

**Practice:** 614 - Watering Facility

**Scenario:** #1 - Frost Proof Trough (2 Ball)

**Scenario Description:** A 2 ball frost-proof watering facility (also called a frost-free, freeze-free, or freeze-proof watering facility) is installed on a compacted gravel surface (10x10) with underlain geotextile in order to meet the daily requirements of the herd. Due to the available soil conditions, the gravel/geotextile surface is necessary to provide a stable surface for which the watering facility can be placed and will not settle. The 2 ball watering system needs to be permanently mounted on concrete (0.3 Cu.Yd) to prevent overturning by wind and animals. This particular installation typically requires equipment with operator and a skilled laborer to assist in site preparation and connecting the trough to existing pipeline. Associated Practice(s): Access Control (472), Fence (382), Heavy Use Area Protection (561), Livestock Pipeline (516), Prescribed Grazing (528), and Spring Development (574).

**Before Situation:** A pasture grazed with 50 or more cattle has insufficient water supply that does not provide adequate stock water and inhibits proper animal distribution within the pasture. Animals typically have access to a surface water supply such as a stream or pond causing soil erosion and impacting water quality.

**After Situation:** A permanent 2-ball, frost proof watering facility is installed on a compacted gravel surface and mounted on cement to provide animal access to an adequate water supply throughout the year. A frost proof trough is needed to provide livestock access to water during colder months. The alternate water supply now provides year-round water to livestock to adequately meet water needs based on the size of the herd and improve animal distribution within the pasture due to proper placement away from the surface water body. Due to an alternate water supply away from the surface water body animal traffic is reduced on streambanks and/or shorelines therefore improving water quality and reducing soil erosion.

**Scenario Feature Measure:** Per Unit

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Total Scenario Cost:** \$1,408.50

**Scenario Cost/Unit:** \$1,408.50

**Cost Details**

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

**Equipment Installation**

|                                  |     |  |             |          |      |          |
|----------------------------------|-----|--|-------------|----------|------|----------|
| Backhoe, 80 HP                   | 926 | Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.   | Hour        | \$55.24  | 2    | \$110.49 |
| Concrete, CIP, formed reinforced | 38  | Steel reinforced concrete formed and cast-in-place 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  | \$517.09 | 0.3  | \$155.13 |
| Geotextile, woven                | 42  | Woven Geotextile Fabric. Includes materials, equipment and labor   | Square Yard | \$2.60   | 11.1 | \$28.82  |

**Materials**

|                            |     |  |            |          |      |          |
|----------------------------|-----|--|------------|----------|------|----------|
| Aggregate, Gravel, Graded  | 46  | Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel. | Cubic Yard | \$36.28  | 1.85 | \$67.12  |
| Tank, Freeze Proof, 2 hole | 280 | Tank, Freeze Proof with 2 drinking holes. Includes materials and shipping.                                   | Each       | \$699.42 | 1    | \$699.42 |

**Labor**

|                            |     |  |      |         |   |         |
|----------------------------|-----|--|------|---------|---|---------|
| Equipment Operators, Light | 232 | Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers  | Hour | \$23.96 | 2 | \$47.93 |
| General Labor              | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$23.74 | 2 | \$47.47 |

**Mobilization**

|                                |      |   |      |          |   |          |
|--------------------------------|------|---|------|----------|---|----------|
| Mobilization, medium equipment | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds. | Each | \$252.13 | 1 | \$252.13 |
|--------------------------------|------|---|------|----------|---|----------|

**Practice:** 614 - Watering Facility

**Scenario:** #2 - Gravity Concrete Trough

**Scenario Description:** A 500 gallon concrete watering trough is installed at a lower elevation to the water source to allow gravity inflow into the system without the use of electricity. The concrete watering trough is installed on a gravel pad (10x10) with geotextile. Due to the available soil conditions, the gravel/geotextile surface is necessary to provide a stable surface for which the watering facility can be placed and will not settle. A large capacity water supply is needed due to the slow rate of replenishment into the watering facility from the water source. Due to the unlevel surface, the area needs to be shaped with equipment and operator. Additional equipment and labor will be needed to place the concrete trough. Associated Practice(s): Access Control (472), Fence (382), Heavy Use Area Protection (561), Livestock Pipeline (516), Prescribed Grazing (528), and Spring Development (574).

**Before Situation:** A pasture grazed with 80 dairy cows has insufficient water supply that does not provide adequate stock water and inhibits proper animal distribution within the pasture. Animals typically have access to a surface water supply such as a stream or pond causing soil erosion and impacting water quality. The pasture has no access to a water supply from a well and/or electricity, but there may be a potential supply of water, such as from a spring, which provides a slow rate of flow. The terrain slope is greater than 0.2%. The pasture is grazed throughout the year.

**After Situation:** A permanent, year round 500 gallon concrete trough is installed on a compacted gravel surface to provide animal access to an adequate water supply throughout the year. A concrete trough is installed on a graded surface due to the unlevel surface to support the trough. Due to the lack of electricity and/or well water supply, the concrete trough is installed at a lower elevation to the water source to allow gravity inflow to the system. The slope of the terrain must be greater than 0.2% to accommodate a gravity inflow system. The slow rate of water flow into the system from the water source, a greater capacity is required. Freezing is not an issue due to the continual flow of water and insulation of the trough. The alternate water supply now provides year-round water to livestock to adequately meet water needs based on the size of the herd and improve animal distribution within the pasture due to proper placement away from the surface water body. Due to an alternate water supply animal traffic is reduced on streambanks and/or shorelines improving water quality and reducing soil erosion.

**Scenario Feature Measure:** Per Trough

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Total Scenario Cost:** \$1,510.53

**Scenario Cost/Unit:** \$1,510.53

**Cost Details**

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

**Equipment Installation**

|                   |     |  |             |         |      |          |
|-------------------|-----|--|-------------|---------|------|----------|
| Backhoe, 80 HP    | 926 | Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included. | Hour        | \$55.24 | 2    | \$110.49 |
| Geotextile, woven | 42  | Woven Geotextile Fabric. Includes materials, equipment and labor   | Square Yard | \$2.60  | 11.1 | \$28.82  |

**Materials**

|                            |      |  |            |          |      |          |
|----------------------------|------|--|------------|----------|------|----------|
| Aggregate, Gravel, Graded  | 46   | Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel. | Cubic Yard | \$36.28  | 1.85 | \$67.12  |
| Tank, Concrete, 500 gallon | 1049 | Concrete tank for water storage, with riser and lid. Includes materials and delivery                         | Each       | \$956.57 | 1    | \$956.57 |

**Labor**

|                            |     |  |      |         |   |         |
|----------------------------|-----|--|------|---------|---|---------|
| Equipment Operators, Light | 232 | Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers  | Hour | \$23.96 | 2 | \$47.93 |
| General Labor              | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$23.74 | 2 | \$47.47 |

**Mobilization**

|                                |      |   |      |          |   |          |
|--------------------------------|------|---|------|----------|---|----------|
| Mobilization, medium equipment | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds. | Each | \$252.13 | 1 | \$252.13 |
|--------------------------------|------|---|------|----------|---|----------|

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**Scenario:** #3 - Portable Trough

**Scenario Description:** A 100 gallon portable watering trough are installed in a pasture in support of a seasonal prescribed grazing system. A float is needed to maintain the water level within the portable trough. Throughout the grazing season, the trough is moved periodically to provide access to the herd as it moves through the paddocks and to prevent the buildup of nutrients in any one location. To ensure an adequate lifespan, the watering trough is removed from the pasture during the winter months and stored in a protected location. Associated Practice(s): Access Control (472), Fence (382), Heavy Use Area Protection (561), Livestock Pipeline (516), Prescribed Grazing (528), and Spring Development (574).

**Before Situation:** A prescribed pasture system is seasonally grazed by 80 dairy cows and lacks watering facilities at the appropriate locations within the grazing system. Current watering locations inhibit proper animal distribution within the pasture causing the development of bare spots which also receive excessive amounts of manure as the herd congregates in these areas, resulting in water quality concerns.

**After Situation:** A portable plastic watering trough is installed to provide water to the herd away from hydrologically sensitive areas. Because the trough is portable, it can be moved to reduce the build up of excessive nutrients in one location within the grazing system, thereby reducing the risk of impaired water quality. Placement of the trough is determined by a prescribed grazing plan.

**Scenario Feature Measure:** Per Trough

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Total Scenario Cost:** \$144.20

**Scenario Cost/Unit:** \$144.20

**Cost Details**

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

**Labor**

|               |     |  |      |         |   |         |
|---------------|-----|--|------|---------|---|---------|
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$23.74 | 1 | \$23.74 |
|---------------|-----|--|------|---------|---|---------|

**Materials**

|                                |      |  |      |         |   |         |
|--------------------------------|------|--|------|---------|---|---------|
| Tank, Float Valve Assembly     | 1077 | Float Valve, Stem, Swivel, Float Ball  | Each | \$24.16 | 1 | \$24.16 |
| Tank, Polyethylene, 100 gallon | 290  | Portable heavy duty rubber stock tank. | Each | \$96.31 | 1 | \$96.31 |

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**Scenario:** #4 - Portable Trough with Hydrant

**Scenario Description:** A 100 gallon portable watering trough and frost free hydrant are installed to provide a movable water supply to facilitate an extended season grazing plan. The trough is sized to provide a one-day supply of water based on the daily requirements of the herd and replenishment rates. A float is needed to maintain the water level within the portable trough. Additional labor is required to attach the frost free hydrant to the system. A water hose is installed to connect the hydrant to the trough. Due the extended grazing season and freezing overnight weather conditions, a frost free hydrant is required to replenish the system. Throughout the grazing season, the trough is moved periodically to provide access to the herd as it moves through the paddocks and to prevent the buildup of nutrients in any one location. To ensure an adequate lifespan, the watering trough is removed from the pasture during the winter months and stored in a protected location. Associated Practice(s): Access Control (472), Fence (382), Heavy Use Area Protection (561), Livestock Pipeline (516), Prescribed Grazing (528), and Spring Development (574).

**Before Situation:** A prescribed pasture system is seasonally grazed by 80 dairy cows and lacks watering facilities at the appropriate locations within the grazing system. Current watering locations inhibit proper animal distribution within the pasture causing the development of bare spots which also receive excessive amounts of manure as the herd congregates in these areas, resulting in water quality concerns. The prescribed grazing plan calls for grazing through an extended season.

**After Situation:** A portable plastic watering trough and frost free hydrant are installed to provide water to the herd away from hydrologically sensitive areas. Because the trough is portable, it can be moved to reduce the build up of excessive nutrients in one location within the grazing system, thereby reducing the risk of impaired water quality. Placement of the trough is determined by a prescribed grazing plan. The frost free hydrant guarantees that water will be available throughout the colder, shoulder months of the extended grazing season.

**Scenario Feature Measure:** Per Trough

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Total Scenario Cost:** \$222.79

**Scenario Cost/Unit:** \$222.79

**Cost Details**

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

**Labor**

|               |     |  |      |         |   |         |
|---------------|-----|--|------|---------|---|---------|
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$23.74 | 1 | \$23.74 |
|---------------|-----|--|------|---------|---|---------|

**Materials**

|                                  |      |  |      |         |   |         |
|----------------------------------|------|--|------|---------|---|---------|
| Freeze Proof Hydrant, <= 3' Bury | 240  | Freeze Proof Hydrant, 3 foot or less bury. Materials only. | Each | \$78.59 | 1 | \$78.59 |
| Tank, Float Valve Assembly       | 1077 | Float Valve, Stem, Swivel, Float Ball                      | Each | \$24.16 | 1 | \$24.16 |
| Tank, Polyethylene, 100 gallon   | 290  | Portable heavy duty rubber stock tank.                     | Each | \$96.31 | 1 | \$96.31 |

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**Scenario:** #5 - Storage Tank

**Scenario Description:** A 1000 gallon plastic storage tank is installed on a gravel pad (10x10) with geotextile to provide water storage as part of watering facility. A large capacity plastic storage tank is needed because of the extremely slow flow rates from water source or as an emergency supply for several days. Due to the available soil conditions, a gravel/geotextile surface is necessary to provide a stable surface for the tank that will not settle. Due to the unlevel surface, the area needs to be shaped with equipment (with operator). Additional equipment and labor will be needed to place the tank. Associated Practice(s): Access Control (472), Fence (382), Heavy Use Area Protection (561), Livestock Pipeline (516), Prescribed Grazing (528), and Spring Development (574).

**Before Situation:** A seasonally grazed pasture has insufficient water supply that does not adequately meet the daily water requirements of the herd (consisting of 80 head of cattle) and inhibits proper animal distribution within the pasture. Water is currently supplied by a nearby spring however, the rate of flow is too slow to supply the herd during periods of peak usage. Herd health is impaired as a result.

**After Situation:** A 1000 gallon enclosed, plastic tank is installed adjacent to the spring to collect and store water which ensures that there is adequate water during times peak usage by the herd. The system is designed as a seasonal water supply for use during the grazing season. Herd health is improved as a result.

**Scenario Feature Measure:** Per Tank

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Total Scenario Cost:** \$1,454.98

**Scenario Cost/Unit:** \$1,454.98

**Cost Details**

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

**Equipment Installation**

|                   |     |  |             |         |      |          |
|-------------------|-----|--|-------------|---------|------|----------|
| Backhoe, 80 HP    | 926 | Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included. | Hour        | \$55.24 | 2    | \$110.49 |
| Geotextile, woven | 42  | Woven Geotextile Fabric. Includes materials, equipment and labor   | Square Yard | \$2.60  | 11.1 | \$28.82  |

**Materials**

|   |      |  |            |         |      |          |
|---|------|--|------------|---------|------|----------|
| Aggregate, Gravel, Graded                 | 46   | Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel. | Cubic Yard | \$36.28 | 1.85 | \$67.12  |
| Tank, Poly enclosed Storage, 300-1000 gal | 1074 | Water storage tanks. Includes materials and shipping only.   | Gallon     | \$0.90  | 1000 | \$901.03 |

**Labor**

|                            |     |  |      |         |   |         |
|----------------------------|-----|--|------|---------|---|---------|
| Equipment Operators, Light | 232 | Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers  | Hour | \$23.96 | 2 | \$47.93 |
| General Labor              | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$23.74 | 2 | \$47.47 |

**Mobilization**

|                                |      |   |      |          |   |          |
|--------------------------------|------|---|------|----------|---|----------|
| Mobilization, medium equipment | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds. | Each | \$252.13 | 1 | \$252.13 |
|--------------------------------|------|---|------|----------|---|----------|

**Practice:** 614 - Watering Facility

**Scenario:** #16 - Hydrant with prorated trough cost

**Scenario Description:** A system is designed with a movable tank used with several hydrants. A water hose is installed to connect the hydrant to the trough. Due the extended grazing season and freezing overnight weather conditions, a frost free hydrant is required to replenish the system. Throughout the grazing season, the trough is moved periodically to these hydrants to provide access to the herd as it moves through the paddocks and to prevent the buildup of nutrients in any one location. To ensure an adequate lifespan, the watering supply to the hydrant is drained and the hydrant is left open to avoid freezing over the winter. Hydrant includes a partial cost of buying a trough when it is shared with several hydrants. No separate trough payment needed. Associated Practice(s): Access Control (472), Fence (382), Heavy Use Area Protection (561), Livestock Pipeline (516), Prescribed Grazing (528), and Spring Development (574)

**Before Situation:** A prescribed pasture system is seasonally grazed by 80 dairy cows and lacks watering facilities at the appropriate locations within the grazing system. Current watering locations inhibit proper animal distribution within the pasture causing the development of bare spots which also receive excessive amounts of manure as the herd congregates in these areas, resulting in water quality concerns. The prescribed grazing plan calls for grazing through an extended season.

**After Situation:** Five additional hydrants are associated with one portable trough and installed to provide water to the herd away from hydrologically sensitive areas. Because the trough is portable, it can be moved to each of these hydrants to reduce the build up of excessive nutrients in one location within the grazing system, thereby reducing the risk of impaired water quality. Placement of the trough is determined by a prescribed grazing plan. The frost free hydrant guarantees that water will be available throughout the colder, fall months to extended grazing season.

**Scenario Feature Measure:** Number of hydrants

**Scenario Unit:** Each

**Scenario Typical Size:** 5

**Total Scenario Cost:** \$929.27

**Scenario Cost/Unit:** \$185.85

**Cost Details**

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

**Equipment Installation**

|                               |     |   |      |         |   |         |
|-------------------------------|-----|---|------|---------|---|---------|
| Auger, Post driver attachment | 934 | Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included. | Hour | \$7.20  | 2 | \$14.41 |
| Truck, Pickup                 | 939 | Equipment and power unit costs. Labor not included.   | Hour | \$21.47 | 1 | \$21.47 |

**Labor**

|               |     |   |      |         |   |          |
|---------------|-----|---|------|---------|---|----------|
| Skilled Labor | 230 | Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc. | Hour | \$42.51 | 8 | \$340.09 |
|---------------|-----|---|------|---------|---|----------|

**Materials**

|                                    |      |   |      |         |   |          |
|------------------------------------|------|---|------|---------|---|----------|
| Freeze Proof Hydrant, <= 3' Bury   | 240  | Freeze Proof Hydrant, 3 foot or less bury. Materials only.                    | Each | \$78.59 | 5 | \$392.95 |
| Post, Wood, CCA Treated, 4-5" X 7' | 1050 | Wood Post, Line 4-5" X 7', CCA Treated. Includes materials and shipping only. | Each | \$7.98  | 5 | \$39.88  |
| Tank, Float Valve Assembly         | 1077 | Float Valve, Stem, Swivel, Float Ball   | Each | \$24.16 | 1 | \$24.16  |
| Tank, Polyethylene, 100 gallon     | 290  | Portable heavy duty rubber stock tank.  | Each | \$96.31 | 1 | \$96.31  |