

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Engineering General
Practice Code/Name	410 - Grade Stabilization Structure
Scenario ID	1
Scenario Name	Check Dams

Scenario Description Typical setting is on a 40-acre pasture/hayland field having a slope of 5 to 10 percent where ephemeral gullies have formed. Typical installation consists of stabilizing/grading the gully and installing six check dams with a top width of 3', average height of 2.5', 19' length, and 2:1 side slopes, ; containing an average of 21 tons of rock for a total of 126 tons. The check dams are underlain with geotextile fabric. Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as water quality degradation and soil erosion-concentrated flow erosion.

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

After Practice Situation Area is stabilized. The advancement and/or formation of gullies is stopped, soil from gullies no longer leaves the farm, useable farm area is increased, sedimentation and other pollution hazards are decreased, and water quality downstream is protected. Any needed vegetation of disturbed areas use Critical Area Planting (342).

Scenario Feature Measure	Tons of rock installed
Scenario Unit	Ton
Scenario Typical Size	126

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$5,533.08	\$43.91
Equipment/Installation	\$228.80	\$1.82
Labor	\$514.20	\$4.08
Mobilization	\$1,026.20	\$8.14
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$7,302.28	\$57.95

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	44	Rock Riprap, Placed with geotextile	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	\$65.87	84	\$5,533.08		See Scenario Description
Equipment/Installation	1222	Excavation, common earth, large equipment, 50 ft	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	\$1.43	160	\$228.80		
Labor	231	General Labor	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$25.71	20	\$514.20		
Mobilization	1140	Mobilization, large equipment	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$513.10	2	\$1,026.20		

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Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Engineering General
Practice Code/Name	410 - Grade Stabilization Structure
Scenario ID	2
Scenario Name	Embankment, Pipe <= 6"

Scenario Description
 An earthen embankment dam with a principal spillway pipe of 6 inches or less. Assessment shows anti-seep collars or sand diaphragms are not required. To 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 typical amount of earthfill of 2,000 cubic yards, and 80 feet of pipe 6" PVC pipe with a canopy inlet. A small, non-lined plunge pool protects the outlet channel. Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.

Before Practice 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 Practice 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

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$432.00	\$0.22
Equipment/Installation	\$8,859.20	\$4.43
Labor	\$1,474.96	\$0.74
Mobilization	\$548.66	\$0.27
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$11,314.82	\$5.66

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	980	Pipe, PVC, 6", SCH 40	Materials: - 6" - PVC - SCH 40 - ASTM D1785	Foot	\$5.40	80	\$432.00	Material needed for installation	pipe length
Equipment/Installation	931	Hydraulic Excavator, 1 CY	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	\$94.05	8	\$752.40	Pipe trench excavated on grade. Recommend using machine with operator. Note that with smaller diameter pipe (trickle tubes) this may be done with dozer. Plunge basin excavated.	estimate half a day for install
Equipment/Installation	49	Earthfill, Roller Compacted	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	\$4.00	2000	\$8,000.00	Embankment installation	earthfill needed

Equipment/Installation	50	Earthfill, Manually Compacted	Earthfill, manually compacted, includes equipment and labor	Cubic yard	\$5.34	20	\$106.80	Compaction around principle spillway	volume assuming pipe compaction of 6" both sides, 1' cover, and trench has 3:1 side slopes
Labor	233	Equipment Operators, Heavy	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$34.10	8	\$272.80	Work coordination and intermediate and final surveys (particularly during pipe installation)	estimate on job site two days
Labor	230	Skilled Labor	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	\$39.54	20	\$790.80	Work coordination and intermediate and final surveys (particularly during pipe installation)	estimate on job site two days
Labor	231	General Labor	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$25.71	16	\$411.36	pipe assembly, placing, and other misc. tasks (canopy inlet fabrication)	estimate one day or two half days.
Mobilization	1139	Mobilization, medium equipment	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$274.33	2	\$548.66	mobilization for dozer and excavator	dozer and excavator needed

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Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Engineering General
Practice Code/Name	410 - Grade Stabilization Structure
Scenario ID	3
Scenario Name	Embankment, Pipe 8"-12"

Scenario Description
 An earthen embankment dam with a principle spillway pipe between 8 and 12 inches, anti-seep collars or sand diaphragm, and excavated plunge pool basin. Installed to 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 typical amount of earthfill of 2,500 cubic yards, 90 feet of 10" 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 Practice 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 Practice 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	2500

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$432.00	\$0.22
Equipment/Installation	\$8,859.20	\$4.43
Labor	\$1,474.96	\$0.74
Mobilization	\$548.66	\$0.27
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$11,314.82	\$5.66

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1351	Pipe, PVC, 10", SCH 80	Materials: - 10" - PVC - SCH 80 - ASTM D1785	Foot	\$18.22	90	\$1,639.80	Material needed for installation	principle spillway length
Materials	976	Pipe, PVC, 2", SCH 40	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	\$1.05	60	\$63.00	Drain pipe and outlet for sand diaphragm	6 ft long perforated and 54 ft to outlet
Materials	45	Aggregate, Sand, Graded, Washed	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	\$26.71	3	\$80.13	Needed to construct Sand diaphragm	2' thick x 6' long x 5' tall as per the minimum by PS 378
Equipment/Installation	931	Hydraulic Excavator, 1 CY	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	\$94.05	16	\$1,504.80	Pipe trench need on grade. Recommend using machine with operator. Note that with smaller diameter pipe (trickle tubes) this may be done with dozer.	estimate half a day for install
Equipment/Installation	49	Earthfill, Roller Compacted	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	\$4.00	2500	\$10,000.00	Embankment installation	earthfill needed

Equipment/Installation	50	Earthfill, Manually Compacted	Earthfill, manually compacted, includes equipment and labor	Cubic yard	\$5.34	30	\$160.20	Compaction around principle spillway	volume assuming pipe compaction of 6" both sides, 1' cover, and trench has 3:1 side slopes
Labor	233	Equipment Operators, Heavy	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$34.10	16	\$545.60	Work coordination and intermediate and final surveys (particularly during pipe installation)	estimate on job site two days
Labor	230	Skilled Labor	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	\$39.54	30	\$1,186.20	Work coordination and intermediate and final surveys (particularly during pipe installation)	estimate on job site two days

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Engineering General
Practice Code/Name	410 - Grade Stabilization Structure
Scenario ID	4
Scenario Name	Embankment, Pipe >12"

Scenario Description
 An earthen embankment dam with a principle spillway pipe greater than 12 inches. Installed 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 typical amount of earthfill of 2,500 cubic yards, smooth steel drop inlet principle spillway with a 7 ft riser and 90 ft barrel, and 82 Square feet of anti-seep collars. A rock lined plunge pool protects the outlet channel. Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.

Before Practice 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 Practice 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	2500

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$3,705.00	\$1.48
Equipment/Installation	\$13,731.12	\$5.49
Labor	\$3,361.28	\$1.34
Mobilization	\$624.62	\$0.25
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$21,422.02	\$8.57

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1356	Pipe, Steel, 12", Std Wt, USED	Materials: - USED - 12" - Steel Std Wt	Foot	\$24.18	90	\$2,176.20	Material needed for installation	barrel length
Materials	1357	Pipe, Steel, 16", Std Wt, USED	Materials: - USED - 16" - Steel Std Wt	Foot	\$33.00	7	\$231.00	Material needed for installation	Riser height
Materials	1044	Dimension Lumber, Treated	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	\$0.74	30	\$22.20	pipe support needed	2 - 4x4x8' posts (4x4x16/12 = 21.3 BF) 1 - 2x6x8' (8x2x6/12 = 8 BF) Total = 30 BF
Materials	1047	Steel, Plate, 1/8"	Flat Steel Plate, 1/8" thick, materials only.	Square Foot	\$4.31	82	\$353.42	Needed to construct Anti-seep Collars	estimated quantity to meet PS 378
Materials	44	Rock Riprap, Placed with geotextile	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	\$65.87	14	\$922.18	Needed to line a plunge pool for outlet	plunge pool for typical scenario is approx 17' x 17' rectangular rock is 1.7 ft thick

Equipment/Installation	931	Hydraulic Excavator, 1 CY	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	\$94.05	20	\$1,881.00	Pipe trench need on grade and other excavation as needed (plunge pool). Recommend using machine with operator. Note that with smaller diameter pipe (trickle tubes) this may be done with dozer.	estimate half a day for pipe install and additional time for rock prep
Equipment/Installation	49	Earthfill, Roller Compacted	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	\$4.00	2500	\$10,000.00	Embankment installation	earthfill needed
Equipment/Installation	38	Concrete, CIP, formed reinforced	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	\$502.94	2	\$1,005.88	needed for base and anti-buancy	about 1.5 CY estimated but rounded to nearest CY

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Engineering General
Practice Code/Name	410 - Grade Stabilization Structure
Scenario ID	5
Scenario Name	Embankment, Soil Treatment

Scenario Description
An earthen embankment dam with a principal spillway pipe where on site soils are not acceptable and require extra processing or hauling from off farm, distances greater than one mile. Installed to 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 typical amount of earthfill of 2,500 cubic yards, 90 feet of 10" 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 Practice 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 Practice 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	2500

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$1,782.93	\$0.71
Equipment/Installation	\$18,095.36	\$7.24
Labor	\$3,155.60	\$1.26
Mobilization	\$624.62	\$0.25
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$23,658.51	\$9.46

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1351	Pipe, PVC, 10", SCH 80	Materials: - 10" - PVC - SCH 80 - ASTM D1785	Foot	\$18.22	90	\$1,639.80	Material needed for installation	principle spillway length
Materials	976	Pipe, PVC, 2", SCH 40	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	\$1.05	60	\$63.00	Drain pipe and outlet for sand diaphragm	6 ft long perforated and 54 ft to outlet
Materials	45	Aggregate, Sand, Graded, Washed	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	\$26.71	3	\$80.13	Needed to construct Sand diaphragm	2' thick x 6' long x 5' tall as per the minimum by PS 378
Equipment/Installation	931	Hydraulic Excavator, 1 CY	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	\$94.05	10	\$940.50	Pipe trench need on grade. Recommend using machine with operator. Note that with smaller diameter pipe (trickle tubes) this may be done with dozer.	estimate half a day for install

Equipment/Installation	49	Earthfill, Roller Compacted	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	\$4.00	2500	\$10,000.00	Compaction of earthfill as material is imported or processed.	volume assuming pipe compaction of 6" both sides, 1' cover, and trench has 3:1 side slopes
Equipment/Installation	1615	Hauling, bulk, highway truck	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	\$0.28	25000	\$7,000.00	Hauling of suitable soil 10 miles away from site. Note that for soil processing using admendment that this unit would be replaced by soil admendment (gypsum, quick lime, etc) and light tillage	earthfill needed
Equipment/Installation	50	Earthfill, Manually Compacted	Earthfill, manually compacted, includes equipment and labor	Cubic yard	\$5.34	29	\$154.86	Compaction around principle spillway	volume assuming pipe compaction of 6" both sides, 1' cover, and trench has 3:1 side slopes
Labor	233	Equipment Operators, Heavy	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$34.10	16	\$545.60	Work coordination and intermediate and final surveys (particularly during pipe installation)	estimate on job site two days

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Engineering General
Practice Code/Name	410 - Grade Stabilization Structure
Scenario ID	6
Scenario Name	Pipe Drop, Plastic

Scenario Description	A full flow pipe drop (ie: riser and barrel) grade stabilization structure designed and constructed using plastic pipe without anti-seep collars. This is typically a earthen dry dam structure with no permanent storage (water or sediment), however some structures may have some permanent pool / storage but do not have 35 years of sediment life. Payment rate is based upon the riser weir length (Diameter x 3.14) in feet times the length of the pipe barrel in (feet). Installed to stabilized the grade and control erosion in natural or artificial channels, to prevent the formation or advancing of gullies, and to enhance environmental quality and reduce pollution hazards. Applied in areas where the concentration and flow velocity of water require structures to stabilize the grade in channels or to control gully erosion. Cost estimate is based upon 6 ft high 18" (1.5') PVC riser with a 40 ft long barrel (1.5' x 3.14 x 40' = 188 SF). Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.
Before Practice 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 Practice Situation	Area is stabilized. The advancement and/or formation of gullies is stopped, soil from gullies no longer leaves the farm, useable farm area is increased, sedimentation and other pollution hazards are decreased, and water quality downstream is protected. Any needed re-vegetation of disturbed areas use Critical Area Planting (342). Other associated practices such as; Pond (378), Dam (402), Fence (382), Channel Bed Stabilization (584), Dike (356), Grassed Waterway (412), Structure for Water Control (587), and Irrigation Canal or Lateral (320) will use the corresponding Standard(s) as appropriate.

Scenario Feature Measure	Riser Weir Length x Barrel Length
Scenario Unit	Square Foot
Scenario Typical Size	188

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$3,701.92	\$19.69
Equipment/Installation	\$1,762.14	\$9.37
Labor	\$478.48	\$2.55
Mobilization	\$350.29	\$1.86
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$6,292.83	\$33.47

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1374	Coupling, PVC, Tee, 24x18, SCH 40	Materials: - Tee, 24"x18" - PVC - SCH 40 - ASTM D1785	Each	\$2,243.54	1	\$2,243.54		
Materials	2046	Pipe, PVC, 24", SCH 40	Materials: - 24" - PVC - SCH 40 - ASTM D1785	Foot	\$39.53	6	\$237.18		
Materials	1373	Pipe, PVC, 18", SCH 40	Materials: - 18" - PVC - SCH 40 - ASTM D1785	Foot	\$30.53	40	\$1,221.20		
Equipment/Installation	38	Concrete, CIP, formed reinforced	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	\$502.94	1	\$502.94		

Equipment/Installation	931	Hydraulic Excavator, 1 CY	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	\$94.05	8	\$752.40		
Equipment/Installation	49	Earthfill, Roller Compacted	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	\$4.00	100	\$400.00		
Equipment/Installation	50	Earthfill, Manually Compacted	Earthfill, manually compacted, includes equipment and labor	Cubic yard	\$5.34	20	\$106.80		
Labor	233	Equipment Operators, Heavy	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$34.10	8	\$272.80		

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Engineering General
Practice Code/Name	410 - Grade Stabilization Structure
Scenario ID	7
Scenario Name	Pipe Drop, Steel

Scenario Description
 A full flow pipe drop (ie: riser and barrel) grade stabilization structure designed and constructed with a metal anti-seep collar. This is typically a earthen dry dam structure with no permanent storage (water or sediment), however some structures may have some permanent pool / storage but do not have 35 years of sediment life. Payment rate is based upon the riser weir length (Diameter x 3.14) in feet times the length of the pipe barrel in (feet). Installed to 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 smooth steel pipe drop structure with a 36", 12' tall riser and a 100' long 30" barrel (Riser Weir length x Barrel Length = 3ft x 3.14 x 30ft = 940). Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.

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

Scenario Feature Measure	Riser Weir Length x Barrel Length
Scenario Unit	Square Foot
Scenario Typical Size	940

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$16,806.00	\$17.88
Equipment/Installation	\$3,310.20	\$3.52
Labor	\$1,316.80	\$1.40
Mobilization	\$624.62	\$0.66
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$22,057.62	\$23.47

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1047	Steel, Plate, ½"	Flat Steel Plate, ½" thick, materials only.	Square Foot	\$4.31	30	\$129.30		
Materials	1375	Steel, Plate, 3/8"	Flat steel plate, 3/8" thickness. Materials only.	Square Foot	\$13.86	9	\$124.74		
Materials	1370	Pipe, Steel, 36", Std Wt	Materials: - 36" - Steel Std Wt	Foot	\$173.83	12	\$2,085.96		
Materials	1369	Pipe, Steel, 30", Std Wt	Materials: - 30" - Steel Std Wt	Foot	\$144.66	100	\$14,466.00		
Equipment/Installation	931	Hydraulic Excavator, 1 CY	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	\$94.05	4	\$376.20		

Equipment/Installation	49	Earthfill, Roller Compacted	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	\$4.00	600	\$2,400.00		
Equipment/Installation	50	Earthfill, Manually Compacted	Earthfill, manually compacted, includes equipment and labor	Cubic yard	\$5.34	100	\$534.00		
Labor	233	Equipment Operators, Heavy	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$34.10	8	\$272.80		

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Engineering General
Practice Code/Name	410 - Grade Stabilization Structure
Scenario ID	8
Scenario Name	Weir Drop Structures

Scenario Description	A Straight, semicircular, or Box Drop structure composed of metal or reinforced concrete 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 semicircular steel toe wall structure with a drop of 3ft and weir length of 30ft (90 square feet). The unit of payment measurement is defined as weir length times drop in "feet". The drop (feet) is defined as the structure inlet crest elevation minus the control outlet elevation (ie: outlet apron elevation). Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.
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Before Practice 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.
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After Practice 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.
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Scenario Feature Measure	Feet of Weir length times Drop Height
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Scenario Unit	Square Foot
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Scenario Typical Size	90
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Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$2,398.23	\$26.65
Equipment/Installation	\$5,405.07	\$60.06
Labor	\$1,933.84	\$21.49
Mobilization	\$548.66	\$6.10
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$10,285.80	\$114.29

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1376	Corrugated Steel, 12 Gauge, galvanized	Corrugated Steel, 12 gauge, 3" by 1" corrugations, galvanized, meets ASTM A 929	Square Foot	\$9.27	212	\$1,965.24	Material needed for installation	2 - 11.3' x 5.4' headwalls and 30' x 3' semicircular weir (13.4' dia with 4.5' sidewall extensions)
Materials	1377	Pipe, CMP, 12", 14 Gauge	12" - Corrugated Steel Pipe. Galvanized, uncoated. 14 Gauge. Materials only.	Foot	\$9.58	2	\$19.16	outlet stub for field drain	assumed drains from field will vary from 2 to 0.
Materials	1200	Rock Riprap, graded, angular, material and shipping	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	\$30.05	11	\$330.55	prevent erosion from high velocity flows over weir	4' x 1' X-sect along a 2ft offset along weir length (54.7 LF)
Materials	46	Aggregate, Gravel, Graded	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$27.76	3	\$83.28	drain fill for adequate weeping of structure	

Equipment/Installation	931	Hydraulic Excavator, 1 CY	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	\$94.05	5	\$470.25	handling and placing corrugated steel. Machine also used during structure excavation (see Excavation, common earth)	estimate half a day of use during install
Equipment/Installation	49	Earthfill, Roller Compacted	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	\$4.00	75	\$300.00	berms to extend headwall away to natural ground and/or to insure structure is not flanked	earthfill needed
Equipment/Installation	38	Concrete, CIP, formed reinforced	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	\$502.94	9	\$4,526.46	toe wall is poured in place, apron concrete is reinforced	Approx 5 CY in apron and 3.6 CY in toe wall rounded to nearest CY
Equipment/Installation	42	Geotextile, woven	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	\$2.44	9	\$21.96	under rip rap to protect soil	

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Engineering General
Practice Code/Name	410 - Grade Stabilization Structure
Scenario ID	9
Scenario Name	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. This structure could also be constructed of non reinforced concrete blocks. 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 gabion wall structure with a drop of 3ft and weir length of 8ft (48 square feet). The unit of payment measurement is defined as weir length times drop in "feet". The drop (feet) is defined as the structure inlet crest elevation minus the control outlet elevation (ie: outlet apron elevation). Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.

Before Practice 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 Practice Situation
 Area is stabilized. The advancement and/or formation of gullies is stopped, soil from gullies no longer leaves the farm, useable farm area is increased, sedimentation and other pollution hazards are decreased, and water quality downstream is protected. Any needed re-vegetation of disturbed areas use Critical Area Planting (342). Other associated practices such as; Pond (378), Dam (402), Fence (382), Channel Bed Stabilization (584), Dike (356), Grassed Waterway (412), Structure for Water Control (587), Subsurface Drain (606), and Underground Outlet (620) will use the corresponding Standard(s) as appropriate.

Scenario Feature Measure Feet of Weir length times Drop Height

Scenario Unit Square Foot

Scenario Typical Size 48

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$1,359.26	\$28.32
Equipment/Installation	\$1,455.09	\$30.31
Labor	\$1,351.04	\$28.15
Mobilization	\$548.66	\$11.43
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$4,714.05	\$98.21

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1378	Gabion basket or mat	Gabion baskets or mats installed and filled on grade, includes materials, transport, equipment, and labor, does not include geotextile fabric.	Cubic Yard	\$194.18	7	\$1,359.26	Material needed for installation	4 gabions for 8ft channel provides 2ft on either side to protect against flanking. Mat provides foundation and outlet apron.
Equipment/Installation	49	Earthfill, Roller Compacted	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	\$4.00	40	\$160.00	berms to extend headwall away to natural ground and/or shaping banks	earthfill needed
Equipment/Installation	931	Hydraulic Excavator, 1 CY	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	\$94.05	5	\$470.25	Placement of riprap	

Equipment/Installation	48	Excavation, Common Earth, side cast, small equipment	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	\$2.16	7	\$15.12	toe wall and apron footprint excavation	
Equipment/Installation	42	Geotextile, woven	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	\$2.44	23	\$56.12	under rip rap to protect soil	
Equipment/Installation	1201	Tractor, agricultural, 210 HP	Agricultural tractor with horsepower range of 190 to 240. Equipment and power unit costs. Labor not included.	Hour	\$94.20	8	\$753.60	prevent erosion from high velocity flows over weir, on outlet channel, and around channel sides and/or berms	
Labor	234	Supervisor or Manager	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	\$41.68	16	\$666.88	Work coordination, intermediate and final surveys	estimate on job site two half-days
Labor	231	General Labor	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$25.71	16	\$411.36	general	estimate one day or two half days.

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Engineering General
Practice Code/Name	410 - Grade Stabilization Structure
Scenario ID	10
Scenario Name	Log Drop Structures

Scenario Description	A Straight Drop structure constructed using bioengineering principles. In this instance the drop structure is constructed of logs, rock riprap, and earthfill. These structures are used to 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 an 8 foot weir length and 3 foot drop. The unit of payment measurement is each. Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.
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Before Practice 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.
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After Practice Situation	Area is stabilized using using an engineered structure utilizing natural materials (bioengineered). The advancement and/or formation of gullies is stopped, soil from gullies no longer leaves the farm, useable farm area is increased, sedimentation and other pollution hazards are decreased, and water quality downstream is protected. Any needed re-vegetation of disturbed areas use Critical Area Planting (342). Other associated practices such as; Pond (378), Dam (402), Fence (382), Channel Bed Stabilization (584), Dike (356), Grassed Waterway (412), Structure for Water Control (587), Subsurface Drain (606), and Underground Outlet (620) will use the corresponding Standard(s) as appropriate.
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Scenario Feature Measure	each
Scenario Unit	each
Scenario Typical Size	1

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$0.00	\$0.00
Equipment/Installation	\$3,370.32	\$3,370.32
Labor	\$1,917.88	\$1,917.88
Mobilization	\$548.66	\$548.66
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$5,836.86	\$5,836.86

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Equipment/Installation	49	Earthfill, Roller Compacted	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	\$4.00	40	\$160.00	berms to extend headwall away to natural ground and/or shaping banks	earthfill needed
Equipment/Installation	931	Hydraulic Excavator, 1 CY	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	\$94.05	12	\$1,128.60	Placement of riprap harvest load and placement of tree trunks (4 @ avg dia 8" - 9").	Riprap - 5hr, Tree falling, load/offload, place - 6.5hrs
Equipment/Installation	48	Excavation, Common Earth, side cast, small equipment	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	\$2.16	10	\$21.60	shaping, aprons, and prep for logs	
Equipment/Installation	42	Geotextile, woven	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	\$2.44	11	\$26.84	under rip rap to protect soil	

Equipment/Installation	1201	Tractor, agricultural, 210 HP	Agricultural tractor with horsepower range of 190 to 240. Equipment and power unit costs. Labor not included.	Hour	\$94.20	20	\$1,884.00	prevent erosion from high velocity flows over weir and on apron. Used to stabilize logs.	
Equipment/Installation	937	Chainsaw	Equipment and power unit costs. Labor not included.	Hour	\$5.48	4	\$21.92	log cutting. Assume 5 to 6 logs with an average length of 10 feet	
Equipment/Installation	1505	Trailer, flatbed, small	Small flatbed trailer (typically less than 30' in length) pulled by a pickup to transport materials and equipment. Truck not included.	Hour	\$5.33	4	\$21.32		
Equipment/Installation	939	Truck, Pickup	Equipment and power unit costs. Labor not included.	Hour	\$26.51	4	\$106.04		

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Engineering General
Practice Code/Name	410 - Grade Stabilization Structure
Scenario ID	11
Scenario Name	Sheetpile Weir

Scenario Description
 A Straight, Square, or Box Drop structure composed of steel sheetpile 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 semicircular steel toe wall structure with a drop of 3ft and weir length of 30ft (90 square feet). The unit of payment measurement is defined as weir length times drop in "feet". The drop (feet) is defined as the structure inlet crest elevation minus the control outlet elevation (ie: outlet apron elevation). Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.

Before Practice 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 Practice Situation
 Area is stabilized. The advancement and/or formation of gullies is stopped, soil from gullies no longer leaves the farm, useable farm area is increased, sedimentation and other pollution hazards are decreased, and water quality downstream is protected. Any needed re-vegetation of disturbed areas use Critical Area Planting (342). Other associated practices such as; Pond (378), Dam (402), Fence (382), Channel Bed Stabilization (584), Dike (356), Grassed Waterway (412), Structure for Water Control (587), Subsurface Drain (606), and Underground Outlet (620) will use the corresponding Standard(s) as appropriate.

Scenario Feature Measure Feet of Weir length times Drop Height

Scenario Unit Square Foot

Scenario Typical Size 90

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$329.35	\$3.66
Equipment/Installation	\$23,040.00	\$256.00
Labor	\$790.80	\$8.79
Mobilization	\$670.02	\$7.44
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$24,830.17	\$275.89

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	44	Rock Riprap, Placed with geotextile	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	\$65.87	5	\$329.35	Riprap apron downstream of weir	Assume 10 X 10 by 1 pad
Equipment/Installation	1228	Excavation, common earth, wet, side cast, large equipment	Bulk excavation and side casting of wet common earth with hydraulic excavator or dragline with greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	\$4.08	250	\$1,020.00	Excavation to shape channel upstream and downstream of weir	Excavation upstream and downstream to shape channel (assume roughly 20' shaping upstream and downstream)
Equipment/Installation	1337	Sheet piling, steel, 15'	Steel sheet pile, panels or barrier driven up to 15 feet and left in place. Includes materials, equipment and labor.	Square Foot	\$28.27	750	\$21,202.50	Sheetpile to create weir	30' weir plus 10' tiebacks

Equipment/Installation	51	Earthfill, Dumped and Spread	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	\$3.27	250	\$817.50	Replace excated material	Same as excavated material
Labor	230	Skilled Labor	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	\$39.54	20	\$790.80	Alignment of sheetpile, quality control, etc	
Mobilization	1140	Mobilization, large equipment	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$513.10	1	\$513.10	Mobilize excavator for excavation and sheetpile driving	
Mobilization	1141	Mobilization, Skilled labor	Mobilization of skilled labor: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	\$39.23	4	\$156.92		

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Engineering General
Practice Code/Name	410 - Grade Stabilization Structure
Scenario ID	12
Scenario Name	Concrete Weir

Scenario Description	A Straight Drop structure constructed of reinforced concrete. 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 reinforced concrete structure with a drop of 3ft and weir length of 8ft (48 square feet). The unit of payment measurement is defined as weir length times drop in "feet". The drop (feet) is defined as the structure inlet crest elevation minus the control outlet elevation (ie: outlet apron elevation). Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.
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Before Practice 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.
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After Practice 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.
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Scenario Feature Measure	Feet of Weir length times Drop Height
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Scenario Unit	Square Foot
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Scenario Typical Size	48
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Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$534.02	\$11.13
Equipment/Installation	\$9,749.10	\$203.11
Labor	\$1,581.60	\$32.95
Mobilization	\$1,026.20	\$21.38
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$12,890.92	\$268.56

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	46	Aggregate, Gravel, Graded	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$27.76	5	\$138.80	Bedding for concrete	Assume 4' by 30' by 1' bedding volume.
Materials	44	Rock Riprap, Placed with geotextile	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	\$65.87	6	\$395.22	Outlet apron	Assume 8' by 20' by 1' apron.
Equipment/Installation	1228	Excavation, common earth, wet, side cast, large equipment	Bulk excavation and side casting of wet common earth with hydraulic excavator or dragline with greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	\$4.08	300	\$1,224.00	Excavation for structure plus shaping of immediate surrounding area	Excavation for weir and channel shaping immediately upstream and downstream of structure

Equipment/Installation	38	Concrete, CIP, formed reinforced	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	\$502.94	15	\$7,544.10	Concrete for concrete weir	Assume 2' by 30' by 6' concrete structure
Equipment/Installation	51	Earthfill, Dumped and Spread	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic yard	\$3.27	300	\$981.00	Place excavated material	Shaping of earth in vicinity of weir
Labor	230	Skilled Labor	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	\$39.54	40	\$1,581.60	Quality assurance, etc	
Mobilization	1140	Mobilization, large equipment	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$513.10	2	\$1,026.20	Excavator and concrete equipment	

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Engineering General
Practice Code/Name	410 - Grade Stabilization Structure
Scenario ID	13
Scenario Name	Catch Basin and Pipe <= 24"

Scenario Description	A catch basin structure constructed of concrete and a grate with an outlet pipe. 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 standard catch basin plus length of pipe. Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.
Before Practice 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 Practice 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	Catch Basin Structure
Scenario Unit	Each
Scenario Typical Size	1

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$4,763.91	\$4,763.91
Equipment/Installation	\$873.00	\$873.00
Labor	\$1,028.40	\$1,028.40
Mobilization	\$513.10	\$513.10
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$7,178.41	\$7,178.41

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1754	Catch Basin, concrete, 60" dia.	Precast 60-in diameter catch basin, 6' deep, with collar and grate cover. Materials only.	Each	\$2,243.91	1	\$2,243.91	Necessary component for scenario	Based on MA example
Materials	1245	Pipe, HDPE, 18", CPT, Double Wall	Pipe, Corrugated HDPE Double Wall, 18" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	\$12.60	200	\$2,520.00	Necessary component for scenario	Based on MA example
Equipment/Installation	50	Earthfill, Manually Compacted	Earthfill, manually compacted, includes equipment and labor	Cubic yard	\$5.34	100	\$534.00	Necessary component for scenario	Based on MA example
Equipment/Installation	1223	Excavation, common earth, large equipment, 150 ft	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	\$3.39	100	\$339.00	Necessary component for scenario	Based on MA example

Labor	231	General Labor	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$25.71	40	\$1,028.40	Labor for catch basin and pipe	
Mobilization	1140	Mobilization, large equipment	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$513.10	1	\$513.10		

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Engineering General
Practice Code/Name	410 - Grade Stabilization Structure
Scenario ID	14
Scenario Name	Catch Basin and Pipe >24"

Scenario Description	A catch basin structure constructed of concrete and a grate with an outlet pipe. 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 standard catch basin plus length of pipe. Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.
Before Practice 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 Practice 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	Catch Basin Structure
Scenario Unit	Each
Scenario Typical Size	1

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$9,853.91	\$9,853.91
Equipment/Installation	\$873.00	\$873.00
Labor	\$1,028.40	\$1,028.40
Mobilization	\$513.10	\$513.10
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$12,268.41	\$12,268.41

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1754	Catch Basin, concrete, 60" dia.	Precast 60-in diameter catch basin, 6' deep, with collar and grate cover. Materials only.	Each	\$2,243.91	1	\$2,243.91	Necessary component for scenario	Based on MA example
Materials	1248	Pipe, HDPE, 36", CPT Double Wall	Pipe, Corrugated HDPE Double Wall, 36" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	\$38.05	200	\$7,610.00	Necessary component for scenario	Based on MA example
Equipment/Installation	50	Earthfill, Manually Compacted	Earthfill, manually compacted, includes equipment and labor	Cubic yard	\$5.34	100	\$534.00	Necessary component for scenario	Based on MA example
Equipment/Installation	1223	Excavation, common earth, large equipment, 150 ft	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	\$3.39	100	\$339.00	Necessary component for scenario	Based on MA example

Labor	231	General Labor	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$25.71	40	\$1,028.40	Labor for catch basin and pipe	
Mobilization	1140	Mobilization, large equipment	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$513.10	1	\$513.10		

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Engineering General
Practice Code/Name	410 - Grade Stabilization Structure
Scenario ID	15
Scenario Name	Rock Chute

Scenario Description	A Rock Chute structure constructed of rock riprap, bedding, and geotextile. Structure includes inlet and outlet apron. 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 an 8' bottom width chute with 3:1 side slopes. Costs developed from scenario created using NRCS Rock Chute spreadsheet. Disturbed areas are protected with permanent vegetative cover. Addresses resource concerns such as soil erosion-concentrated flow erosion and water quality degradation.
Before Practice 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 Practice 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 Yard of Rock Chute Material
Scenario Unit	Cubic Yard
Scenario Typical Size	200

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$11,420.94	\$57.10
Equipment/Installation	\$4,856.00	\$24.28
Labor	\$514.20	\$2.57
Mobilization	\$513.10	\$2.57
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$17,304.24	\$86.52

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	46	Aggregate, Gravel, Graded	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$27.76	46	\$1,276.96	Bedding for riprap in rock chute	Taken from Rock Chute Spreadsheet for typical scenario.
Materials	44	Rock Riprap, Placed with geotextile	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	\$65.87	154	\$10,143.98	Riprap for rock chute	Taken from Rock Chute Spreadsheet for typical scenario.
Equipment/Installation	1228	Excavation, common earth, wet, side cast, large equipment	Bulk excavation and side casting of wet common earth with hydraulic excavator or dragline with greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	\$4.08	700	\$2,856.00	Excavation necessary to construct chute	Taken from Rock Chute Spreadsheet for typical scenario.
Equipment/Installation	49	Earthfill, Roller Compacted	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	\$4.00	500	\$2,000.00	Earthfill necessary to construct chute	Taken from Rock Chute Spreadsheet for typical scenario.

Labor	231	General Labor	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$25.71	20	\$514.20	Labor needed for quality assurance	
Mobilization	1140	Mobilization, large equipment	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$513.10	1	\$513.10	Mobilize large equipment	