Practice: 578 - Stream Crossing

Scenario: #1 - Culvert Installation, >30 inch diameter

Scenario Description:

Install a new culvert greater than 30" in diameter. HDPE and CMP are acceptable materials under this scenario. For culverts less than 30" use Practice Standard 587 Structure for Water Control. Work includes dewatering, site preparation and removing any old crossing, acquiring and installing culvert pipe with gravel bedding and fill (compacted), and building headwalls. If a different travel surface is needed, refer to another appropriate standard for the surfacing. 36 inch Culvert installation with <75 cy of fill needed and < 2 yds rock riprap for headwalls. Pipe is 40 feet long.Use (396) Aquatic Organism Passage instead, when the primary intent is biological concerns, not hydrologic. Use (587) Structure for Water Control instead, for ditch cross culverts and other intermittent flows and culverts less than 30" in diameter.

Before Situation:

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

After Situation:

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

Scenario Feature Measure: Culvert

Scenario Unit: Inch-Foot

Scenario Typical Size: 1,440

Scenario Cost: $5,051.69 **Scenario Cost/Unit:** $3.51

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$112.94	10	$1,129.40
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.60	3	$16.80
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$34.14	10	$341.40
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$82.51	2	$165.02
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	$35.02	40	$1,400.80
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$34.86	50	$1,743.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$255.27	1	$255.27

Practice: 578 - Stream Crossing

Scenario: #2 - Low Water Crossing, Riprap

Scenario Description:

Stabilize the bottom and slope of a stream channel using rock riprap or cast in place concrete. This scenario includes site preparation, dewatering, acquiring and installing gravel or geotextile with rock riprap or cast in place concrete on channel bottom and approaches. Final travel surface shall be the rocks or concrete. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Typical stream has 30 foot bottom width and approaches. Width is 14 feet for a total area as 420sf. Use (396) Aquatic Organism Passage instead, when the primary intent is biological concerns, not hydrologic.

Before Situation:

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

After Situation:

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

Scenario Feature Measure: Crossing dimensions

Scenario Unit: Square Foot

Scenario Typical Size: 420

Scenario Cost: $3,045.13 **Scenario Cost/Unit:** $7.25

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$95.88	8	$767.04
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	$1.80	18	$32.40
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$34.14	8	$273.12
Materials						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$82.51	18	$1,485.18
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$487.39	1	$487.39

Practice: 578 - Stream Crossing

Scenario: #3 - Low water crossing using prefabricated products

Scenario Description:

To install a stable crossing medium on channel bottom and approaches. Medium includes but not limited to precast concrete blocks, geocells, pavers, and gabions. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Typical stream has 30 foot bottom width and approaches. Width is 14 feet for a total area as 420sf. Use (396) Aquatic Organism Passage instead, when the primary intent is biological concerns, not hydrologic.

Before Situation:

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

After Situation:

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

Scenario Feature Measure: low water crossing

Scenario Unit: Square Foot

Scenario Typical Size: 420

Scenario Cost: $4,832.43 **Scenario Cost/Unit:** $11.51

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$1.80	18	$32.40
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$95.88	8	$767.04
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.74	40	$989.60
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$34.14	8	$273.12
Materials						
GeoCell, 4"	1054	Polymer 3-D cellular grid 4" deep that is filled with stone or earth. Includes materials, labor and equipment for the geocell only, does not include backfill.	Square Yard	$28.98	50	$1,449.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$34.86	18	$627.48
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	$34.40	6	$206.40
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$487.39	1	$487.39

Practice: 578 - Stream Crossing

Scenario: #4 - Low Water Crossing, River Rock

Scenario Description:

Stabilize the bottom and slope of a stream channel using natural river rock to achieve a more natural low water crossing. This scenario includes site preparation, dewatering, acquiring and installing gravel or geotextile with river rock on channel bottom and approaches. Final travel surface shall be the river rocks. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Typical stream is 50 feet wide. Width is 15 feet and the depth is 1.5 feet for a total volume of 42 cubic yard. 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: Cubic yard of crossing material

Scenario Unit: Cubic Yard

Scenario Typical Size: 42

Scenario Cost: $11,084.99 **Scenario Cost/Unit:** $263.93

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$120.04	16	$1,920.64
Clearing and Grubbing	40	Clearing and Grubbing, includes materials, equipment and labor	Acre	$307.50	0.5	$153.75
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.42	85	$205.70
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	$5.60	24	$134.40
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$188.78	16	$3,020.48
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$42.73	16	$683.68
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.74	16	$395.84
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$34.14	32	$1,092.48
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$40.66	16	$650.56
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.58	16	$681.28
Materials						
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$29.24	48	$1,403.52
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$255.27	1	$255.27

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	$487.39	1	$487.39

Practice: 578 - Stream Crossing

Scenario: #5 - Bridge with a span of less than or equal to 14 feet

Scenario Description:

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

Before Situation:

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

After Situation:

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

Scenario Feature Measure: square footage of bridge deck

Scenario Unit: Square Foot

Scenario Typical Size: 252

Scenario Cost: $17,923.62 **Scenario Cost/Unit:** $71.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
	43				100	
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	$1.80	75	$135.00
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$224.23	15	$3,363.45
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$95.88	8	$767.04
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$40.66	80	$3,252.80
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$34.14	8	$273.12
Materials						
Dimension Lumber, untreated	1045	Untreated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners.	Board Foot	$0.73	2000	$1,460.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	$34.86	20	$697.20
Steel, structural steel members	1779	Structural steel, includes materials and fabrication.	Pound	$1.01	4200	$4,242.00
Block, pre-cast concrete, modular	1496	Pre-cast concrete blocks, typically 2ft x 2ft x 6ft , includes installation and delivery.	Cubic Yard	$101.53	18	$1,827.54
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$82.51	20	$1,650.20
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$255.27	1	$255.27

Practice: 578 - Stream Crossing

Scenario: #6 - Bridge with cast in place abutments, span > 14 feet

Scenario Description:

Install a bridge to allow stream flows to cross under access road or animal trail. Bridge opening determined by sizing for storm event dictated in standard. Scenario includes dewatering, abutments, girders, decking. Work consists of site preparation, dewatering, acquiring and installing abuttments, girders, decking with necessary hardware, backfilling abuttments, and armoring with geotextile and riprap. Riprap and geotextile are used to stabilize and protect abutments as needed. Scenario based on cast in place concrete abutments, steel girders, and timber deck. Travel surface shall be wooden deck surface. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Span is greater than 14 feet. Load is H-20. Width is 15 feet including curbs. Abutment height as needed from design. 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: Linear feet of bridge deck

Scenario Unit: Linear Foot

Scenario Typical Size: 30

Scenario Cost: $72,606.28 **Scenario Cost/Unit:** $2,420.21

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$55.45	40	$2,218.00
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$42.73	40	$1,709.20
Truck, Concrete Pump	1211	Concrete pump, normally truck mounted. Use this item in association with other concrete components when job requires placement by other than normal chutes. Include drive and setup time in quantity; therefore, do not include mobilization. Includes equi	Hour	$185.65	8	$1,485.20
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$188.78	60	$11,326.80
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$120.04	40	$4,801.60
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$485.73	32	$15,543.36
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$105.41	120	$12,649.20
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$40.66	40	$1,626.40
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.74	60	$1,484.40

Labor

Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$34.14	140	$4,779.60
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.58	40	$1,703.20

Materials

Pipe, PE, 4", DR 9, perforated	2140	Materials: -4" - Perforated PE- 160 psi - ASTM D3035 DR 9	Foot	$11.35	60	$681.00
Steel, structural steel members	1779	Structural steel, includes materials and fabrication.	Pound	$1.01	5360	$5,413.60
Epoxy anchor	1599	Galvanized bolts anchored into concrete or stone using epoxy adhesive. Includes materials and labor to drill and install.	Each	$18.20	12	$218.40
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.83	2500	$2,075.00
Galvanized Bolts, large	2166	5/8" x 12" galvanized timber bolts. Materials only.	Each	$4.40	24	$105.60
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$82.51	40	$3,300.40

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$487.39	2	$974.78
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$255.27	2	$510.54

Practice: 578 - Stream Crossing

Scenario: #7 - Bridge with precast abutments, span > 14 feet

Scenario Description:

Install a bridge to allow stream flows to cross under access road or animal trail. Bridge opening determined by sizing for storm event dictated in standard. Scenario includes dewatering, abutments, girders, decking. Work consists of site preparation, dewatering, acquiring and installing abuttments, girders, decking with necessary hardware, backfilling abuttments, and armoring with geotextile and riprap. Riprap and geotextile are used to stabilize and protect abutments as needed. Scenario based on precast 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 greater than 14 feet. Load is H-20. Width is 15 feet including curbs. Abutment height as needed from design. 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: Linear feet of bridge deck

Scenario Unit: Linear Foot

Scenario Typical Size: 30

Scenario Cost: $57,767.72 **Scenario Cost/Unit:** $1,925.59

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$55.45	40	$2,218.00
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$188.78	60	$11,326.80
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$120.04	40	$4,801.60
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$42.73	40	$1,709.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.74	60	$1,484.40
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.58	40	$1,703.20
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$40.66	40	$1,626.40
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$105.41	120	$12,649.20
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$34.14	140	$4,779.60
Materials						
Steel, structural steel members	1779	Structural steel, includes materials and fabrication.	Pound	$1.01	5360	$5,413.60

Materials

Epoxy anchor	1599	Galvanized bolts anchored into concrete or stone using epoxy adhesive. Includes materials and labor to drill and install.	Each	$18.20	12	$218.40
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	$82.51	40	$3,300.40
Dimension Lumber, Treated	1044	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	$0.83	2500	$2,075.00
Pipe, PE, 4", DR 9, perforated	2140	Materials: -4" - Perforated PE- 160 psi - ASTM D3035 DR 9	Foot	$11.35	60	$681.00
Footing, concrete, precast	1836	Precast spread footing with stemwall, T-shaped, with channel built to accept arched culvert leg. Includes materials only.	Foot	$54.75	40	$2,190.00
Galvanized Bolts, large	2166	5/8" x 12" galvanized timber bolts. Materials only.	Each	$4.40	24	$105.60

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$255.27	2	$510.54
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$487.39	2	$974.78

Practice: 578 - Stream Crossing

Scenario: #8 - Bridge, prefabricated

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 installed as a prefabricated unit. Work consists of site preparation, dewatering, acquiring and installing the prefabricated unit with necessary hardware, backfilling abuttments, and armoring with geotextile and riprap. Riprap and geotextile are used to stabilize and protect abutments as needed. Scenario based on prefabricated bridge structure. Travel surface shall be part of the prefabricated bridge structure. If a different travel surface is needed, refer to another appropriate standard for the surfacing. Load is H-20. Width is 15 feet including curbs. Abutment height as needed from design. 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: Linear feet of bridge deck

Scenario Unit: Linear Foot

Scenario Typical Size: 30

Scenario Cost: $71,553.94 **Scenario Cost/Unit:** $2,385.13

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$55.45	40	$2,218.00
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$120.04	10	$1,200.40
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$188.78	20	$3,775.60
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	$485.73	18	$8,743.14
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$224.23	50	$11,211.50
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.58	20	$851.60
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$105.41	80	$8,432.80
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.74	60	$1,484.40
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$40.66	34	$1,382.44

Labor

Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$34.14	80	$2,731.20

Materials

Bridge, steel or concrete, pre-Manufactured Bridge	2193	A premanufactured steel or precast prestressed concrete bridge rated for an HS 25 highway loading. Typical width is 14', length is variable. Includes railing system. Includes materials and shipping only.	Square Foot	$61.52	450	$27,684.00
Painting, steel surface, Impermeable	2165	Painting of steel surface with an impermeable coating. Includes materials and application	Square Foot	$0.87	1260	$1,096.20

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$255.27	1	$255.27
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$487.39	1	$487.39

Practice: 578 - Stream Crossing

Scenario: #9 - Stream Simulation Culvert, with Headwalls

Scenario Description:

Install a stream simulation culvert with a headwall where a particular culvert geometry is needed even though aquatic organism passage may not be the primary concern. For culverts less than 30" use Practice Standard 587 Structure for Water Control. 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. Pipe is 20 feet long and headwalls are included. Typical arch size may be 10' X 5'3" X 20' arch with 2'X3' precast footings 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 and culverts less than 30" in diameter.

Before Situation:

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

After Situation:

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

Scenario Feature Measure: Length of Multi-plate arch or box

Scenario Unit: Linear Foot

Scenario Typical Size: 20

Scenario Cost: $49,141.55 **Scenario Cost/Unit:** $2,457.08

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$120.04	40	$4,801.60
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.42	100	$242.00
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$188.78	60	$11,326.80
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$42.73	40	$1,709.20
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$224.23	25	$5,605.75
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.58	40	$1,703.20
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$34.14	100	$3,414.00
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$40.66	40	$1,626.40
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.74	60	$1,484.40
Materials						
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$29.24	45	$1,315.80
Footing, concrete, precast	1836	Precast spread footing with stemwall, T-shaped, with channel built to accept arched culvert leg. Includes materials only.	Foot	$54.75	40	$2,190.00

Materials

Geocell, 6"	1842	6-inch thick cellular confinement system, three-dimensional, expandable panels made from high-density polyethylene (HDPE), polyester or another polymer material. Includes materials, labor and equipment for the geocell only, does not include backfill.	Square Yard	$35.83	45	$1,612.35
Culvert, Multi-Plate arch	1979	Multi-plate arch culvert, typically 7 Gauge corrugated plate. Includes metal arch materials only, does not include footings.	Pound	$1.36	8000	$10,880.00

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	$487.39	2	$974.78
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$255.27	1	$255.27

Practice: 578 - Stream Crossing

Scenario: #10 - Stream Simulation Culvert, without Headwalls

Scenario Description:

Install a stream simulation culvert without a headwall where a particular culvert geometry is needed even though aquatic organism passage may not be the primary concern. For culverts less than 30" use Practice Standard 587 Structure for Water Control. Work includes dewatering, site preparation and removing any old crossing, acquiring and installing culvert pipe with gravel bedding and fill (compacted). If a different travel surface is needed, refer to another appropriate standard for the surfacing. Pipe is 40 feet long and therefore headwalls are not included. Typical arch size may be 10' X 5'3" X 40' arch with 2'X3' precast footings 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 and culverts less than 30" in diameter.

Before Situation:

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

After Situation:

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

Scenario Feature Measure: Length of Multi-plate arch or box

Scenario Unit: Linear Foot

Scenario Typical Size: 40

Scenario Cost: $57,901.70 **Scenario Cost/Unit:** $1,447.54

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.42	200	$484.00
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$224.23	25	$5,605.75
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$188.78	60	$11,326.80
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$120.04	40	$4,801.60
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$42.73	40	$1,709.20
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$34.14	100	$3,414.00
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$40.66	40	$1,626.40
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.74	60	$1,484.40
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.58	40	$1,703.20
Materials						
Culvert, Multi-Plate arch	1979	Multi-plate arch culvert, typically 7 Gauge corrugated plate. Includes metal arch materials only, does not include footings.	Pound	$1.36	10500	$14,280.00

Materials

Geocell, 6"	1842	6-inch thick cellular confinement system, three-dimensional, expandable panels made from high-density polyethylene (HDPE), polyester or another polymer material. Includes materials, labor and equipment for the geocell only, does not include backfill.	Square Yard	$35.83	90	$3,224.70
Footing, concrete, precast	1836	Precast spread footing with stemwall, T-shaped, with channel built to accept arched culvert leg. Includes materials only.	Foot	$54.75	80	$4,380.00
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$29.24	90	$2,631.60

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$255.27	1	$255.27
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$487.39	2	$974.78

Practice: 578 - Stream Crossing

Scenario: #11 - Concrete Box Culvert

Scenario Description:

Install a concrete box culvertwhere a particular culvert geometry is needed even though aquatic organism passage may not be the primary concern. For culverts less than 30" use Practice Standard 587 Structure for Water Control. Work includes dewatering, site preparation and removing any old crossing, acquiring and installing concrete box culvert with gravel bedding and fill (compacted). If a different travel surface is needed, refer to another appropriate standard for the surfacing. Concrete box culvert is a 6' by 8' box and is 20 feet long.Headwalls are not included. Typical concrete box culvert size is 6' by 8' by 20'. 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 and culverts less than 30" in diameter.

Before Situation:

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

After Situation:

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

Scenario Feature Measure: Length of concrete box culvert

Scenario Unit: Linear Foot

Scenario Typical Size: 20

Scenario Cost: $42,805.95 **Scenario Cost/Unit:** $2,140.30

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$42.73	40	$1,709.20
Water management, Flooding & dewatering	969	Includes equipment, power unit and labor costs.	Acre Foot	$224.23	25	$5,605.75
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$188.78	60	$11,326.80
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.42	100	$242.00
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$120.04	40	$4,801.60
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.74	60	$1,484.40
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$34.14	100	$3,414.00
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$40.66	40	$1,626.40
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$42.58	40	$1,703.20
Materials						
Culvert, box, 6' x 8'	2175	Precast concrete box culvert, 6'X8'. Typically in 4' sections. Materials only.	Foot	$336.72	20	$6,734.40

Materials

Geocell, 6"	1842	6-inch thick cellular confinement system, three-dimensional, expandable panels made from high-density polyethylene (HDPE), polyester or another polymer material. Includes materials, labor and equipment for the geocell only, does not include backfill.	Square Yard	$35.83	45	$1,612.35
Aggregate, river rock	1834	Well graded, rounded mineral substrates derived from local riverine settings. Includes materials and local delivery	Ton	$29.24	45	$1,315.80

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$255.27	1	$255.27
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$487.39	2	$974.78