

Practice: 410 - Grade Stabilization Structure

Scenario: #1 - Check Dams

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

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

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

Scenario Feature Measure: Tons of rock installed

Scenario Unit: Ton

Scenario Typical Size: 126

Total Scenario Cost: \$7,461.50

Scenario Cost/Unit: \$59.22

Cost Details

| Component Name | Id | Description | Unit | Cost | Qty | Total |
|----------------|----|-------------|------|------|-----|-------|
|----------------|----|-------------|------|------|-----|-------|

Materials

| | | | | | | |
|-------------------------------------|----|---|------------|---------|----|------------|
| Rock Riprap, Placed with geotextile | 44 | Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place | Cubic Yard | \$76.60 | 84 | \$6,434.57 |
|-------------------------------------|----|---|------------|---------|----|------------|

Labor

| | | | | | | |
|---------------|-----|--|------|---------|---|----------|
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$22.19 | 8 | \$177.55 |
|---------------|-----|--|------|---------|---|----------|

Mobilization

| | | | | | | |
|--------------------------------|------|---|------|----------|---|----------|
| Mobilization, medium equipment | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds. | Each | \$283.39 | 2 | \$566.78 |
|--------------------------------|------|---|------|----------|---|----------|

Equipment Installation

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|--|------|---|------------|--------|-----|----------|
| Excavation, common earth, large equipment, 50 ft | 1222 | Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 50 feet. Includes equipment and labor. | Cubic Yard | \$1.77 | 160 | \$282.61 |
|--|------|---|------------|--------|-----|----------|

Practice: 410 - Grade Stabilization Structure

Scenario: #6 - Pipe Drop, Plastic

Scenario Description: A full flow pipe drop (ie: riser and barrel) grade stabilization structure designed and constructed using plastic pipe without anti-seep collars. This is typically a earthen dry dam structure with no permanent storage (water or sediment), however some structures may have some permanent pool / storage but do not have 35 years of sediment life. Payment rate is based upon the riser 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 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 Situation: The operator presently has gullies forming and/or worsening on the farmland and impacting the useable area and the downstream water quality. Erosion from the gullies is allowing soil and possibly nutrients to be transported to downstream receiving waters degrading water quality and causing soil loss.

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

Scenario Feature Measure: Riser Weir Length x Barrel Length

Scenario Unit: Square Foot

Scenario Typical Size: 188

Total Scenario Cost: \$5,036.71

Scenario Cost/Unit: \$26.79

Cost Details

| Component Name | Id | Description | Unit | Cost | Qty | Total |
|----------------|----|-------------|------|------|-----|-------|
|----------------|----|-------------|------|------|-----|-------|

Equipment Installation

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|----------------------------------|-----|---|------------|----------|-----|----------|
| 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 | \$429.82 | 1 | \$429.82 |
| Earthfill, Manually Compacted | 50 | Earthfill, manually compacted, includes equipment and labor | Cubic Yard | \$5.91 | 20 | \$118.11 |
| Earthfill, Roller Compacted | 49 | Earthfill, roller or machine compacted, includes equipment and labor | Cubic Yard | \$4.48 | 100 | \$447.62 |
| 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 | \$126.00 | 2 | \$252.00 |

Labor

| | | | | | | |
|----------------------------|-----|--|------|---------|---|----------|
| Equipment Operators, Heavy | 233 | Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons. | Hour | \$30.82 | 2 | \$61.64 |
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$22.19 | 8 | \$177.55 |

Mobilization

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|------------------------------------|------|--|------|----------|---|----------|
| Mobilization, medium equipment | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds. | Each | \$283.39 | 1 | \$283.39 |
| Mobilization, very small equipment | 1137 | Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously. | Each | \$78.25 | 1 | \$78.25 |

Materials

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|-----------------------------------|------|---|------|------------|---|------------|
| Coupling, PVC, Tee, 24x18, SCH 40 | 1374 | Materials: - Tee, 24"x18" - PVC - SCH 40 - ASTM D1785 | Each | \$1,642.11 | 1 | \$1,642.11 |
|-----------------------------------|------|---|------|------------|---|------------|

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|-----------------------------------|------|--|------|---------|----|------------|
| Pipe, PVC, 18", SCH 40 | 1373 | Materials: - 18" - PVC - SCH 40 - ASTM D1785 | Foot | \$33.92 | 40 | \$1,356.96 |
| Pipe, PVC, 24", ASTM-2241, SDR 26 | 1945 | Materials: -24" -PVC - ASTM 2241, SDR 26 | Foot | \$31.54 | 6 | \$189.25 |

Practice: 410 - Grade Stabilization Structure

Scenario: #7 - Pipe Drop, Steel

Scenario Description: A full flow pipe drop (ie: riser and barrel) grade stabilization structure designed and constructed with a metal anti-seep collar. This is typically a earthen dry dam structure with no permanent storage (water or sediment), however some structures may have some permanent pool / storage but do not have 35 years of sediment life. Payment rate is based upon the riser weir length (Diameter x 3.14) in feet times the length of the pipe barrel in (feet). Installed to 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 Situation: The operator presently has gullies forming and/or worsening on the farmland and impacting the useable area and the downstream water quality. Erosion from the gullies is allowing soil and possibly nutrients to be transported to downstream receiving waters degrading water quality and causing soil loss.

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

Scenario Feature Measure: Riser Weir Length x Barrel Length

Scenario Unit: Square Foot

Scenario Typical Size: 940

Total Scenario Cost: \$14,591.13

Scenario Cost/Unit: \$15.52

Cost Details

| Component Name | Id | Description | Unit | Cost | Qty | Total |
|----------------|----|-------------|------|------|-----|-------|
|----------------|----|-------------|------|------|-----|-------|

Equipment Installation

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|-------------------------------|-----|--|------------|----------|-----|------------|
| Earthfill, Manually Compacted | 50 | Earthfill, manually compacted, includes equipment and labor | Cubic Yard | \$5.91 | 100 | \$590.56 |
| Earthfill, Roller Compacted | 49 | Earthfill, roller or machine compacted, includes equipment and labor | Cubic Yard | \$4.48 | 600 | \$2,685.71 |
| 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 | \$126.00 | 4 | \$503.99 |

Labor

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|----------------------------|-----|--|------|---------|----|----------|
| Equipment Operators, Heavy | 233 | Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons. | Hour | \$30.82 | 4 | \$123.29 |
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$22.19 | 10 | \$221.94 |
| Skilled Labor | 230 | Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc. | Hour | \$34.38 | 11 | \$378.18 |

Materials

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|--------------------------------|------|---|-------------|----------|-----|------------|
| Pipe, Steel, 30", Std Wt, USED | 1361 | Materials: - USED - 30" - Steel Std Wt | Foot | \$79.99 | 100 | \$7,998.70 |
| Pipe, Steel, 36", Std Wt, USED | 1362 | Materials: - USED - 36" - Steel Std Wt | Foot | \$102.13 | 12 | \$1,225.52 |
| Steel, Plate, 1/8" | 1047 | Flat Steel Plate, 1/8" thick, materials only. | Square Foot | \$3.80 | 30 | \$114.08 |
| Steel, Plate, 3/8" | 1375 | Flat steel plate, 3/8" thickness. Materials only. | Square Foot | \$11.57 | 9 | \$104.12 |

Mobilization

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|--------------------------------|------|---|------|----------|---|----------|
| Mobilization, medium equipment | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds. | Each | \$283.39 | 2 | \$566.78 |
|--------------------------------|------|---|------|----------|---|----------|

| | | | | | | |
|------------------------------------|------|--|------|---------|---|---------|
| Mobilization, very small equipment | 1137 | Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously. | Each | \$78.25 | 1 | \$78.25 |
|------------------------------------|------|--|------|---------|---|---------|

Practice: 410 - Grade Stabilization Structure

Scenario: #8 - Weir Drop Structures

Scenario Description: A Straight, semicircular, or Box Drop structure composed of metal or reinforced concrete used to 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 Situation: The operator presently has gullies forming and/or worsening on the farmland and impacting the useable area and the downstream water quality. Erosion from the gullies is allowing soil and possibly nutrients to be transported to downstream receiving waters degrading water quality and causing soil loss.

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

Scenario Feature Measure: Feet of Weir length times Drop Height

Scenario Unit: Square Foot

Scenario Typical Size: 90

Total Scenario Cost: \$8,690.71

Scenario Cost/Unit: \$96.56

Cost Details

| Component Name | Id | Description | Unit | Cost | Qty | Total |
|----------------|----|-------------|------|------|-----|-------|
|----------------|----|-------------|------|------|-----|-------|

Equipment Installation

| | | | | | | |
|--|-----|---|-------------|----------|----|------------|
| Concrete, CIP, formed reinforced | 38 | Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish. | Cubic Yard | \$429.82 | 9 | \$3,868.42 |
| Earthfill, Roller Compacted | 49 | Earthfill, roller or machine compacted, includes equipment and labor | Cubic Yard | \$4.48 | 75 | \$335.71 |
| Excavation, Common Earth, side cast, small equipment | 48 | Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor. | Cubic Yard | \$2.37 | 40 | \$94.74 |
| Geotextile, woven | 42 | Woven Geotextile Fabric. Includes materials, equipment and labor | Square Yard | \$2.43 | 9 | \$21.86 |
| 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 | \$126.00 | 5 | \$629.99 |

Materials

| | | | | | | |
|---|------|--|-------------|---------|-----|------------|
| Aggregate, Gravel, Graded | 46 | Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel. | Cubic Yard | \$32.13 | 3 | \$96.38 |
| Corrugated Steel, 12 Gauge, galvanized | 1376 | Corrugated Steel, 12 gauge, 3" by 1" corrugations, galvanized, meets ASTM A 929. Materials only. | Square Foot | \$7.32 | 212 | \$1,552.23 |
| Pipe, CMP, 12", 14 Gauge | 1377 | 12" - Corrugated Steel Pipe. Galvanized, uncoated. 14 Gauge. Materials only. | Foot | \$9.26 | 2 | \$18.52 |
| Rock Riprap, graded, angular, material and shipping | 1200 | Graded Rock Riprap for all gradation ranges. Includes materials and delivery only. | Ton | \$31.12 | 11 | \$342.34 |

Labor

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|----------------------------|-----|--|------|---------|----|----------|
| Equipment Operators, Heavy | 233 | Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons. | Hour | \$30.82 | 5 | \$154.11 |
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$22.19 | 30 | \$665.82 |

| | | | | | | |
|---------------|-----|---|------|---------|----|----------|
| Skilled Labor | 230 | Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc. | Hour | \$34.38 | 10 | \$343.80 |
|---------------|-----|---|------|---------|----|----------|

Mobilization

| | | | | | | |
|--------------------------------|------|---|------|----------|---|----------|
| Mobilization, medium equipment | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds. | Each | \$283.39 | 2 | \$566.78 |
|--------------------------------|------|---|------|----------|---|----------|

Practice: 410 - Grade Stabilization Structure

Scenario: #9 - Rock Drop Structures

Scenario Description: A Straight Drop structure constructed of rock riprap held in place by galvanized wire, such as, gabion baskets, fence panels, or "sausage" baskets. These structures are used to 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 Situation: The operator presently has gullies forming and/or worsening on the farmland and impacting the useable area and the downstream water quality. Erosion from the gullies is allowing soil and possibly nutrients to be transported to downstream receiving waters degrading water quality and causing soil loss.

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

Scenario Feature Measure: Feet of Weir length times Drop Height

Scenario Unit: Square Foot

Scenario Typical Size: 48

Total Scenario Cost: \$3,731.28

Scenario Cost/Unit: \$77.73

Cost Details

| Component Name | Id | Description | Unit | Cost | Qty | Total |
|----------------|----|-------------|------|------|-----|-------|
|----------------|----|-------------|------|------|-----|-------|

Equipment Installation

| | | | | | | |
|--|------|---|-------------|----------|----|----------|
| Earthfill, Roller Compacted | 49 | Earthfill, roller or machine compacted, includes equipment and labor | Cubic Yard | \$4.48 | 40 | \$179.05 |
| Excavation, Common Earth, side cast, small equipment | 48 | Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor. | Cubic Yard | \$2.37 | 7 | \$16.58 |
| Geotextile, woven | 42 | Woven Geotextile Fabric. Includes materials, equipment and labor | Square Yard | \$2.43 | 23 | \$55.87 |
| 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 | \$126.00 | 5 | \$629.99 |
| Tractor, agricultural, 210 HP | 1201 | Agricultural tractor with horsepower range of 190 to 240. Equipment and power unit costs. Labor not included. | Hour | \$118.62 | 3 | \$355.86 |

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 | \$30.82 | 5 | \$154.11 |
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$22.19 | 10 | \$221.94 |
| Supervisor or Manager | 234 | Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc. | Hour | \$44.78 | 10 | \$447.76 |

Mobilization

| | | | | | | |
|--------------------------------|------|---|------|----------|---|----------|
| Mobilization, medium equipment | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds. | Each | \$283.39 | 2 | \$566.78 |
|--------------------------------|------|---|------|----------|---|----------|

Materials

| | | | | | | |
|----------------------|------|--|------------|----------|---|------------|
| Gabion basket or mat | 1378 | Gabion baskets or mats installed and filled on grade, includes | Cubic Yard | \$157.62 | 7 | \$1,103.35 |
|----------------------|------|--|------------|----------|---|------------|

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| | | materials, transport, equipment, and labor, does not include geotextile fabric. | | | | |
|--|--|---|--|--|--|--|