the 1/4 mile length of the laterals, so a secondary main will be needed to allow drainage water management to be implemented on the higher half of the field.

Before Situation: The patterned tile drainage system allows free flow of drainage water to a receiving ditch. Drainage water carries nitrogen and phosphorus out of the soil and these nutrients pollute the receiving waters.

After Situation: A 12 inch diameter secondary mainline is retrofitted to the drainage system, located halfway up the field and relatively parallel to the topographic contours. This new mainline is hooked to each individual lateral and continued to a stable outlet. A Drainage Water practice must be completed along with the mainline; typically Structures for Water Control (587) installed at two foot vertical intervals so that water can be retained in the field. This scenario also applies to systems where the secondary main is used to connect drain lines that formerly each exited separately to the ditch, with a structure that distributes the drainage water into the subsurface soil at a vegetated buffer (772) OR a Denitrifying Bioreactor (747) might be installed at the outlet. In combination or singly, one of these practices must be installed with the secondary main.

Scenario Feature Measure: Length of Pipe

Scenario Unit: Foot

Scenario Typical Size: 3135

Total Scenario Cost: $23,820.19

Scenario Cost/Unit: $7.60

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Drainage Lateral Connection	1458	Connect 3"-6" drainage lateral to main drain, includes excavation to 6' depth, install tee on main line, connect lateral, and backfill. Includes material cost for tee.	Each	$29.80	32	$953.65
Pipe, HDPE, 12", PCPT, Single Wall	1274	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 12" diameter - ASTM F667. Material cost only.	Foot	$4.86	3135	$15,251.54
Equipment Installation						
Trenching, tile line plowing, earth, 60"	1457	Plowing in 3"-15" CPP drain line into earth, 60" depth, includes equipment and labor for trenching, laying, and backfilling.	Foot	$2.43	3135	$7,615.00

DRAFT

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 appropriate.

Scenario Feature Measure: Capacity in Gallons

Scenario Unit: Gallon

Scenario Typical Size: 1200

Total Scenario Cost: $2,010.88

Scenario Cost/Unit: $1.68

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	4	$95.64
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	$19.99	4	$79.98
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic Yard	$15.97	1.5	$23.96
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.92	30	$27.74
Freeze Proof Hydrant, <= 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$78.59	1	$78.59
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.98	3	$23.93
Tank, Galvanized Steel Livestock, > 300 - 1,000 gallon	1068	Includes tank materials and float valve	Gallon	$0.76	1200	$910.62
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.70	2	$49.40
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	$56.69	2	$113.37
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	2	$90.21
Mobilization						

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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: 1200

Total Scenario Cost: $1,933.88

Scenario Cost/Unit: $1.61

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$56.69	1	$56.69
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	$122.61	0.25	$30.65
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	1	$45.10
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	2	$47.82
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	2	$39.99
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic Yard	$15.97	1.5	$23.96
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.92	30	$27.74
Freeze Proof Hydrant, <= 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$78.59	1	$78.59
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.98	3	$23.93
Tank, Tire, 10' diameter	287	Tire, includes material cost for tank and shipping. Labor and other appurtenance costs not included.	Each	$992.57	1	$992.57

Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.70	2	$49.40

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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: 1200

Total Scenario Cost: $3,102.43

Scenario Cost/Unit: $2.59

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	10	$239.09
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	6	$119.96
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic Yard	$15.97	1.5	$23.96
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.92	30	$27.74
Freeze Proof Hydrant, <= 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$78.59	1	$78.59
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.98	3	$23.93
Tank, Fiberglass, 10' diameter by 2' height	2526	Fiberglass stockwater tank, includes material cost for tank and shipping. Labor and other appurtenance costs not included.	Each	$1,975.67	1	$1,975.67
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.70	2	$49.40
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
Equipment Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to	Hour	$56.69	3	$170.06

		90. Equipment and power unit costs. Labor not included.				
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	3	$135.31

DRAFT

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: 1200

Total Scenario Cost: $2,301.42

Scenario Cost/Unit: $1.92

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$56.69	1	$56.69
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	$122.61	0.25	$30.65
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	$248.80	1.5	$373.20
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	1	$45.10
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	0.8	$18.29
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.92	30	$27.74
Freeze Proof Hydrant, <= 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$78.59	1	$78.59
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.98	3	$23.93
Tank, Tire, 10' diameter	287	Tire, includes material cost for tank and shipping. Labor and other appurtenance costs not included.	Each	$992.57	1	$992.57
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.70	2	$49.40
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts,	Hour	$23.91	2	$47.82

		Mulchers				
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	2	$39.99

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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: 1200

Total Scenario Cost: $3,469.97

Scenario Cost/Unit: $2.89

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$56.69	3	$170.06
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	$248.80	1.5	$373.20
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	3	$135.31
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	0.8	$18.29
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.92	30	$27.74
Freeze Proof Hydrant, <= 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$78.59	1	$78.59
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.98	3	$23.93
Tank, Fiberglass, 10' diameter by 2' height	2526	Fiberglass stockwater tank, includes material cost for tank and shipping. Labor and other appurtenance costs not included.	Each	$1,975.67	1	$1,975.67
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.70	2	$49.40
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	10	$239.09
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer,	Hour	$19.99	6	$119.96

		herder, concrete placement, materials spreader, flagger, etc.				

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

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: 10500

Total Scenario Cost: $3,976.44

Scenario Cost/Unit: $0.38

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	19.7	$450.28
Bentonite	41	Bentonite, includes materials (50# bag)	Each	$24.76	6	$148.54
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.92	30	$27.74
Freeze Proof Hydrant, <= 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$78.59	1	$78.59
Poly film, 6 mil.	245	6 mil, polyethylene, black	Square Foot	$0.08	1414	$111.75
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.98	3	$23.93
Tank, Galvanized Steel Bottomless Livestock, > 6,000 gallon	1070	Includes tank materials, shipping, and float valve, no liner	Gallon	$0.19	10500	$1,999.98
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.70	2	$49.40
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	6	$143.45
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	6	$119.96
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	$56.69	3	$170.06
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and	Hour	$45.10	3	$135.31

		power unit costs. Labor not included.				

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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: 4700

Total Scenario Cost: $6,434.07

Scenario Cost/Unit: $1.37

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$56.69	4	$226.75
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$248.80	11.2	$2,786.58
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	10	$451.05
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	8.4	$192.00
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.92	60	$55.49
Freeze Proof Hydrant, <= 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$78.59	1	$78.59
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.98	3	$23.93
Tank, Galvanized Steel Bottomless Livestock, <= 6,000 gallon	1069	Includes tank materials, shipping, and float valve, no liner	Gallon	$0.28	4700	$1,317.99
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.70	2	$49.40
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	14	$334.72
General Labor	231	Labor performed using basic tools such as power tool, shovels, and	Hour	$19.99	12	$239.93

		other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.				
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	4	$160.21

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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

Total Scenario Cost: $1,853.62

Scenario Cost/Unit: $1,853.62

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$248.80	1.6	$398.08
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$45.10	2	$90.21
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	0.8	$18.29
Freeze Proof Hydrant, <= 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$78.59	1	$78.59
Tank, Freeze Proof, 4 hole	281	Tank, Freeze Proof with 4 drinking holes. Includes materials and shipping.	Each	$921.93	1	$921.93
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	2	$47.82
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	2	$39.99
Mobilization						
Mobilization, medium	1139	Equipment with 70-150 HP or typical weights between 14,000 and	Each	$258.72	1	$258.72

equipment		30,000 pounds.				

DRAFT

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

Total Scenario Cost: $1,823.70

Scenario Cost/Unit: $3.65

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.91	2	$47.82
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	2	$39.99
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic Yard	$15.97	0.9	$14.37
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.92	20	$18.50
Freeze Proof Hydrant, <= 3' Bury	240	Freeze Proof Hydrant, 3 foot or less bury. Materials only.	Each	$78.59	1	$78.59
Post, Wood, CCA Treated, 4-5" X 7'	1050	Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only.	Each	$7.98	3	$23.93
Tank, Concrete, 500 gallon	1049	Concrete tank for water storage, with riser and lid. Includes materials and delivery	Each	$956.57	1	$956.57
Wildlife Escape Ramp	242	Pool size 15' x 30', for small mammals less than one pound	Each	$24.70	1	$24.70
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	$56.69	1	$56.69
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and	Hour	$45.10	1	$45.10

		power unit costs. Labor not included.				

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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: 5000

Total Scenario Cost: $8,108.46

Scenario Cost/Unit: $1.62

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	1.3	$30.12
Tank, Concrete, 2500 gallon	1055	Concrete tank for water storage, with riser and lid. Includes materials and delivery.	Each	$3,210.43	2	$6,420.86
Tank, Float Valve Assembly	1077	Float Valve, Stem, Swivel, Float Ball	Each	$24.16	1	$24.16
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	$27.55	8	$220.43
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	16	$319.91
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	4	$160.21
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	$66.88	4	$267.52
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$166.31	4	$665.26

Practice: 620 - Underground Outlet

Scenario: #4 - 4 inch - 6 inch PVC or DW w Riser

Scenario Description: Install 400 feet of 4" &6" approved plastic pipe (PVC or Dual Wall HDPE) to convey stormwater from one location to a suitable and stable outlet in high pressure flow conditions, situations needing greater capacity or where rodent damage may be a concern. Trench excavation is 48" deep and 12" wide for 4" pipe, and 18-24" wide for 6" pipe. Costs include 6" PVC pipe, 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: Foot

Scenario Typical Size: 400

Total Scenario Cost: $2,679.21

Scenario Cost/Unit: $6.70

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	6	$31.78
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.24	400	$497.90
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	8	$159.95
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	1	$40.05
Materials						
Inlet, riser, 6"	1261	Riser, polymer, complete vertical perforated UGO inlet with Tee, orifice plate if needed, 6" diameter. Materials only.	Each	$70.31	2	$140.62
Pipe, PVC, 4", SDR 35	992	Materials: - 4" - PVC - SDR 35 - ASTM D3034	Foot	$1.99	200	$397.52
Pipe, PVC, 6", SDR 35	993	Materials: - 6" - PVC - SDR 35 - ASTM D3034	Foot	$4.47	200	$893.94
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

Practice: 620 - Underground Outlet

Scenario: #6 - 6 inch or smaller Single Wall PE 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: Foot

Scenario Typical Size: 400

Total Scenario Cost: $1,706.01

Scenario Cost/Unit: $4.27

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	6	$31.78
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.24	400	$497.90
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	8	$159.95
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	1	$40.05
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Materials						
Inlet, riser, 6"	1261	Riser, polymer, complete vertical perforated UGO inlet with Tee, orifice plate if needed, 6" diameter. Materials only.	Each	$70.31	2	$140.62
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	$91.97
Pipe, HDPE, 6", CPT, Single Wall	1242	Pipe, Corrugated Plastic Tubing, Single Wall, 6" diameter - ASTM F405. Material cost only.	Foot	$1.13	200	$226.29

DRAFT

Practice: 620 - Underground Outlet

Scenario: #7 - 8 inch - 10 inch PVC or DW 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: Foot

Scenario Typical Size: 400

Total Scenario Cost: $6,250.69

Scenario Cost/Unit: $15.63

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	10	$52.97
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	$1,141.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	8	$159.95
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	1	$40.05
Materials						
Inlet, riser, 8"	1262	Riser, polymer, complete vertical perforated UGO inlet with Tee, orifice plate if needed, 8" diameter. Materials only.	Each	$109.37	2	$218.74
Pipe, PVC, 10", SDR 35	1251	Pipe, PVC, SDR 35, 10" Diameter - ASTM D3034. Material cost only.	Foot	$12.57	200	$2,514.44
Pipe, PVC, 8", SDR 35	994	Materials: - 8" - PVC - SDR 35 - ASTM D3034	Foot	$8.03	200	$1,605.29
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

Practice: 620 - Underground Outlet

Scenario: #9 - 12 inch - 18 inch PVC or DW 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: Foot

Scenario Typical Size: 400

Total Scenario Cost: $5,948.45

Scenario Cost/Unit: $14.87

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	14	$74.16
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	$1,141.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	8	$159.95
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	1	$40.05
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Materials						
Inlet, riser, 10"	1263	Riser, polymer, complete vertical perforated UGO inlet with Tee, orifice plate if needed, 10" diameter. Materials only.	Each	$148.31	2	$296.61
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	$7.31	200	$1,462.84
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	$11.28	200	$2,255.59

DRAFT

Practice: 620 - Underground Outlet

Scenario: #10 - 12 inch - 18 inch PVD or DW w Canopy

Scenario Description: Install 80 feet of 12" approved plastic pipe (PVC or Dual Wall HDPE) to convey stormwater from one location to a suitable and stable outlet in pressure flow conditions and when draining single practices. Trench Excavation is 48" deep and 24" wide. Costs include 12" PVC pipe, 12" canopy or hooded 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: Foot

Scenario Typical Size: 80

Total Scenario Cost: $2,477.97

Scenario Cost/Unit: $30.97

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	7	$37.08
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	80	$228.36
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	4	$79.98
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	1	$40.05
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Materials						
Hooded Inlet, 12"	1423	Hooded Inlet for 12" dia. pipe. Includes materials and labor for fabrication and installation.	Each	$136.38	1	$136.38
Pipe, PVC, 12", SDR 35	1252	Pipe, PVC, SDR 35, 12" Diameter - ASTM D3034. Material cost only.	Foot	$17.98	80	$1,438.67

DRAFT

Practice: 620 - Underground Outlet

Scenario: #11 - Over 18 inch PVC or DW w/ Riser

Scenario Description: Install 60 feet of greater than 18" approved plastic (PVC or Dual Wall HDPE) or CMP pipe 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 24" HDPE dual wall pipe, 36" dual wall HDPE pipe 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: Foot

Scenario Typical Size: 60

Total Scenario Cost: $2,259.80

Scenario Cost/Unit: $37.66

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	4	$79.98
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	4	$160.21
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
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	$1.70	35	$59.65
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	$2.53	35	$88.59
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	$18.97	60	$1,137.96
Pipe, HDPE, CPT, Double Wall, Soil Tight, 36"	1248	Pipe, Corrugated HDPE Double Wall, 36" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$35.99	6	$215.96

DRAFT

Practice: 620 - Underground Outlet

Scenario: #57 - 6 inch - 10 inch PVC or DW w Canopy

Scenario Description: Install 80 feet of 8" approved plastic pipe (PVC or Dual Wall HDPE) to convey stormwater from one location to a suitable and stable outlet in pressure flow conditions and when draining single practices. Trench Excavation is 48" deep and 24" wide. Typical costs include 8" PVC pipe, 8" canopy or hooded 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: Foot

Scenario Typical Size: 80

Total Scenario Cost: $1,621.84

Scenario Cost/Unit: $20.27

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	5	$26.49
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	80	$228.36
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	4	$79.98
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	1	$40.05
Materials						
Hooded Inlet, 8"	1421	Hooded Inlet for 8" dia. pipe. Includes materials and labor for fabrication and installation.	Each	$87.40	1	$87.40
Pipe, PVC, 8", SDR 35	994	Materials: - 8" - PVC - SDR 35 - ASTM D3034	Foot	$8.03	80	$642.12
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

Practice: 629 - Waste Treatment

Scenario: #1 - Swine Waste, Phosphorus Reduction System

Scenario Description: This practice scenario includes infrastructure to remove phosphorus from swine operation wastewater in watersheds with limited land for application and the phosphorus index is rated High or greater. The purpose of the practice is to address resource concerns related to water quality degradation (excess nutrients). Associated practices: Nutrient Management (590), Waste Storage Facility (313), Irrigation Water Conveyance, Pipeline (430), Irrigation System, Spinkler (442), Irrigation System, Microirrigation (442)

Before Situation: Untreated swine lagoon water is applied to fields in a watershed where the phosphorus index is rated High or greater.

After Situation: This scenario assumes that swine wastewater is treated with a phosphorus reduction system. The precipitated phosphorus, in the form of struvite, can be collected and sold to commercial fertilizer producers. The treated wastewater may be able to be agronomically applied at higher application rates and/or on fewer acres. This system has been shown to decrease movement of phosphorus particles into waterways.

Scenario Feature Measure: gallons per minute treated

Scenario Unit: Gallon per Minute

Scenario Typical Size: 600

Total Scenario Cost: $383,827.03

Scenario Cost/Unit: $639.71

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	907.5	$28,371.83
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	$98.96	133.2	$13,181.05
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	$493.97	1	$493.97
Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been included in the component price.	Dollar	$1.00	7442	$7,442.00
Materials						
Struvite extraction system	1865	Struvite extraction system (magnesium ammonium phosphate) Phred components including fabricated parts, off the shelf parts, and installation materials.	Each	$334,338.17	1	$334,338.17

DRAFT

Practice: 629 - Waste Treatment

Scenario: #2 - Pathogen Removal System

Scenario Description: This practice scenario includes a reclamation system to treat and recycle water collected from the overflow of livestock watering facilities. The associated pipelines, collection manholes, pumping plants, and other items are covered by other conservation practices. The portion of the system covered by this scenario includes sand media filters, a pathogen removal system (such as an ultraviolet light treatment unit, chlorination, or ozone system), and a small building to house the treatment facility. The complete system collects overflows from multiple feedlot watering facilities (where overflow is used to prevent winter freeze-up), filters and disinfects the water to a quality suitable for livestock consumption, and then conveys the treated water back into the livestock water supply system. Associated practices: Nutrient Management (590), Waste Storage Facility (313), Livestock Pipeline (516), Irrigation Pipeline (430), Sprinkler System (442), Pumping Plant (533), Structure for Water Control (587), Waste Recycling (633), Waste Transfer 634)

Before Situation: Overflow water picks up excessive nutrients and organics from ground surface contaminants, and results in a substantial loss of water available for livestock consumption. Overflow water is discharged into the waste stream collected by a waste storage pond, increasing the storage and waste utilization requirements.

After Situation: Overflow water is disinfected to a quality suitable for livestock consumption, and is conveyed back into the livestock water supply system. This decreases the volume of process-generated wastewater that is discharged into the waste storage pond system. This increases the effective storage capacity and service life of the waste storage ponds and facilitates nutrient management by decreasing the amount of wastewater that must be applied to agricultural land. Implementation also provides a water conservation benefit.

Scenario Feature Measure: Design flow rate

Scenario Unit: Gallon per Minute

Scenario Typical Size: 300

Total Scenario Cost: $27,928.00

Scenario Cost/Unit: $93.09

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$248.80	4	$995.21
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$66.88	8	$535.04
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$27.55	8	$220.43
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	24	$479.86
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	24	$750.33
Materials						
Micro Irrigation, Media Filter, 30" to 48" Dia. tank, Equipped for Automatic Flush	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	$5,211.81	2	$10,423.63
Pathogen Removal System	2547	Pathogen removal system for wastewater, using ultraviolet light, chlorination, ozone, or similar treatment, with a capacity up to 0.5 MGD. Includes materials and shipping only.	Each	$11,951.66	1	$11,951.66
Post Frame Building, enclosed 4 sides	1046	Enclosed post frame building, four walls. Building sites with expected snow loads up to 30 lbs per square foot and wind exposure in semi protected areas (wooded or terrain with numerous closely spaced obstructions). Includes materials, shipping, and labor only.	Square Foot	$9.25	250	$2,313.13

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

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

Total Scenario Cost: $33,848.72

Scenario Cost/Unit: $33,848.72

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$248.80	7.5	$1,866.01
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	3.7	$84.57
Vibratory or Rotating Screen	1948	Vibratory or Rotating Screen, includes materials, shipping and equipment.	Each	$30,325.37	1	$30,325.37
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	32	$639.81
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$31.26	16	$500.22
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
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	$174.01	1	$174.01

DRAFT

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: 30000

Total Scenario Cost: $7,962.16

Scenario Cost/Unit: $0.27

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$1.65	37.3	$61.61
Pipe, PVC, 12", SCH 80	1352	Materials: - 12" - PVC - SCH 80 - ASTM D1785	Foot	$31.02	60	$1,861.24
Post, Wood, CCA treated, 6" x 8'	12	Wood Post, End 6" X 8', CCA Treated. Includes materials and shipping only.	Each	$15.10	4	$60.40
Wire Mesh Screen, galvanized, 1/16 in	1229	Wire Mesh Screen, galvanized, 1/16 inch grid spacing. Materials only.	Square Foot	$4.11	32	$131.49
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	$248.80	3.3	$821.05
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	1000	$4,015.01
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	16	$319.91
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
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	$174.01	1	$174.01

DRAFT

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: 4000

Total Scenario Cost: $11,670.53

Scenario Cost/Unit: $2.92

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$386.95	14.8	$5,726.89
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	$248.80	12.3	$3,060.26
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	50	$200.75
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$2.12	100	$212.45
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	9.9	$229.35
Weeping Wall	1765	Weeping wall or picket screen structure for solid settling basin. Materials only.	Foot	$53.48	20	$1,069.51
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	24	$479.86
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
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	$174.01	1	$174.01

DRAFT

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: 16280

Total Scenario Cost: $113,385.27

Scenario Cost/Unit: $6.96

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$386.95	72.1	$27,899.24
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	$248.80	301.5	$75,013.72
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$2.12	2412	$5,124.28
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	201	$4,656.58
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
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	$174.01	1	$174.01

DRAFT

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: 1200

Total Scenario Cost: $13,177.56

Scenario Cost/Unit: $10.98

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$386.95	11	$4,256.47
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$248.80	22	$5,473.64
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$66.88	8	$535.04
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	$2.53	4	$10.12
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	$27.55	8	$220.43
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	40	$799.76
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	$40.05	24	$961.27
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic Yard	$15.97	26	$415.24
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	$15.43	16	$246.86

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72

DRAFT

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: Foot

Scenario Typical Size: 150

Total Scenario Cost: $3,804.93

Scenario Cost/Unit: $25.37

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	10	$228.57
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	$11.28	150	$1,691.69
Equipment Installation						
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic Yard	$3.29	45	$148.25
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	57	$301.94
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$2.12	97	$206.08
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	24	$479.86
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	10	$400.53
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$174.01	2	$348.02

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: Foot

Scenario Typical Size: 150

Total Scenario Cost: $6,395.74

Scenario Cost/Unit: $42.64

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$22.86	13	$297.14
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	$27.70	150	$4,154.44
Equipment Installation						
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic Yard	$3.29	45	$148.25
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	57	$301.94
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$2.12	125	$265.56
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	24	$479.86
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	10	$400.53
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$174.01	2	$348.02

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: Foot

Scenario Typical Size: 1000

Total Scenario Cost: $13,538.35

Scenario Cost/Unit: $13.54

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$122.61	1	$122.61
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	90	$476.75
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	$2,854.50
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	40	$799.76
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	$40.05	10	$400.53
Materials						
Pipe, PVC, 6", SDR 21	987	Materials: - 6" - PVC - SDR 21 200 psi - ASTM D2241	Foot	$7.76	1100	$8,536.18
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	$174.01	2	$348.02

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: Foot

Scenario Typical Size: 1000

Total Scenario Cost: $19,375.59

Scenario Cost/Unit: $19.38

DRAFT

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$122.61	1	$122.61
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	90	$476.75
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	$2,854.50
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	40	$799.76
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	$40.05	10	$400.53
Materials						
Pipe, PVC, 8", SDR 21	988	Materials: - 8" - PVC - SDR 21 200 psi - ASTM D2241	Foot	$13.07	1100	$14,373.41
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	$174.01	2	$348.02

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: Foot

Scenario Typical Size: 1000

Total Scenario Cost: $26,291.09

Scenario Cost/Unit: $26.29

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$122.61	1	$122.61
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	127	$672.74
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	$2,854.50
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	40	$799.76
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	$40.05	10	$400.53
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$174.01	2	$348.02
Materials						
Pipe, PVC, 10", SDR 21	1714	Materials: - 10" - PVC - SDR 21 - ASTM D2241	Foot	$19.18	1100	$21,092.92

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: Foot

Scenario Typical Size: 300

Total Scenario Cost: $11,716.63

Scenario Cost/Unit: $39.06

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$122.61	2	$245.23
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.30	89	$471.45
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	$2.12	97	$206.08
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	40	$799.76
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	$40.05	10	$400.53
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$174.01	2	$348.02
Materials						
Pipe, PVC, 12", SDR 21	1717	Materials: - 12" - PVC - SDR 21 - ASTM D2241	Foot	$28.02	330	$9,245.56

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

Total Scenario Cost: $8,126.96

Scenario Cost/Unit: $4,063.48

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$248.80	7	$1,741.61
Dozer, 80 HP	929	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$66.88	24	$1,605.11
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	$2.12	70	$148.71
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.39	600	$1,431.21
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	70	$1,621.69
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	$27.55	24	$661.29
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	20	$399.88
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

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

Total Scenario Cost: $23,517.61

Scenario Cost/Unit: $11,758.81

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$248.80	7	$1,741.61
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic Yard	$3.29	6453	$21,258.56
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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

Total Scenario Cost: $22,787.02

Scenario Cost/Unit: $2,278.70

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$66.88	24	$1,605.11
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	$2.12	310	$658.59
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.39	2800	$6,678.98
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.24	50	$62.24
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	310	$7,181.78
Pipe, aluminum, smooth wall gated irrigation, 8"	2029	8" diameter smooth wall gated irrigation aluminum pipe. Material only.	Foot	$6.70	700	$4,687.40
Pipe, PVC, 6", SCH 40	980	Materials: - 6" - PVC - SCH 40 - ASTM D1785	Foot	$6.69	50	$334.29
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$27.55	24	$661.29
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	20	$399.88
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

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

Total Scenario Cost: $23,110.01

Scenario Cost/Unit: $11,555.01

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic Yard	$3.29	6453	$21,258.56
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.24	50	$62.24
Materials						
Pipe, aluminum, smooth wall gated irrigation, 8"	2029	8" diameter smooth wall gated irrigation aluminum pipe. Material only.	Foot	$6.70	140	$937.48
Pipe, PVC, 6", SCH 40	980	Materials: - 6" - PVC - SCH 40 - ASTM D1785	Foot	$6.69	50	$334.29
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

Practice: 635 - Vegetated Treatment Area

Scenario: #8 - Minor Shaping

Scenario Description: This is a permanent herbaceous vegetative area or channel installed down slope from a livestock production area or diversion. 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 2.0 ac in size, includes a shaped vegetated area to promote sheet flow through the VTA. Typically requires grading and shaping 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: Amount of VTA installed

Scenario Unit: Acre

Scenario Typical Size: 2

Total Scenario Cost: $2,880.36

Scenario Cost/Unit: $1,440.18

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	16	$440.86
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	$125.43	12	$1,505.16
Motor Grader, 160 HP	1781	Motor Grader or Maintainer, 160 hp. Typical of equipment with HP in range of 150-170. Equipment cost, does not include labor.	Hour	$104.22	4	$416.89
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

Practice: 638 - Water and 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

Total Scenario Cost: $2,850.56

Scenario Cost/Unit: $4.07

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	700	$2,810.51
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$40.05	1	$40.05

DRAFT

Practice: 638 - Water and 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

Total Scenario Cost: $3,075.09

Scenario Cost/Unit: $4.39

Cost Details

DRAFT

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.02	700	$2,810.51
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.90	250	$224.53
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	$40.05	1	$40.05

Practice: 642 - Water Well

Scenario: #1 - Well Point

Scenario Description: Typical construction is for a 2" diameter well screen, 36" long, with 2"diameter pipe and couplings are driven or water jetted to a typical depth depth of 20 feet into a shallow water bearing formation. The purpose of the practice is to provide water for livestock. The area near the well point is sloped to direct surface water away from entering the well.

Before Situation: Livestock have insufficient water or are fenced from their water source.

After Situation: Sufficient water is available for livestock. Utilize Pumping Plant (533) and Pipeline (516) as associated practices. Use Critical Area Seeding (342) where necessary to prevent erosion following construciton activities.

Scenario Feature Measure: Depth of Well

Scenario Unit: Foot

Scenario Typical Size: 15

Total Scenario Cost: $1,409.57

Scenario Cost/Unit: $93.97

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	2	$39.99
Materials						
Test, Standard Water Test, Well Water	309	Well Water Suitability test. Includes materials and shipping only.	Each	$42.13	1	$42.13
Well Cap, 2"	1784	Well cap, 2". Materials only.	Each	$30.86	1	$30.86
Well Casing, Stainless Steel/Copper, 2"	1796	Stainless steel or Copper well casing, 2". Materials only.	Foot	$19.99	17	$339.83
Well Screen, plastic, 2"	1997	2" PVC well screen. Materials only.	Foot	$3.82	3	$11.45
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	1	$258.72
Equipment Installation						
Rotary Drill Rig	1595	Rotary drill rig including equipment and power unit costs. Labor not included.	Hour	$343.29	2	$686.59

DRAFT

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: Foot

Scenario Typical Size: 75

Total Scenario Cost: $5,299.51

Scenario Cost/Unit: $70.66

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	1	$23.17
Chlorine	1335	Liquid chlorine bleach. Includes materials only.	Gallon	$2.74	1	$2.74
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	$720.99	2	$1,441.98
Test, Standard Water Test, Well Water	309	Well Water Suitability test. Includes materials and shipping only.	Each	$42.13	1	$42.13
Well Cap, 4"	1785	Well cap, 4". Materials only.	Each	$25.67	1	$25.67
Well Casing, Plastic, 4"	1803	PVC or ABS non-threaded well casing, 4". Materials only.	Foot	$3.64	55	$200.26
Well Screen, plastic, 4"	1998	4" PVC well screen. Materials only.	Foot	$6.99	20	$139.80
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	8	$159.95
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Equipment Installation						
Rotary Drill Rig	1595	Rotary drill rig including equipment and power unit costs. Labor not included.	Hour	$343.29	8	$2,746.35

DRAFT

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: Foot

Scenario Typical Size: 200

Total Scenario Cost: $10,026.22

Scenario Cost/Unit: $50.13

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	1.5	$34.75
Chlorine	1335	Liquid chlorine bleach. Includes materials only.	Gallon	$2.74	1	$2.74
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	$720.99	2	$1,441.98
Test, Standard Water Test, Well Water	309	Well Water Suitability test. Includes materials and shipping only.	Each	$42.13	1	$42.13
Well Cap, 4"	1785	Well cap, 4". Materials only.	Each	$25.67	1	$25.67
Well Casing, Plastic, 4"	1803	PVC or ABS non-threaded well casing, 4". Materials only.	Foot	$3.64	150	$546.17
Well Screen, plastic, 4"	1998	4" PVC well screen. Materials only.	Foot	$6.99	50	$349.50
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	10	$199.94
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Equipment Installation						
Rotary Drill Rig	1595	Rotary drill rig including equipment and power unit costs. Labor not included.	Hour	$343.29	20	$6,865.88

DRAFT

Practice: 642 - Water Well

Scenario: #6 - Single PVC Casing with pitless unit, greater than 100 ft. deep

Scenario Description: Typical construction is for the installation of a well with a pitless unit, 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: Foot

Scenario Typical Size: 200

Total Scenario Cost: $10,433.22

Scenario Cost/Unit: $52.17

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$23.17	1.5	$34.75
Chlorine	1335	Liquid chlorine bleach. Includes materials only.	Gallon	$2.74	1	$2.74
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	$720.99	2	$1,441.98
Pitless Adapter Unit	2549	Attach pitless adapter unit to existing well casing. Includes installation and labor costs.	Each	$158.54	1	$158.54
Test, Standard Water Test, Well Water	309	Well Water Suitability test. Includes materials and shipping only.	Each	$42.13	1	$42.13
Well Cap, 4"	1785	Well cap, 4". Materials only.	Each	$25.67	1	$25.67
Well Casing, Plastic, 4"	1803	PVC or ABS non-threaded well casing, 4". Materials only.	Foot	$3.64	150	$546.17
Well Screen, plastic, 4"	1998	4" PVC well screen. Materials only.	Foot	$6.99	50	$349.50
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	$27.55	2	$55.11
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	14	$279.92
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	$56.69	2	$113.37
Rotary Drill Rig	1595	Rotary drill rig including equipment and power unit costs. Labor not included.	Hour	$343.29	20	$6,865.88
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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: Foot

Scenario Typical Size: 2000

Total Scenario Cost: $91,538.24

Scenario Cost/Unit: $45.77

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	200	$3,998.82
Materials						
Chlorine	1335	Liquid chlorine bleach. Includes materials only.	Gallon	$2.74	1	$2.74
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	$720.99	2	$1,441.98
Test, Standard Water Test, Well Water	309	Well Water Suitability test. Includes materials and shipping only.	Each	$42.13	1	$42.13
Well Cap, 6"	1786	Well cap, 6". Materials only.	Each	$33.60	1	$33.60
Well Casing, Plastic, 6"	1804	PVC or ABS non-threaded well casing, 6". Materials only.	Foot	$6.52	500	$3,260.57
Well Casing, Stainless Steel/Copper, 2"	1796	Stainless steel or Copper well casing, 2". Materials only.	Foot	$19.99	2000	$39,980.57
Well Screen, stainless steel, 2"	2278	2" Stainless steel well screen. Materials only.	Foot	$21.30	50	$1,065.09
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44
Equipment Installation						
Rotary Drill Rig	1595	Rotary drill rig including equipment and power unit costs. Labor not included.	Hour	$343.29	120	$41,195.28

DRAFT

Practice: 642 - Water Well

Scenario: #8 - Steel or Copper with pitless unit, 100 ft. or deeper

Scenario Description: Typical construction is for the installation of a well with a pitless unit, 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: Foot

Scenario Typical Size: 2000

Total Scenario Cost: $91,945.24

Scenario Cost/Unit: $45.97

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$27.55	2	$55.11
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	204	$4,078.80
Materials						
Chlorine	1335	Liquid chlorine bleach. Includes materials only.	Gallon	$2.74	1	$2.74
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	$720.99	2	$1,441.98
Pitless Adapter Unit	2549	Attach pitless adapter unit to existing well casing. Includes installation and labor costs.	Each	$158.54	1	$158.54
Test, Standard Water Test, Well Water	309	Well Water Suitability test. Includes materials and shipping only.	Each	$42.13	1	$42.13
Well Cap, 6"	1786	Well cap, 6". Materials only.	Each	$33.60	1	$33.60
Well Casing, Plastic, 6"	1804	PVC or ABS non-threaded well casing, 6". Materials only.	Foot	$6.52	500	$3,260.57
Well Casing, Stainless Steel/Copper, 2"	1796	Stainless steel or Copper well casing, 2". Materials only.	Foot	$19.99	2000	$39,980.57
Well Screen, stainless steel, 2"	2278	2" Stainless steel well screen. Materials only.	Foot	$21.30	50	$1,065.09
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	$56.69	2	$113.37
Rotary Drill Rig	1595	Rotary drill rig including equipment and power unit costs. Labor not included.	Hour	$343.29	120	$41,195.28
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$258.72	2	$517.44

DRAFT

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

Total Scenario Cost: $18.07

Scenario Cost/Unit: $18.07

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	0.167	$3.34
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	$14.73	1	$14.73

DRAFT

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

Total Scenario Cost: $23.16

Scenario Cost/Unit: $23.16

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$19.99	0.167	$3.34
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	$19.82	1	$19.82

DRAFT

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

Total Scenario Cost: $343.96

Scenario Cost/Unit: $343.96

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	1	$31.26
Materials						
Lighting, fixture, Fluorescent, 75 watt	1168	75 watt fluorescent lamp fixture with T5 or T8 lamps and ballast. Materials only.	Each	$312.70	1	$312.70

DRAFT

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

Total Scenario Cost: $32.21

Scenario Cost/Unit: $32.21

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	1	$31.26
Materials						
Lighting, Pulse Start Metal Halide	2425	Replacement of lighting with PSMH Light.	Watt	$0.95	1	$0.95

DRAFT

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

Total Scenario Cost: $285.41

Scenario Cost/Unit: $285.41

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	4	$125.05
Materials						
Switches and Controls, programmable controller	1193	Programmable logic controller (with or without wireless telecommunications) commonly used to control pumps and irrigation systems	Each	$160.35	1	$160.35

DRAFT

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: 20000

Total Scenario Cost: $13,787.62

Scenario Cost/Unit: $0.69

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total

Materials

Insulation, Fiberglass or cellulose, R-15	1196	Fiberglass or cellulose insulation R-15, includes materials, equipment and labor to install.	Square Foot	$0.69	20000	$13,787.62

DRAFT

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: 4500

Total Scenario Cost: $7,561.64

Scenario Cost/Unit: $1.68

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total

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	$1.68	4500	$7,561.64

DRAFT

Practice: 672 - Building Envelope Improvement

Scenario: #3 - Building Envelope - Sealant

Scenario Description: A typical scenario is sealing the gaps between walls, gables, ceiling, etc. in a poultry house or greenhouse. Sealing is performed by a professional contractor, not merely use of spray foam from a can. The unit basis of payment in this scenario is each house based on 60' x 500' poultry house with an assumed need of sealant to seal 2400 linear feet of gap.

Before Situation: An agricultural facility with an inefficient building envelope with gaps between walls, ceiling, etc. for a total of 2400 linear feet.

After Situation: A more effective and efficient building envelope can be created through interior sealing of the exterior walls at the footer plate, eaves, ridge cap, and gable ends. The sealant reduces seasonal heat loss and heat gain due to infiltration which reduces the respective need for heating and cooling equipment to operate. Associated practices/activities: may include 122-AgEMP - HQ and 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Perimeter of heated structure

Scenario Unit: Foot

Scenario Typical Size: 2400

Total Scenario Cost: $3,495.16

Scenario Cost/Unit: $1.46

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$1.46	2400	$3,495.16

DRAFT

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: 25000

Total Scenario Cost: $7,584.92

Scenario Cost/Unit: $0.30

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$31.26	16	$500.22
Materials						
Insulation, Greenhouse, Reflective Bubble	2410	Double bubble reflective insulation with aluminum foil on both sides. Includes materials and shipping only.	Square Foot	$0.28	25000	$7,084.70

DRAFT