

**Practice: 642 - Water Well**

**Scenario: #1 - Dug Well**

**Scenario Description:**

Typical construction is for the excavation of a shallow dug well. The purpose of the practice is to provide water for livestock. A typical dug well is 4 foot in diameter and 12 feet in depth. The well is excavated using a backhoe. Excavate to a depth where the water recharge is greater than the equipment can remove. Washed gravel is placed in the base of the dug opening. Concrete manhole risers are installed to hold the water. Pea gravel is placed above the washed gravel to transition to the earth backfill. The hole is backfilled and sloped to direct surface water away from entering the manhole cover.

**Before Situation:**

Livestock have insufficient water or are fenced from their water source. There is insufficient water for use in micro-irrigation.

**After Situation:**

Sufficient water is available for livestock or micro-irrigation. Utilize Pumping Plant (533), Pipeline (516), Irrigation Pipeline (430) as associated practices. Use Critical Area Seeding (342) where necessary to prevent erosion following construction activities.

**Scenario Feature Measure:** No.

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Scenario Cost:** \$11,104.66

**Scenario Cost/Unit:** \$11,104.66

**Cost Details (by category):**

| Component Name                        | ID   | Component Description  | Unit       | Price (\$/unit) | Quantity | Cost       |
|---------------------------------------|------|--|------------|-----------------|----------|------------|
| <b>Equipment/Installation</b>         |      |  |            |                 |          |            |
| Backhoe, 80 HP                        | 926  | Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.   | Hour       | \$57.52         | 6        | \$345.12   |
| <b>Labor</b>                          |      |  |            |                 |          |            |
| 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       | \$33.69         | 6        | \$202.14   |
| General Labor                         | 231  | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour       | \$24.48         | 8        | \$195.84   |
| <b>Materials</b>                      |      |  |            |                 |          |            |
| Manhole, 4' x 4'                      | 1053 | Precast Manhole with base and top delivered. 4' diameter x 4' depth. Materials only.   | Each       | \$1,726.37      | 3        | \$5,179.11 |
| Aggregate, Gravel, Graded             | 46   | Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.   | Cubic yard | \$35.73         | 3        | \$107.19   |
| Aggregate, gravel, washed, pea gravel | 1331 | Washed and graded pea gravel river stone. Includes materials and local delivery within 20 miles of quarry.   | Cubic Yard | \$39.38         | 1        | \$39.38    |
| Grout, cement                         | 1333 | Cement grout meeting ASTM specifications for well sealing. Includes both neat-cement grout and bentonite grout mixtures. Includes materials, equipment and labor to place.                           | Cubic Yard | \$943.73        | 5        | \$4,718.65 |
| Test, Standard Water Test, Well Water | 309  | Well Water Suitability test. Includes materials and shipping only.   | Each       | \$40.64         | 1        | \$40.64    |
| Chlorine                              | 1335 | Liquid chlorine bleach. Includes materials only.   | Gallon     | \$2.79          | 5        | \$13.95    |
| <b>Mobilization</b>                   |      |  |            |                 |          |            |
| Mobilization, medium equipment        | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.  | Each       | \$262.64        | 1        | \$262.64   |

**Practice: 642 - Water Well**

**Scenario: #2 - Shallow Well**

**Scenario Description:**

Typical construction is for the installation of a well, in areas where sufficient water is known to occur within 100 feet of the ground surface. The well shall be drilled, dug, driven, bored, jetted or otherwise constructed to an aquifer for water supply. The purpose of the practice is to provide water for livestock or irrigation. An average well depth is 50 feet. Well casings is 4" in diameter. Steel casing is installed to a depth of 30 feet.

**Before Situation:**

Livestock have insufficient water or are fenced from their water source. There is insufficient water for use in micro-irrigation.

**After Situation:**

Sufficient water is available for livestock or irrigation. Utilize Pumping Plant (533), Irrigation Pipeline (430), Pipeline (516) as associated practices. Use Critical Area Seeding (342) where necessary to prevent erosion following construction activities.

**Scenario Feature Measure:** No.

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Scenario Cost:** \$3,280.02

**Scenario Cost/Unit:** \$3,280.02

**Cost Details (by category):**

| Component Name                          | ID   | Component Description  | Unit       | Price (\$/unit) | Quantity | Cost       |
|---|------|--|------------|-----------------|----------|------------|
| <b>Equipment/Installation</b>           |      |  |            |                 |          |            |
| Concrete, CIP, formless, non reinforced | 36   | Non reinforced concrete cast-in-placed without forms by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish. | Cubic yard | \$158.17        | 0.16     | \$25.31    |
| Rotary Drill Rig with Operator          | 1595 | Rotary drill rig including equipment and power unit costs and labor.   | Hour       | \$181.21        | 4        | \$724.84   |
| <b>Materials</b>                        |      |  |            |                 |          |            |
| Well Screen, plastic, 4"                | 1998 | 4" PVC well screen. Materials only.  | Foot       | \$6.88          | 10       | \$68.80    |
| Test, Standard Water Test, Well Water   | 309  | Well Water Suitability test. Includes materials and shipping only.   | Each       | \$40.64         | 1        | \$40.64    |
| Well Cap, 4"                            | 1785 | Well cap, 4". Materials only.  | Each       | \$25.44         | 1        | \$25.44    |
| Well Casing, Metal, 4"                  | 1809 | Steel well casing, 4". Materials only.   | Foot       | \$8.07          | 30       | \$242.10   |
| Chlorine                                | 1335 | Liquid chlorine bleach. Includes materials only.   | Gallon     | \$2.79          | 1        | \$2.79     |
| Grout, cement                           | 1333 | Cement grout meeting ASTM specifications for well sealing. Includes both neat-cement grout and bentonite grout mixtures. Includes materials, equipment and labor to place.             | Cubic Yard | \$943.73        | 2        | \$1,887.46 |
| <b>Mobilization</b>                     |      |  |            |                 |          |            |
| Mobilization, medium equipment          | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.  | Each       | \$262.64        | 1        | \$262.64   |

**Practice: 642 - Water Well**

**Scenario: #3 - Typical Well**

**Scenario Description:**

Typical construction is for the installation of a well, in areas where sufficient water is known to occur 100 - 600 feet of the ground surface. The well shall be drilled, driven, bored, jetted or otherwise constructed to an aquifer for water supply. The purpose of the practice is to provide water for livestock or micro-irrigation. An average well depth is 400 feet. Well casings are 4-6" in diameter. Steel casing is installed to a depth of 100 feet.

**Before Situation:**

Livestock have insufficient water or are fenced from their water source. There is insufficient water for use in micro-irrigation.

**After Situation:**

Sufficient water is available for livestock or micro-irrigation. Utilize Pumping Plant (533), Irrigation Pipeline (430), and Pipeline (516) as associated practices. Use Critical Area Seeding (342) where necessary to prevent erosion following construction activities.

**Scenario Feature Measure:** No.

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Scenario Cost:** \$5,715.03

**Scenario Cost/Unit:** \$5,715.03

**Cost Details (by category):**

| Component Name                          | ID   | Component Description  | Unit       | Price (\$/unit) | Quantity | Cost       |
|---|------|--|------------|-----------------|----------|------------|
| <b>Equipment/Installation</b>           |      |  |            |                 |          |            |
| Concrete, CIP, formless, non reinforced | 36   | Non reinforced concrete cast-in-placed without forms by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish. | Cubic yard | \$158.17        | 0.2      | \$31.63    |
| Rotary Drill Rig with Operator          | 1595 | Rotary drill rig including equipment and power unit costs and labor.   | Hour       | \$181.21        | 8        | \$1,449.68 |
| <b>Materials</b>                        |      |  |            |                 |          |            |
| Grout, cement                           | 1333 | Cement grout meeting ASTM specifications for well sealing. Includes both neat-cement grout and bentonite gout mixtures. Includes materials, equipment and labor to place.              | Cubic Yard | \$943.73        | 2        | \$1,887.46 |
| Well Screen, stainless steel, 6"        | 1995 | 6" Stainless steel well screen. Materials only.  | Foot       | \$60.59         | 10       | \$605.90   |
| Chlorine                                | 1335 | Liquid chlorine bleach. Includes materials only.   | Gallon     | \$2.79          | 1        | \$2.79     |
| Test, Standard Water Test, Well Water   | 309  | Well Water Suitability test. Includes materials and shipping only.   | Each       | \$40.64         | 1        | \$40.64    |
| Well Casing, Metal, 6"                  | 1810 | Steel well casing, 6". Materials only.   | Foot       | \$14.01         | 100      | \$1,401.00 |
| Well Cap, 6"                            | 1786 | Well cap, 6". Materials only.  | Each       | \$33.29         | 1        | \$33.29    |
| <b>Mobilization</b>                     |      |  |            |                 |          |            |
| Mobilization, medium equipment          | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.  | Each       | \$262.64        | 1        | \$262.64   |

**Practice: 642 - Water Well**

**Scenario: #4 - Deep Well**

**Scenario Description:**

Typical construction is for the installation of a well, in areas where sufficient water is known to occur > 600 feet of the ground surface. The well shall be drilled, driven, bored, jetted or otherwise constructed to an aquifer for water supply. The purpose of the practice is to provide water for livestock or micro-irrigation. An average well depth is 800 feet. Well casings are 4-6" in diameter. Steel casing is installed to a depth of 100 feet.

**Before Situation:**

Livestock have insufficient water or are fenced from their water source. There is insufficient water for use in micro-irrigation.

**After Situation:**

Sufficient water is available for livestock or micro-irrigation. Utilize Pumping Plant (533), Irrigation Pipeline (430), and Pipeline (516) as associated practices. Use Critical Area Seeding (342) where necessary to prevent erosion following construction activities.

**Scenario Feature Measure:** No.

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Scenario Cost:** \$11,040.78

**Scenario Cost/Unit:** \$11,040.78

**Cost Details (by category):**

| Component Name                          | ID   | Component Description  | Unit       | Price (\$/unit) | Quantity | Cost       |
|---|------|--|------------|-----------------|----------|------------|
| <b>Equipment/Installation</b>           |      |  |            |                 |          |            |
| Concrete, CIP, formless, non reinforced | 36   | Non reinforced concrete cast-in-placed without forms by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish. | Cubic yard | \$158.17        | 0.2      | \$31.63    |
| Rotary Drill Rig with Operator          | 1595 | Rotary drill rig including equipment and power unit costs and labor.   | Hour       | \$181.21        | 24       | \$4,349.04 |
| <b>Materials</b>                        |      |  |            |                 |          |            |
| Well Screen, stainless steel, 6"        | 1995 | 6" Stainless steel well screen. Materials only.  | Foot       | \$60.59         | 50       | \$3,029.50 |
| Test, Standard Water Test, Well Water   | 309  | Well Water Suitability test. Includes materials and shipping only.   | Each       | \$40.64         | 1        | \$40.64    |
| Grout, cement                           | 1333 | Cement grout meeting ASTM specifications for well sealing. Includes both neat-cement grout and bentonite gout mixtures. Includes materials, equipment and labor to place.              | Cubic Yard | \$943.73        | 2        | \$1,887.46 |
| Chlorine                                | 1335 | Liquid chlorine bleach. Includes materials only.   | Gallon     | \$2.79          | 2        | \$5.58     |
| Well Casing, Metal, 6"                  | 1810 | Steel well casing, 6". Materials only.   | Foot       | \$14.01         | 100      | \$1,401.00 |
| Well Cap, 6"                            | 1786 | Well cap, 6". Materials only.  | Each       | \$33.29         | 1        | \$33.29    |
| <b>Mobilization</b>                     |      |  |            |                 |          |            |
| Mobilization, medium equipment          | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.  | Each       | \$262.64        | 1        | \$262.64   |

**Practice: 642 - Water Well**

**Scenario: #5 - High Volume Shallow Well**

**Scenario Description:**

Typical construction is for the installation of a well, in areas where sufficient water is known to occur within 100 feet of the ground surface. The well shall be drilled, dug, driven, bored, jetted or otherwise constructed to an aquifer for water supply. The purpose of the practice is to provide water for overhead irrigation. An average well depth is 75 feet. Well casings are ≥ 8" in diameter. Steel casing is installed to a depth of 30 feet.

**Before Situation:**

There is insufficient water for use in irrigation.

**After Situation:**

Sufficient water is available for irrigation. Utilize Pumping Plant (533) and Irrigation Pipeline (430) as associated practices. Use Critical Area Seeding (342) where necessary to prevent erosion following construction activities.

**Scenario Feature Measure:** No.

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Scenario Cost:** \$5,348.54

**Scenario Cost/Unit:** \$5,348.54

**Cost Details (by category):**

| Component Name                          | ID   | Component Description  | Unit       | Price (\$/unit) | Quantity | Cost       |
|---|------|--|------------|-----------------|----------|------------|
| <b>Equipment/Installation</b>           |      |  |            |                 |          |            |
| Rotary Drill Rig with Operator          | 1595 | Rotary drill rig including equipment and power unit costs and labor.   | Hour       | \$181.21        | 8        | \$1,449.68 |
| Concrete, CIP, formless, non reinforced | 36   | Non reinforced concrete cast-in-placed without forms by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish. | Cubic yard | \$158.17        | 0.2      | \$31.63    |
| <b>Materials</b>                        |      |  |            |                 |          |            |
| Chlorine                                | 1335 | Liquid chlorine bleach. Includes materials only.   | Gallon     | \$2.79          | 1        | \$2.79     |
| Grout, cement                           | 1333 | Cement grout meeting ASTM specifications for well sealing. Includes both neat-cement grout and bentonite gout mixtures. Includes materials, equipment and labor to place.              | Cubic Yard | \$943.73        | 2        | \$1,887.46 |
| Well Casing, Metal, 8"                  | 1811 | Steel well casing, 8". Materials only.   | Foot       | \$22.54         | 30       | \$676.20   |
| Well Cap, 8"                            | 1787 | Well cap, 8". Materials only.  | Each       | \$49.90         | 1        | \$49.90    |
| Test, Standard Water Test, Well Water   | 309  | Well Water Suitability test. Includes materials and shipping only.   | Each       | \$40.64         | 1        | \$40.64    |
| Well Screen, stainless steel, 8"        | 1819 | 8" Stainless steel well screen. Materials only.  | Foot       | \$94.76         | 10       | \$947.60   |
| <b>Mobilization</b>                     |      |  |            |                 |          |            |
| Mobilization, medium equipment          | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.  | Each       | \$262.64        | 1        | \$262.64   |

**Practice: 642 - Water Well**

**Scenario: #6 - High Volume Typical Well**

**Scenario Description:**

Typical construction is for the installation of a well, in areas where sufficient water is known to occur 100 - 600 feet of the ground surface. The well shall be drilled, driven, bored, jetted or otherwise constructed to an aquifer for water supply. The purpose of the practice is to provide water for livestock or micro-irrigation. An average well depth is 400 feet. Well casings are ≥ 8" in diameter. Steel casing is installed to a depth of 100 feet.

**Before Situation:**

There is insufficient water for use in irrigation.

**After Situation:**

Sufficient water is available for irrigation. Utilize Pumping Plant (533) and Irrigation Pipeline (430) as associated practices. Use Critical Area Seeding (342) where necessary to prevent erosion following construction activities.

**Scenario Feature Measure:** No.

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Scenario Cost:** \$8,376.02

**Scenario Cost/Unit:** \$8,376.02

**Cost Details (by category):**

| Component Name                          | ID   | Component Description  | Unit       | Price (\$/unit) | Quantity | Cost       |
|---|------|--|------------|-----------------|----------|------------|
| <b>Equipment/Installation</b>           |      |  |            |                 |          |            |
| Concrete, CIP, formless, non reinforced | 36   | Non reinforced concrete cast-in-placed without forms by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish. | Cubic yard | \$158.17        | 0.2      | \$31.63    |
| Rotary Drill Rig with Operator          | 1595 | Rotary drill rig including equipment and power unit costs and labor.   | Hour       | \$181.21        | 16       | \$2,899.36 |
| <b>Materials</b>                        |      |  |            |                 |          |            |
| Chlorine                                | 1335 | Liquid chlorine bleach. Includes materials only.   | Gallon     | \$2.79          | 1        | \$2.79     |
| Test, Standard Water Test, Well Water   | 309  | Well Water Suitability test. Includes materials and shipping only.   | Each       | \$40.64         | 1        | \$40.64    |
| Grout, cement                           | 1333 | Cement grout meeting ASTM specifications for well sealing. Includes both neat-cement grout and bentonite grout mixtures. Includes materials, equipment and labor to place.             | Cubic Yard | \$943.73        | 2        | \$1,887.46 |
| Well Casing, Metal, 8"                  | 1811 | Steel well casing, 8". Materials only.   | Foot       | \$22.54         | 100      | \$2,254.00 |
| Well Cap, 8"                            | 1787 | Well cap, 8". Materials only.  | Each       | \$49.90         | 1        | \$49.90    |
| Well Screen, stainless steel, 8"        | 1819 | 8" Stainless steel well screen. Materials only.  | Foot       | \$94.76         | 10       | \$947.60   |
| <b>Mobilization</b>                     |      |  |            |                 |          |            |
| Mobilization, medium equipment          | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.  | Each       | \$262.64        | 1        | \$262.64   |

**Practice: 642 - Water Well**

**Scenario: #7 - High Volume Deep Well**

**Scenario Description:**

Typical construction is for the installation of a well, in areas where sufficient water is known to occur > 600 feet of the ground surface. The well shall be drilled, driven, bored, jetted or otherwise constructed to an aquifer for water supply. The purpose of the practice is to provide water for livestock or micro-irrigation. An average well depth is 800 feet. Well casings are ≥ 8" in diameter. Steel casing is installed to a depth of 100 feet.

**Before Situation:**

There is insufficient water for use in irrigation.

**After Situation:**

Sufficient water is available for irrigation. Utilize Pumping Plant (533) and Irrigation Pipeline (430) as associated practices. Use Critical Area Seeding (342) where necessary to prevent erosion following construction activities.

**Scenario Feature Measure:** No.

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Scenario Cost:** \$16,515.46

**Scenario Cost/Unit:** \$16,515.46

**Cost Details (by category):**

| Component Name                          | ID   | Component Description  | Unit       | Price (\$/unit) | Quantity | Cost       |
|---|------|--|------------|-----------------|----------|------------|
| <b>Equipment/Installation</b>           |      |  |            |                 |          |            |
| Concrete, CIP, formless, non reinforced | 36   | Non reinforced concrete cast-in-placed without forms by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish. | Cubic yard | \$158.17        | 0.2      | \$31.63    |
| Rotary Drill Rig with Operator          | 1595 | Rotary drill rig including equipment and power unit costs and labor.   | Hour       | \$181.21        | 40       | \$7,248.40 |
| <b>Materials</b>                        |      |  |            |                 |          |            |
| Well Screen, stainless steel, 8"        | 1819 | 8" Stainless steel well screen. Materials only.  | Foot       | \$94.76         | 50       | \$4,738.00 |
| Grout, cement                           | 1333 | Cement grout meeting ASTM specifications for well sealing. Includes both neat-cement grout and bentonite grout mixtures. Includes materials, equipment and labor to place.             | Cubic Yard | \$943.73        | 2        | \$1,887.46 |
| Well Cap, 8"                            | 1787 | Well cap, 8". Materials only.  | Each       | \$49.90         | 1        | \$49.90    |
| Test, Standard Water Test, Well Water   | 309  | Well Water Suitability test. Includes materials and shipping only.   | Each       | \$40.64         | 1        | \$40.64    |
| Chlorine                                | 1335 | Liquid chlorine bleach. Includes materials only.   | Gallon     | \$2.79          | 1        | \$2.79     |
| Well Casing, Metal, 8"                  | 1811 | Steel well casing, 8". Materials only.   | Foot       | \$22.54         | 100      | \$2,254.00 |
| <b>Mobilization</b>                     |      |  |            |                 |          |            |
| Mobilization, medium equipment          | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.  | Each       | \$262.64        | 1        | \$262.64   |