Practice: 436 - Irrigation Reservoir

Scenario: #1 - Embankment Dam with On-Site Borrow

Scenario Description: The reservoir, created by an embankment built across a natural depression, with an 18" diameter principal spillway outlet through the embankment, is controlled by a canal-style gate. Outlet can also serve as overflow protection with a 12" diameter standpipe and tee to the 18" pipe. Any watershed runoff will be diverted around reservoir. It will be built with approximately 4,500 cubic yards of on-site material. It will be about 19.9 feet high and 200 feet long and hold approximately 1,000,000 gallons (3 acre-feet). The top of berm will be 10 feet wide and the embankment side slopes will be 2.5 H to 1 V up and down stream. Resource concern: Insufficient Water - Inefficient use of irrigation water. Associated practices include: 521 - Pond Sealing or Lining (various); 320 - Irrigation Canal or Lateral; 430 - Irrigation Pipeline; 428 - Irrigation Ditch Lining; 533 - Pumping Plant; 440 series - Irrigation Systems; 378 - Pond; 447 - Irrigation System, Tailwater Recovery; 484 - Mulching; and 342 - Critical Area Planting.

Before Situation: Current system relies on an intermittent or low-flow rate water source. This results in untimely and/or inefficient water application. Divert water around - no spillway

After Situation: This is an embankment, installed across a natural off-stream intermittent watercourse, used to store water for subsequent irrigation. It will be used to accumulate and store water for timely and efficient application of water through an irrigation system The water source could be a well, irrigation district pipeline, and/or a pump from a stream. It is designed to deliver water by gravity to an open ditch or non-pressurized pipeline, generally in excess of 5 cfs. All earthen materials will be from on-site sources.

Scenario Feature Measure: Volume of Compacted Eartfill

Scenario Unit: Cubic Yard

Scenario Typical Size: 4500

Total Scenario Cost: $23,897.83

Scenario Cost/Unit: $5.31

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	$4.22	4500	$18,986.47
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.26	16	$388.24
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	$43.17	8	$345.36
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$471.90	2	$943.80
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$247.16	1	$247.16
Materials						
Coupling, HDPE CPT Dual Wall, Tee, 18"x18"x12"	1921	Tee, 18"x18"x12" - HDPE CPT Tee. Materials only.	Each	$279.80	1	$279.80
Pipe, HDPE, CPT, Double Wall, Soil Tight, 12"	1244	Pipe, Corrugated HDPE Double Wall, 12" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$7.47	36	$268.85
Pipe, HDPE, CPT, Double Wall, Soil Tight, 18"	1245	Pipe, Corrugated HDPE Double Wall, 18" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$11.52	120	$1,381.81
Screw gate, cast iron, 18" diameter, 10/0 head	1917	18" diameter cast iron screw (canal) gate rated at 10 seating head 0 feet unseating head. Materials only.	Each	$1,056.34	1	$1,056.34

Practice: 436 - Irrigation Reservoir

Scenario: #2 - Embankment Dam with Off-Site Borrow

Scenario Description: The reservoir, created by an embankment built across a natural depression, with an 18" diameter principal spillway through the embankment, is controlled by a canal-style gate. It will be built with approximately 4,500 cubic yards of material from off the site. It will be about 19.9 feet high and 200 feet long and hold approximately 1,000,000 gallons (3 Ac-Ft.). The top of berm will be 10 feet wide and the embankment side slopes will be 2.5 H to 1 V up and down stream. Resource concern: Insufficient Water - Inefficient use of irrigation water. Associated Practices: 521 - Pond Sealing or Lining (various); 320 - Irrigation Canal or Lateral; 430 - Irrigation Pipeline; 428 - Irrigation Ditch Lining; 533 - Pumping Plant; 440 series - Irrigation Systems; 447 - Irrigation System, Tailwater Recovery; 378 - Pond; 484 - Mulching; and 342 - Critical Area Planting.

Before Situation: Current system relies on an intermittent or low-flow rate water source. This results in untimely and/or inefficient water application.

After Situation: This is an embankment, installed across a natural off-stream intermittent watercourse, used to store water for subsequent irrigation. It will be used to accumulate and store water for timely and efficient application of water through an irrigation system The water source could be, a well, irrigation district pipeline, and/or a pump from a stream. It is designed to deliver water by gravity to an open ditch or non-pressurized pipeline, generally in excess of 5 cfs. All earthen materials will be from off-site sources.

Scenario Feature Measure: Volume of Compacted Eartfill

Scenario Unit: Cubic Yard

Scenario Typical Size: 4500

Total Scenario Cost: $38,900.42

Scenario Cost/Unit: $8.64

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	$4.22	4500	$18,986.47
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	$2.23	5850	$13,060.39
Hauling, bulk, highway truck	1615	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	$0.32	4500	$1,447.88
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.26	16	$388.24
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	$43.17	8	$345.36
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$471.90	2	$943.80
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$247.16	3	$741.49
Materials						
Coupling, HDPE CPT Dual Wall, Tee, 18"x18"x12"	1921	Tee, 18"x18"x12" - HDPE CPT Tee. Materials only.	Each	$279.80	1	$279.80
Pipe, HDPE, CPT, Double Wall, Soil Tight, 12"	1244	Pipe, Corrugated HDPE Double Wall, 12" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$7.47	36	$268.85
Pipe, HDPE, CPT, Double	1245	Pipe, Corrugated HDPE Double Wall, 18" diameter with soil tight	Foot	$11.52	120	$1,381.81

Wall, Soil Tight, 18"		joints - AASHTO M294. Material cost only.				
Screw gate, cast iron, 18" diameter, 10/0 head	1917	18" diameter cast iron screw (canal) gate rated at 10 seating head 0 feet unseating head. Materials only.	Each	$1,056.34	1	$1,056.34

Practice: 436 - Irrigation Reservoir

Scenario: #3 - Embankment Reservoir = 30 Acre-Feet

Scenario Description: This is a small rectangular embankment reservoir with a 10" diameter principal spillway through the embankment controlled by a canal-type gate. It is designed to accumulate, store, and deliver water by gravity to an open ditch or non-pressurized pipeline, in excess of 5 cfs. It will have an inside dimension of about 375 feet square, with 12 feet of fill and about 1600 feet total length of embankment (along the centerline). The embankment top will be 10 feet wide and the side slopes will no steeper than 2.5 H to 1 V inside and out. It will be built with approximately 28,500 cubic yards of on-site material. It will have a maximum water depth of 10 feet with 2 feet of freeboard and no auxiliary spillway. Volume is approximately 30 ac-ft (10,000,000 gallons). Resource Concern: Insufficient Water - Inefficient use of irrigation water. Associated Practices: 521 - Pond Sealing or Lining (various); 320 - Irrigation Canal or Lateral; 430 - Irrigation Pipeline; 428 - Irrigation Ditch Lining; 533 - Pumping Plant; 440 series - Irrigation Systems; 447 - Irrigation System, Tailwater Recovery; 378 - Pond; 484 - Mulching; and 342 - Critical Area Planting.

Before Situation: Current system relies on an intermittent or low-flow rate water source. This results in untimely and/or inefficient water application.

After Situation: The square reservoir will be built on a relatively flat site and be used to accumulate and store water for timely application through an irrigation system. The water source could be a stream, an irrigation well, or an irrigation district canal.

Scenario Feature Measure: Volume of Compacted Earthfill

Scenario Unit: Cubic Yard

Scenario Typical Size: 28500

Total Scenario Cost: $124,797.80

Scenario Cost/Unit: $4.38

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	$4.22	28500	$120,247.63
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.26	16	$388.24
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	$43.17	8	$345.36
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$471.90	2	$943.80
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$247.16	2	$494.33
Materials						
Catwalk, metal	1918	Metal pedestrian walk way giving access to the valve on a structure, typically 3' wide with railing. Materials only.	Foot	$56.59	20	$1,131.83
Pipe, HDPE, CPT, Double Wall, Soil Tight, 10"	1243	Pipe, Corrugated HDPE Double Wall, 10" diameter with soil tight joints - AASHTO M252. Material cost only.	Foot	$5.20	100	$520.46
Screw gate, cast iron, 10" diameter, 10/0 head	1916	10" diameter cast iron screw (canal) gate rated at 10 seating head 0 feet unseating head. Materials only.	Each	$726.17	1	$726.17

Practice: 436 - Irrigation Reservoir

Scenario: #4 - Embankment Reservoir > 30 Acre-Feet

Scenario Description: This is a very large embankment reservoir with a 18" diameter drain pipe through the embankment controlled by a canal-type gate. It is designed to accumulate, store, and deliver water by gravity to an open ditch or non-pressurized pipeline, in excess of 5 cfs. It will have a top width of 12ft and centerline length of embankment of 5,280 feet. Average fill of 10 feet and the side slopes will be no steeper than 3 H to 1 V inside and out. It will be built with approximately 105,000 cubic yards of on-site material. It will have a maximum water depth of 8 feet with 2 feet of freeboard and no auxiliary spillway. Volume is approximately 320 ac-ft (104,500,000 gallons). Critical Area Planting and Mulching is required. Resource Concern: Insufficient Water - Inefficient use of irrigation water. Associated Practices: 521 - Pond Sealing or Lining (various); 320 - Irrigation Canal or Lateral; 430 - Irrigation Pipeline; 428 - Irrigation Ditch Lining; 533 - Pumping Plant; 440 series - Irrigation Systems; 447 - Irrigation System, Tailwater Recovery; 378 - Pond; 484 - Mulching; and 342 - Critical Area Planting.

Before Situation: Current system relies on an intermittent or low-flow rate water source. This results in untimely and/or inefficient water application.

After Situation: The rectangular reservoir will be built on a relatively flat site and be used to accumulate and store water for timely application through an irrigation system. The water source could be a stream or an irrigation district canal.

Scenario Feature Measure: Volume of Compacted Earthfill

Scenario Unit: Cubic Yard

Scenario Typical Size: 104200

Total Scenario Cost: $459,965.50

Scenario Cost/Unit: $4.41

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	$4.22	104200	$439,642.20
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.26	32	$776.47
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	$43.17	16	$690.71
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$471.90	3	$1,415.70
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$247.16	2	$494.33
Materials						
Catwalk, metal	1918	Metal pedestrian walk way giving access to the valve on a structure, typically 3' wide with railing. Materials only.	Foot	$56.59	50	$2,829.58
Pipe, Steel, 18", Std Wt	1366	Materials: - 18" - Steel Std Wt	Foot	$130.60	100	$13,060.17
Screw gate, cast iron, 18" diameter, 10/0 head	1917	18" diameter cast iron screw (canal) gate rated at 10 seating head 0 feet unseating head. Materials only.	Each	$1,056.34	1	$1,056.34

Practice: 436 - Irrigation Reservoir

Scenario: #5 - Excavated Tailwater Pit

Scenario Description: This is an excavated pit with a control structure. It is designed to accumulate, store, deliver or regulate water for a surface irrigation system. It will have a bottom width of 20 ft and length of 1,250 feet. The side slopes will be no steeper than 1.5 H to 1 V inside and out. It will be built with approximately 20,000 cubic yards of on-site material. It will have a maximum water depth of 10 feet with 1 feet of freeboard. Volume is approximately 12 ac-ft (3,950,303 gallons). Resource concern: Insufficient Water - Inefficient use of irrigation water. Associated Practices: 521 - Pond Sealing or Lining (various); 320 - Irrigation Canal or Lateral; 430 - Irrigation Pipeline; 428 - Irrigation Ditch Lining; 533 - Pumping Plant; 440 series - Irrigation Systems; 447 - Irrigation System, Tailwater Recovery; 378 - Pond; 484 - Mulching; and 342 - Critical Area Planting.

Before Situation: Current system relies on an intermittent or low-flow rate water source. This results in untimely and/or inefficient water application.

After Situation: An excavated regulating reservoir will be built on a relatively flat site and be used to accumulate and store water for timely application through an irrigation system. The water source could be a stream or an irrigation district canal.

Scenario Feature Measure: Volume of Earth Excavated

Scenario Unit: Cubic Yard

Scenario Typical Size: 19600

Total Scenario Cost: $45,315.64

Scenario Cost/Unit: $2.31

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
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	$2.23	19600	$43,757.88
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.26	8	$194.12
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	$43.17	4	$172.68
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$471.90	2	$943.80
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$247.16	1	$247.16

Practice: 436 - Irrigation Reservoir

Scenario: #6 - Steel Tank

Scenario Description: A 20,000 Gallon, above ground, enclosed fabricated Steel or bottomless Corrugated Metal (with plastic liner and cover) tank with fittings, is installed on 6" of well compacted drain rock support pad with sand padding (CM tank), to store water from a reliable source for irrigation of an area less than 5 acres. The scenario assumes the typical dimensions of the tank are 24 feet in diameter and 6 feet tall. The scenario also assumes a 28 feet diameter gravel base pad to extend a minimum of 2 feet past the base of tank for adequate foundation support. This cost estimate scenario is for cost of the tank and pad only and does not include the cost for pumps, pipe, or fittings for the pipeline. Resource Concern: Insufficient Water - Inefficient use of irrigation water. Associated Practices: 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 533 - Pumping Plant; 447 - Irrigation System, Tailwater Recovery.

Before Situation: Insufficient volume of water to complete an irrigation cycle at the required flow rate.

After Situation: An above ground, enclosed fabricated steel or bottomless corrugated metal tank (with plastic liner and cover), capable of withstanding the elements, is used to accumulate and store water between irrigation cycles for a small irrigation system. This allows for an improved flow rate and timing of water application. Sources of water could be a well, a domestic water system, a very large roof area, a water ram , or a pump drawing water from a stream.

Scenario Feature Measure: Volume of Tank Storage

Scenario Unit: Gallon

Scenario Typical Size: 20000

Total Scenario Cost: $29,802.42

Scenario Cost/Unit: $1.49

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic Yard	$16.12	12	$193.46
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$23.07	8	$184.58
Tank, Corrugated Metal Storage, 20,000 gallon	1920	20,000 gallon capacity enclosed corrugated Metal Storage tank. Includes delivery to the site and anchoring material.	Each	$23,980.31	1	$23,980.31
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	$39.75	16	$636.02
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	$24.26	80	$1,941.18
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	$43.17	40	$1,726.78
Equipment Installation						
Plate compactor	1915	Manually guided vibratroy plate compactor. Equipment only.	Hour	$4.90	16	$78.37
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.09	10	$430.89
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$247.16	2	$494.33
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	$68.25	2	$136.50

Practice: 436 - Irrigation Reservoir

Scenario: #7 - Plastic Tank

Scenario Description: A 3,000 Gallon, above-ground, High Density Polyethylene plastic enclosed tank, is installed on 6" of well-compacted drain rock or a 4" thick reinforced concrete support pad, to store water from a reliable source for irrigation of an area less than one acre. The scenario assumes the typical dimensions of the tank are 102" in diameter and 93" tall. The scenario also assumes a 126" diameter gravel base or concrete pad to extend a minimum of 12" past the base of tank for adequate foundation support. This cost estimate scenario is for cost of the tank and pad only and does not include estimate for pumps, pipe, or connecting fittings. Resource Concern: Insufficient Water - Inefficient use of irrigation water. Associated Practices: 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 533 - Pumping Plant; 447 - Irrigation System, Tailwater Recovery.

Before Situation: Insufficient volume of water to complete an irrigation cycle at the required flow rate.

After Situation: An above-ground plastic tank, constructed to withstand the elements, is used to accumulate and store water between irrigation cycles for a very small irrigation system. This allows for an improved flow rate and timing of water application. Sources of water could be a well, a domestic water system, a large roof area, a water ram , or a pump drawing water from a stream.

Scenario Feature Measure: Volume of Tank Storage

Scenario Unit: Gallon

Scenario Typical Size: 3000

Total Scenario Cost: $5,421.89

Scenario Cost/Unit: $1.81

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$39.75	6	$238.51
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	$24.26	32	$776.47
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	$43.17	16	$690.71
Equipment Installation						
Plate compactor	1915	Manually guided vibratroy plate compactor. Equipment only.	Hour	$4.90	4	$19.59
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.09	6	$258.54
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic Yard	$16.12	2	$32.24
Tank, Poly Enclosed Storage, >1,000	1075	Water storage tanks. Includes materials and shipping only.	Gallon	$0.93	3000	$2,775.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$247.16	2	$494.33
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	$68.25	2	$136.50

Practice: 436 - Irrigation Reservoir

Scenario: #8 - Fiberglass Tank

Scenario Description: A 10,000 Gallon above ground, enclosed, fiberglass tank, is installed on 6" of well compacted drain rock support pad. The tank is used to store water from a reliable source for irrigation of areas less than 3 acres. The scenario assumes the typical dimensions of the tank are 15 feet in diameter and 8 feet tall. The scenario also assumes a 19 feet diameter gravel base pad to extend a minimum of 2 feet past the base of tank for adequate foundation support. This cost estimate scenario is for cost of the tank and pad only and does not include estimate for pumps, pipe, fittings for the pipeline, or catchment area. Resource Concern: Insufficient Water - Inefficient use of irrigation water. Associated Practices: 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 533 - Pumping Plant; 447 - Irrigation System, Tailwater Recovery.

Before Situation: Insufficient volume of water to complete an irrigation cycle at the required flow rate.

After Situation: A large fiberglass enclosed tank, capable of withstanding the elements, is used to accumulate and store water between irrigation cycles for a very small irrigation system. This allows for an improved flow rate and timing of water application and better efficiency. Sources of water could be a well, a domestic water system, a very large roof area, a water ram , or a pump drawing water from a stream.

Scenario Feature Measure: Volume of Tank Storage

Scenario Unit: Gallon

Scenario Typical Size: 10000

Total Scenario Cost: $11,378.38

Scenario Cost/Unit: $1.14

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
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	$39.75	8	$318.01
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	$24.26	40	$970.59
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	$43.17	24	$1,036.07
Equipment Installation						
Plate compactor	1915	Manually guided vibratroy plate compactor. Equipment only.	Hour	$4.90	4	$19.59
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$43.09	8	$344.72
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic Yard	$16.12	6	$96.73
Tank, Fiberglass Enclosed Storage, 10,000 gallon	1919	10,000 gallon capacity enclosed fiberglass water storage tank. Includes tank anchoring materials and delivery.	Each	$7,961.86	1	$7,961.86
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$247.16	2	$494.33
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	$68.25	2	$136.50

Practice: 436 - Irrigation Reservoir

Scenario: #9 - Reservoir < 15 ac-ft

Scenario Description: Relatively smaller irrigation reservoir constructed such that the capacity is obtained from both excavation and embankment material. Single pipe conduit for outflow consisting of an 18" diameter pipe to control up to 4 cfs. Excavated material is used to construct an embankment surrounding the excavation in which both retain irrigation water. Embankment is compacted with a minimum of two passes of construction equipment and the final 6-8 inches is roller compacted to reduce seepage losses. No auxiliary spillway.

Before Situation: Irrigated cropland/hayland and some pasture with river, stream or ditch water source. Current system relies on an intermittent or low-flow rate water source. This results in untimely and/or inefficient water application.

After Situation: A dependable water source or more efficient delivery for an improved irrigation system.

Scenario Feature Measure: Excavated Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 10000

Total Scenario Cost: $31,367.65

Scenario Cost/Unit: $3.14

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	$4.22	3000	$12,657.65
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	$1.54	10000	$15,405.00
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$24.26	8	$194.12
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	$43.17	4	$172.68
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$471.90	2	$943.80
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$247.16	1	$247.16
Materials						
Pipe, HDPE, CPT, Double Wall, Soil Tight, 18"	1245	Pipe, Corrugated HDPE Double Wall, 18" diameter with soil tight joints - AASHTO M294. Material cost only.	Foot	$11.52	60	$690.91
Screw gate, cast iron, 18" diameter, 10/0 head	1917	18" diameter cast iron screw (canal) gate rated at 10 seating head 0 feet unseating head. Materials only.	Each	$1,056.34	1	$1,056.34