

Practice: 447 - Irrigation System, Tailwater Recovery

Scenario: #1 - Tailwater Field Ditch

Scenario Description:

A new field ditch is constructed to collect the excess irrigation water of a single field and direct it to a collection system so that the water can be recovered and reused. Typical ditch size is trapezoidal ditch with 4ft bottom x 3ft depth x 1760 ft length with 2:1 side slopes. The total yardage of earthwork is 1956 cy.

Resource concerns that will be addressed: Excess/Insufficient Water - inefficient use of irrigation water; Water Quality Degradation - excessive sediments in surface waters; Water Quality Degradation - Excess nutrients in surface and ground water; Degradation Plant Condition - undesirable plant productivity and health.

Associated practices: 533 - Pumping Plants; 410 - Grade Stabilization Structure; 587 - Structure for water control; 449 - Irrigation Water Management

Before Situation:

Excess irrigation water collects at lower ends of field and backs up into crops and causes plant stress or causes erosion and travels off farm in a drainage ditch causing water quality issues in lower watersheds.

After Situation:

Excess irrigation water is collected and directed into a recovery system where the water can be recycled and reused for irrigation. Sedimentation has a chance to settle out of the water allowing for less sediment to travel down stream.

Scenario Feature Measure: Length of Ditch

Scenario Unit: Linear Foot

Scenario Typical Size: 1,760

Scenario Cost: \$4,397.63

Scenario Cost/Unit: \$2.50

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, small equipment, 50 ft	1220	Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	\$2.17	1956	\$4,244.52
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	\$153.11	1	\$153.11

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Scenario: #2 - Tailwater Lateral Ditch

Scenario Description:

A new lateral ditch is constructed to collect the excess irrigation water of a series of fields creating a collection system so that the water can be recovered and reused. Typical ditch size is trapezoidal ditch with 8 ft bottom x 5 ft depth x 1950 ft length with 2:1 side slopes. The total yardage of earthwork is 6,500 cy.

Resource concerns that will be addressed: Excess/Insufficient Water - inefficient use of irrigation water; Water Quality Degradation - excessive sediments in surface waters; Water Quality Degradation - Excess nutrients in surface and ground water; Degradation Plant Condition - undesirable plant productivity and health.

Associated practices: 533 - Pumping Plants; 410 - Grade Stabilization Structure; 587 - Structure for water control; 449 - Irrigation Water Management

Before Situation:

Excess irrigation water collects at lower ends of field and backs up into crops and causes plant stress or causes erosion and travels off farm in a drainage ditch causing water quality issues in lower watersheds.

After Situation:

Excess irrigation water is collected and directed into a recovery system where the water can be recycled and reused for irrigation. Sedimentation has a chance to settle out of the water allowing for less sediment to travel down stream.

Scenario Feature Measure: Length of ditch

Scenario Unit: Linear Foot

Scenario Typical Size: 1,950

Scenario Cost: \$10,899.63

Scenario Cost/Unit: \$5.59

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	\$1.61	6500	\$10,465.00
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	\$434.63	1	\$434.63

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Scenario: #3 - Tailwater Pit

Scenario Description:

A new excavated pit is constructed to collect the excess irrigation water to create a pumping pool and storage area so the water can be recovered and reused. Typical pit cross section is trapezoidal with 20 ft bottom x 10 ft depth, with 2:1 side slopes, and 1575 ft length. The total yardage of earthwork is 21,613 cy.

Resource concerns that will be addressed: Excess/Insufficient Water - inefficient use of irrigation water; Water Quality Degradation - excessive sediments in surface waters; Water Quality Degradation - Excess nutrients in surface and ground water; Degradation Plant Condition - undesirable plant productivity and health.

Associated practices: 533 - Pumping Plants; 410 - Grade Stabilization Structure; 587 - Structure for water control; 449 - Irrigation Water Management

Before Situation:

Excess irrigation water collects at lower ends of field and backs up into crops and causes plant stress or causes erosion and travels off farm in a drainage ditch causing water quality issues in lower watersheds.

After Situation:

Excess irrigation water is collected and directed into a recovery system where the water can be recycled and reused for irrigation. Sedimentation has a chance to settle out of the water allowing for less sediment to travel down stream.

Scenario Feature Measure: volume of excavation

Scenario Unit: Cubic Yard

Scenario Typical Size: 21,613

Scenario Cost: \$36,756.75

Scenario Cost/Unit: \$1.70

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	\$109.77	8	\$878.16
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	\$1.61	21613	\$34,796.93
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	\$26.55	8	\$212.40
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	\$434.63	2	\$869.26

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Scenario: #4 - Convert a Field Ditch to a Lateral Ditch

Scenario Description:

An existing lateral ditch's cross-sectional area is enlarged to atailwater pit cross-sectional area allowing for more capacity in order to collect the excess irrigation water of a series of fields creating a collection system so that the water can be recovered and reused. Typical existing ditch cross section is a trapezoidal ditch with 4 ft bottom x 3 ft depth 2:1 side slopes and the new ditch cross section is a trapezoidal ditch with 8 ft bottom x 5 ft depth with 2:1 side slopes. The existing cross sectional area is calculated to be 30 sf, which is equivalent to 1.11 cy per foot of excavated area. The new cross sectional area is calculated to be 90 sf, which is equivalent to 3.33 cy per foot of excavated area. The difference to be excavated is 2.22 cy per foot to be moved. Length of ditches varies from 500 ft to 5280 ft but typical length is 1950 ft

Resource concerns that will be addressed: Excess/Insufficient Water - inefficient use of irrigation water; Water Quality Degradation - excessive sediments in surface waters; Water Quality Degradation - Excess nutrients in surface and ground water; Degradation Plant Condition - undesirable plant productivity and health.

Associated practices: 533 - Pumping Plants; 410 - Grade Stabilization Structure; 587 - Structure for water control; 449 - Irrigation Water Management

Before Situation:

Excess irrigation water collects in an existing lateral but the capacity of the lateral is too small to adequately contain the excess causing erosion and allowing sediment to travels off farm in a drainage ditch causing water quality issues in lower watersheds.

After Situation:

Excess irrigation water is collected and directed into a recovery system where the water can be recycled and reused for irrigation. Sedimentation has a chance to settle out of the water allowing for less sediment to travel down stream.

Scenario Feature Measure: Length of Ditch

Scenario Unit: Linear Foot

Scenario Typical Size: 1,575

Scenario Cost: \$7,410.76

Scenario Cost/Unit: \$4.71

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	\$1.61	4333	\$6,976.13
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	\$434.63	1	\$434.63

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Scenario: #5 - Convert a Lateral Ditch to a Tailwater Pit

Scenario Description:

An existing lateral ditch's cross-sectional area is enlarged to atailwater pit cross-sectional area allowing for more capacity in order to collect the excess irrigation water of a series of fields creating a collection system so that the water can be recovered and reused. Typical existing ditch cross section is a trapezoidal ditch with 8 ft bottom x 5 ft depth 2:1 side slopes and the new ditch cross section is a trapezoidal ditch with 20 ft bottom x 10 ft depth with 2:1 side slopes. The existing cross sectional area is calculated to be 90 sf, which is equivalent to 3.33 cy per foot of excavated area. The new cross sectional area is calculated to be 400 sf, which is equivalent to14.8 cy per foot of excavated area. The difference to be excavated is 11.5 cy per foot to be moved. Length of ditches varies from 500 ft to 5280 ft but typical length is 1575 ft

Resource concerns that will be addressed: Excess/Insufficient Water - inefficient use of irrigation water; Water Quality Degradation - excessive sediments in surface waters; Water Quality Degradation - Excess nutrients in surface and ground water; Degradation Plant Condition - undesireable plant prductivity and health.

Associated practices: 533 - Pumping Plants; 410 - Grade Stabilization Structure; 587 - Structure for water control; 449 - Irrigation Water Management

Before Situation:

Excess irrigation water collects in an existing lateral but the capacity of the lateral is too small to provide adequate capacity for pumping .

After Situation:

Excess irrigation water is collected and directed into a recovery system where the water can be recycled and reused for irrigation. Sedimentation has a chance to settle out of the water allowing for less sediment to travel down stream.

Scenario Feature Measure: Length of Ditch

Scenario Unit: Linear Foot

Scenario Typical Size: 1,575

Scenario Cost: \$30,687.12

Scenario Cost/Unit: \$19.48

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	\$109.77	8	\$878.16
Excavation, common earth, side cast, large equipment	1227	Bulk excavation and side casting of common earth with hydraulic excavator with less greater than 1 CY capacity. Includes equipment and labor.	Cubic Yard	\$1.61	18113	\$29,161.93
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	\$26.55	8	\$212.40
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	\$434.63	1	\$434.63