

Practice: 441 - Irrigation System, Microirrigation

Scenario: #1 - SDI (Subsurface Drip Irrigation)

Scenario Description:

A subsurface drip irrigation system (SDI) with a lateral spacing between 37-59 inches. This buried drip irrigation system utilizes a thinwall dripperline (drip tube) or durabe 10 to 15 mil tape with inline emitters at a uniform spacing for the system laterals. The dripperline or tape is normally installed by being plowed in approx 10-14 inches deep with a chisel shank type plow equipped with tape reels. This type of drip irrigation system utilizes a buried supply manifold with automated zone control valves and a buried flush manifold with manual flush valves. This permanent micro-irrigation system includes an automated filter station, flow meter, backflow prevention device, automated control box or timer, the thinwall dipperline or tape for laterals, both a supply and a flushing manifold and numerous types of water control valves. This is an all-inclusive system starting with the filter station including all required system components out to the flush valves. The water supply line from the water source to the filter station is an irrigation pipeline (430) and is not included as part of this system. Where needed, a flowmeter can be added under practice 587.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, Degraded Plant Condition - Undesirable plant productivity and health, Water Quality Degradation - Excessive sediment in surface waters, and Inefficient Energy Use - Equipment and facilities.

Associated Practices: 533-Pumping Plant, 449- Irrigation Water Management, 430 - Irrigation Pipeline, 433 - Irrigation Flow Measurement, 610 - Salinity & Sodic Soil Management, 434 - Soil Moisture Measurement, 328-Conservation Crop Rotation, 590 - Nutrient Management, and 587 - Structures for Water Control.

Before Situation:

Typical before irrigation situation would normally be an existing inefficient surface or sprinkler irrigation system on a cropland or hayland field. The existing irrigation system would experience poor, non-uniform irrigation applications and significant water losses affecting both water quantity and water quality

After Situation:

A typical practice would be the installation of a subsurface drip irrigation system (SDI) on a 15 acre cropland or hayland field. The system lateral (thinwall dripperline or tape) spacing would 40 inches. This highly efficient SDI (buried) irrigation system provides irrigation water directly to the plant root zone eliminating application losses resulting in a very high water application efficiency and properly designed these SDI systems are capable of very uniform water applications.
Typical field size is 15 acres.

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 15

Scenario Cost: \$36,065.32

Scenario Cost/Unit: \$2,404.35

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,360.10	1	\$1,360.10
Trenching, Pipeline Plowing	1096	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.10	820	\$902.00
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	\$1.34	820	\$1,098.80
Materials						
Pipe, PVC, dia. < 18", weight priced	1323	Polyvinyl Chloride (PVC) pressure rated pipe priced by the weight of the pipe materials for pipes with diameters less than 18". Materials only.	Pound	\$1.55	1200	\$1,860.00
Micro Irrigation, media filter	1482	Sand or media filter for Micro irrigation system. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	\$2,449.98	2	\$4,899.96
Micro Irrigation, screen filter, ≥ 100 gpm	1484	Screen filter for Micro irrigation system with 100 gpm or greater capacity. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	\$313.85	1	\$313.85

Materials

Micro Irrigation, control valves and timers	1485	Automatic controller and timer, to turn on and off the sets for micro irrigation, installation and valves. Based on control unit, not number of valves controlled.	Each	\$1,223.75	1	\$1,223.75
Micro Irrigation, buried drip tubing	1487	Tubing that is installed underground for Sub-surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tubing has emitters built in. Includes labor.	Foot	\$0.14	171285	\$23,979.90

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	\$171.69	1	\$171.69
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$255.27	1	\$255.27

Practice: 441 - Irrigation System, Microirrigation

Scenario: #2 - Automated Surface Permanent PE Tube with Media Filter Laterals 9 ft oc

Scenario Description:

An permanent automated micro-irrigation system is installed above-ground or on trellis utilizing surface UV resistant PE tubing with integrated emitters to provide irrigation for an orchard, vinyard, or other perennial crop grown in a grid pattern. The typical system is a permanent system installed on a 10 acre orchard. The orchard has a plant spacing of 8 feet x 9 feet. Laterals are spaced 9 feet apart. This system typically includes automatic controls, a media filter system, PE tubing laterals, PVC manifolds, and submains, valves, fittings, emitters, etc. This practice applies to systems designed to discharge < 60 gal/hr at each individual lateral discharge point. Does not include pump, power source, water source (well or reservoir), or flowmeter.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, Degraded Plant Condition - Undesirable plant productivity and health, Water Quality Degradation - Excessive sediment in surface waters, and Inefficient Energy Use - Equipment and facilities.

Associated Practices: 533-Pumping Plant, 449- Irrigation Water Management, 430 - Irrigation Pipeline, 433 - Irrigation Flow Measurement, 610 - Salinity & Sodic Soil Management, 434 - Soil Moisture Measurement, 328-Conservation Crop Rotation, 590 - Nutrient Management, 587 - Structures for Water Control.

Before Situation:

An orchard has an inefficient surface irrigation system causing irrigation water loss that impacts water quality and water quantity.

After Situation:

An automated surface microirrigation system with media filter with laterals at 9ft o.c. is utilized to provide highly efficient irrigation to an orchard. Water applications are reduced and runoff eliminated. Offsite water quality is improved, and on site water use is reduced.

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: \$58,517.50

Scenario Cost/Unit: \$5,851.75

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,360.10	1	\$1,360.10
Trenching, Pipeline Plowing	1096	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.10	1500	\$1,650.00
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	\$24.74	40	\$989.60
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	\$3.79	640	\$2,425.60
Micro Irrigation, surface drip tubing or tape	1488	Tubing or Tape is installed above ground for surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tubing has emitters built in.	Foot	\$0.87	52640	\$45,796.80
Micro Irrigation, media filter	1482	Sand or media filter for Micro irrigation system. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	\$2,449.98	2	\$4,899.96
Micro Irrigation, control valves and timers	1485	Automatic controller and timer, to turn on and off the sets for micro irrigation, installation and valves. Based on control unit, not number of valves controlled.	Each	\$1,223.75	1	\$1,223.75
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	\$171.69	1	\$171.69

Practice: 441 - Irrigation System, Microirrigation

Scenario: #3 - Surface Permanent PE tube with Media Filter Laterals 9 ft oc

Scenario Description:

An permanent micro-irrigation system is installed utilizing surface UV resistant PE tubing with integrated emitters to provide irrigation for an orchard, vinyard, or other perennial crop. The typical system is a permanent system installed on a 10 acre orchard on the ground surface or attached to a trellis. The orchard has a plant spacing of 8 feet x 9 feet. Laterals are spaced 9 feet apart. This system typically includes manual controls, a media filter system, PE tubing laterals, PVC manifolds, and submains, valves, fittings, emitters, etc. This practice applies to systems designed to discharge < 60 gal/hr at each individual lateral discharge point. Does not include pump, power source, water source (well or reservoir), or flowmeter.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, Degraded Plant Condition - Undesirable plant productivity and health, Water Quality Degradation - Excessive sediment in surface waters, and Inefficient Energy Use - Equipment and facilities.

Associated Practices: 533-Pumping Plant, 449- Irrigation Water Management, 430 - Irrigation Pipeline, 433 - Irrigation Flow Measremnt, 610 - Salinity & Sodic Soil Management, 434 - Soil Moisture Measurement, 328-Conservation Crop Rotation, 590 - Nutrient Management, 587 - Structures for Water Control.

Before Situation:

An orchard has an inefficient surface irrigation system causing irrigation water loss that impacts water quality and water quantity.

After Situation:

A surface microirrigation system with media filter with laterals at 9ft o.c. is utilized to provide highly efficient irrigation to an orchard. Water applications are reduced and runoff eliminated. Offsite water quality is improved, and on site water use is reduced.

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: \$57,293.75

Scenario Cost/Unit: \$5,729.38

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,360.10	1	\$1,360.10
Trenching, Pipeline Plowing	1096	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.10	1500	\$1,650.00
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	\$24.74	40	\$989.60
Materials						
Micro Irrigation, surface drip tubing or tape	1488	Tubing or Tape is installed above ground for surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tubing has emitters built in.	Foot	\$0.87	52640	\$45,796.80
Micro Irrigation, media filter	1482	Sand or media filter for Micro irrigation system. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	\$2,449.98	2	\$4,899.96
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	\$3.79	640	\$2,425.60
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	\$171.69	1	\$171.69

Practice: 441 - Irrigation System, Microirrigation

Scenario: #4 - Surface Permanent PE Tube with Disk Filter Laterals 9 ft oc

Scenario Description:

An permanent micro-irrigation system is installed utilizing surface UV resistant PE tubing with integrated emitters to provide irrigation for an orchard, vinyard, or other perennial crop. The typical system is a permanent system installed on a 10 acre orchard on the ground surface or attached to a trellis. The orchard has a plant spacing of 8 feet x 9 feet. Laterals are spaced 9 feet apart. This system typically includes manual controls, disk filters, PE tubing laterals, PVC manifolds, and submains, valves, fittings, emitters, etc. This practice applies to systems designed to discharge < 60 gal/hr at each individual lateral discharge point. This scenario assumes a well water source. Does not include pump, power source, water source (well or reservoir), or flowmeter.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, Degraded Plant Condition - Undesirable plant productivity and health, Water Quality Degradation - Excessive sediment in surface waters, and Inefficient Energy Use - Equipment and facilities.

Associated Practices: 533-Pumping Plant, 449- Irrigation Water Management, 430 - Irrigation Pipeline, 433 - Irrigation Flow Measurement, 610 - Salinity & Sodic Soil Management, 434 - Soil Moisture Measurement, 328-Conservation Crop Rotation, 590 - Nutrient Management, 587 - Structures for Water Control.

Before Situation:

Ann orchard has an inefficient surface irrigation system causing irrigation water loss that impacts water quality and water quantity.

After Situation:

A surface microirrigation system with disk filter with laterals at 9ft o.c. is utilized to provide highly efficient irrigation to an orchard. Water applications are reduced and runoff eliminated. Offsite water quality is improved, and on site water use is reduced.

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: \$58,844.37

Scenario Cost/Unit: \$5,884.44

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,360.10	1	\$1,360.10
Trenching, Pipeline Plowing	1096	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.10	1500	\$1,650.00
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	\$24.74	40	\$989.60
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	\$3.79	640	\$2,425.60
Micro Irrigation, disk filter	1483	Disk filter for Micro irrigation system. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	\$3,225.29	2	\$6,450.58
Micro Irrigation, surface drip tubing or tape	1488	Tubing or Tape is installed above ground for surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tubing has emitters built in.	Foot	\$0.87	52640	\$45,796.80
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	\$171.69	1	\$171.69

Practice: 441 - Irrigation System, Microirrigation

Scenario: #5 - Automated Surface Permanent PE Tube with Media Filter Laterals 14 ft oc

Scenario Description:

An permanent automated micro-irrigation system is installed utilizing surface UV resistant PE tubing with integrated emitters to provide irrigation for an orchard, vinyard, or other permanent crop. The typical system is installed on a 10 acre orchard on the ground surface or attached to a trellis. The orchard has a plant spacing of 12 feet x 14 feet. Laterals are spaced 14 feet apart. This system typically includes automatic controls, a media filter system, PE tubing laterals, PVC manifolds, and submains, valves, fittings, emitters, etc. This practice applies to systems designed to discharge < 60 gal/hr at each individual lateral discharge point. Does not include Pump, Power source, Water source (well or reservoir), or flowmeter.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, Degraded Plant Condition - Undesirable plant productivity and health, Water Quality Degradation - Excessive sediment in surface waters, and Inefficient Energy Use - Equipment and facilities.

Associated Practices: 533-Pumping Plant, 449- Irrigation Water Management, 430 - Irrigation Pipeline, 433 - Irrigation Flow Measurement, 610 - Salinity & Sodic Soil Management, 434 - Soil Moisture Measurement, 328-Conservation Crop Rotation, 590-Nutrient Management, and 587-Structures for Water Control..

Before Situation:

An orchard has an inefficient surface irrigation system causing irrigation water loss that impacts water quality and water quantity.

After Situation:

An automated surface microirrigation system with media filter and laterals at 14 ft o.c. is utilized to provide highly efficient irrigation to an orchard. Water applications are reduced and runoff eliminated. Offsite water quality is improved, and on site water use is reduced.

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: \$41,865.70

Scenario Cost/Unit: \$4,186.57

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Pipeline Plowing	1096	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.10	1500	\$1,650.00
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,360.10	1	\$1,360.10
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	\$24.74	40	\$989.60
Materials						
Micro Irrigation, control valves and timers	1485	Automatic controller and timer, to turn on and off the sets for micro irrigation, installation and valves. Based on control unit, not number of valves controlled.	Each	\$1,223.75	1	\$1,223.75
Micro Irrigation, surface drip tubing or tape	1488	Tubing or Tape is installed above ground for surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tubing has emitters built in.	Foot	\$0.87	33500	\$29,145.00
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	\$3.79	640	\$2,425.60
Micro Irrigation, media filter	1482	Sand or media filter for Micro irrigation system. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	\$2,449.98	2	\$4,899.96
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	\$171.69	1	\$171.69

Practice: 441 - Irrigation System, Microirrigation

Scenario: #6 - Surface Permanent PE Tube with Media Filter Laterals 14 ft oc

Scenario Description:

A permanent micro-irrigation system is installed utilizing surface UV resistant PE tubing with integrated emitters to provide irrigation for an orchard, vinyard, or other permanent crop. The typical system is installed on a 10 acre orchard on the ground surface or attached to a trellis. The orchard has a plant spacing of 12 feet x 14 feet. Laterals are spaced 14 feet apart. This system typically includes manual controls, a media filter system, PE tubing laterals, PVC manifolds, and submains, valves, fittings, emitters, etc. This practice applies to systems designed to discharge < 60 gal/hr at each individual lateral discharge point. Does not include Pump, Power source, Water source (well or reservoir), or flowmeter.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, Degraded Plant Condition - Undesirable plant productivity and health, Water Quality Degradation - Excessive sediment in surface waters, and Inefficient Energy Use - Equipment and facilities.

Associated Practices: 533-Pumping Plant, 449- Irrigation Water Management, 430 - Irrigation Pipeline, 433 - Irrigation Flow Measurement, 610 - Salinity & Sodic Soil Management, 434 - Soil Moisture Measurement, 328-Conservation Crop Rotation, 590-Nutrient Management, and 587-Structures for Water Control.

Before Situation:

Ann orchard has an inefficient surface irrigation system causing irrigation water loss that impacts water quality and water quantity.

After Situation:

A surface microirrigation system with media filter and laterals at 14 ft o.c. is utilized to provide highly efficient irrigation to an orchard. Water applications are reduced and runoff eliminated. Offsite water quality is improved, and on site water use is reduced.

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: \$40,641.95

Scenario Cost/Unit: \$4,064.20

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,360.10	1	\$1,360.10
Trenching, Pipeline Plowing	1096	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.10	1500	\$1,650.00
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	\$24.74	40	\$989.60
Materials						
Micro Irrigation, media filter	1482	Sand or media filter for Micro irrigation system. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	\$2,449.98	2	\$4,899.96
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	\$3.79	640	\$2,425.60
Micro Irrigation, surface drip tubing or tape	1488	Tubing or Tape is installed above ground for surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tubing has emitters built in.	Foot	\$0.87	33500	\$29,145.00
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	\$171.69	1	\$171.69

Practice: 441 - Irrigation System, Microirrigation

Scenario: #7 - Surface Permanent PE Tube with Disk filter laterals 14 ft oc

Scenario Description:

An permanent micro-irrigation system is installed utilizing surface UV resistant PE tubing with integrated emitters to provide irrigation for an orchard, vinyard, or other permanent crop. The typical system is installed on a 10 acre orchard on the ground surface or attached to a trellis. The orchard has a plant spacing of 12 feet x 14 feet. Laterals are spaced 14 feet apart. This system typically includes manual controls, a media filter system, PE tubing laterals, PVC manifolds, and submains, valves, fittings, emitters, etc. This practice applies to systems designed to discharge < 60 gal/hr at each individual lateral discharge point. Does not include pump, power source, water source (well or reservoir), or flowmeter.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, Degraded Plant Condition - Undesirable plant productivity and health, Water Quality Degradation - Excessive sediment in surface waters, and Inefficient Energy Use - Equipment and facilities.

Associated Practices: 533-Pumping Plant, 449- Irrigation Water Management, 430 - Irrigation Pipeline, 433 - Irrigation Flow Measremnt, 610 - Salinity & Sodic Soil Management, 434 - Soil Moisture Measurement, 328-Conservation Crop Rotation, 590-Nutrient Management, and 587-Structures for Water Control.

Before Situation:

An orchard has an inefficient surface irrigation system causing irrigation water loss that impacts water quality and water quantity.

After Situation:

A surface microirrigation system with disk filter and laterals at 14 ft o.c. is utilized to provide highly efficient irrigation to an orchard. Water applications are reduced and runoff eliminated. Offsite water quality is improved, and on site water use is reduced.

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: \$42,192.57

Scenario Cost/Unit: \$4,219.26

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Pipeline Plowing	1096	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.10	1500	\$1,650.00
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,360.10	1	\$1,360.10
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	\$24.74	40	\$989.60
Materials						
Micro Irrigation, surface drip tubing or tape	1488	Tubing or Tape is installed above ground for surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tubing has emitters built in.	Foot	\$0.87	33500	\$29,145.00
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	\$3.79	640	\$2,425.60
Micro Irrigation, disk filter	1483	Disk filter for Micro irrigation system. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	\$3,225.29	2	\$6,450.58
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	\$171.69	1	\$171.69

Practice: 441 - Irrigation System, Microirrigation

Scenario: #8 - Microjet with Filter

Scenario Description:

A micro-irrigation system, utilizing micro-jets to provide irrigation and/or frost protection for an orchard or other specialty crops grown in a grid pattern. The system is installed with all fittings, control valves, pressure reducing/regulating valves, air/vacuum release, disc filters, pressure gauges, submains, lateral lines, and micro-jet sprayers to deliver water to the trees. This practice applies to systems designed to discharge < 60 gal/hr at each individual lateral discharge point. Does not include Pump, Power source, Water source (well or reservoir). The typical installation is a permanent, microjet -irrigation system installed on a 60 acre orchard. Typical tree spacing is 20' x 20' feet. The water supply line from the water source to the zone valves is an irrigation pipeline (430) and is not included as part of this system. Where needed, a flowmeter can be added under practice 587.

Resource Concerns: Insufficient Water - Inefficient use of irrigation water, Degraded Plant Condition - Undesirable plant productivity and health, Water Quality Degradation - Excessive sediment in surface waters, and Inefficient Energy Use - Equipment and facilities.

Associated Practices: 533-Pumping Plant, 449- Irrigation Water Management, 430 - Irrigation Pipeline, 433 - Irrigation Flow Measurement, 610 - Salinity & Sodic Soil Management, 434 - Soil Moisture Measurement, 328-Conservation Crop Rotation, 590-Nutrient Management, and 587-Structures for Water Control.

Before Situation:

An orchard has an inefficient irrigation system causing irrigation water loss that impacts water quality and water quantity.

After Situation:

A micro-spray microirrigation system is utilized to provide highly efficient irrigation to an orchard. Water applications are reduced and runoff eliminated. Offsite water quality is improved, and on site water use is reduced.

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 60

Scenario Cost: \$155,696.88

Scenario Cost/Unit: \$2,594.95

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Pipeline Plowing	1096	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.10	3520	\$3,872.00
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,360.10	1	\$1,360.10
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	\$24.74	24	\$593.76
Materials						
Pipe, PVC, dia. < 18", weight priced	1323	Polyvinyl Chloride (PVC) pressure rated pipe priced by the weight of the pipe materials for pipes with diameters less than 18". Materials only.	Pound	\$1.55	4800	\$7,440.00
Micro Irrigation, media filter	1482	Sand or media filter for Micro irrigation system. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	\$2,449.98	3	\$7,349.94
Micro Irrigation, control valves and timers	1485	Automatic controller and timer, to turn on and off the sets for micro irrigation, installation and valves. Based on control unit, not number of valves controlled.	Each	\$1,223.75	1	\$1,223.75
Micro Irrigation, emitters or sprays and tubing	1489	Emitters or sprays that are installed above ground for micro or drip irrigation. Includes installation and connections to the supply and flushing laterals. Tubing for the emitters is included in this item.	Foot	\$0.93	143748	\$133,685.64

Mobilization

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	\$171.69	1	\$171.69
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Practice: 441 - Irrigation System, Microirrigation

Scenario: #9 - Automated Surface Drip Tape with Media Filter

Scenario Description:

An automated, micro-irrigation system is installed over 10 acres of rotating vegetable crops. The system is installed with all fittings, control valves, pressure reducing/regulating valves, air/vacuum release, media filter, pressure gauges, submain, lateral lines, computerized soil moisture sensor system, and emitters to deliver water to the plants at or below the soil infiltration rate on a typical 10 acre site. The seasonal drip tape used for the lateral lines is disposable, typically used for only one season, and not included. Where needed, a flowmeter can be added under practice 587.

Associated Practices: Irrigation Pipeline (430), Irrigation Water Management (449), Structures for Water Control (587)

Before Situation:

A 10 acre field of vegetable crops has an inefficient irrigation system causing irrigation water loss that impacts water quality, water quantity, and potential overdraft from the aquifer. A surface water source is available.

After Situation:

An automated micro-irrigation system is installed over 10 acres of rotating vegetable crops to reduce water consumption and provide a system to efficiently and uniformly apply water to meet plant needs. The mainline is installed with PS 430-Irrigation Pipeline. The system is installed with all fittings, control valves, pressure reducing/regulating valves, air/vacuum release, media filter, pressure gauges, submain, lateral lines, computerized soil moisture sensor system, and emitters to deliver water to the plants at or below the soil infiltration rate on a typical 10 acre site. The available water supply requires the use of an automatic-cleaning sand media water filtration system or its equivalent. The lateral lines are not included.

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: \$12,126.94

Scenario Cost/Unit: \$1,212.69

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Pipeline Plowing	1096	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.10	1500	\$1,650.00
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,360.10	1	\$1,360.10
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	\$24.74	16	\$395.84
Materials						
Micro Irrigation, media filter	1482	Sand or media filter for Micro irrigation system. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	\$2,449.98	2	\$4,899.96
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	\$3.79	640	\$2,425.60
Micro Irrigation, control valves and timers	1485	Automatic controller and timer, to turn on and off the sets for micro irrigation, installation and valves. Based on control unit, not number of valves controlled.	Each	\$1,223.75	1	\$1,223.75
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	\$171.69	1	\$171.69

Practice: 441 - Irrigation System, Microirrigation

Scenario: #10 - Surface Drip Tape with Media Filter

Scenario Description:

A micro-irrigation system is installed over 10 acres of rotating vegetable crops. The system is installed with all fittings, control valves, pressure reducing/regulating valves, air/vacuum release, media filter, pressure gauges, submain, lateral lines, computerized soil moisture sensor system, and emitters to deliver water to the plants at or below the soil infiltration rate on a typical 10 acre site. The seasonal drip tape used for the lateral lines is disposable, typically used for only one season, and not included. Where needed, a flowmeter can be added under practice 587.

Associated Practices: Irrigation Pipeline (430), Irrigation Water Management (449), Structures for Water Control (587)

Before Situation:

A 10 acre field of vegetable crops has an inefficient irrigation system causing irrigation water loss that impacts water quality, water quantity, and potential overdraft from the aquifer. A surface water source is available.

After Situation:

A micro-irrigation system is installed over 10 acres of rotating vegetable crops to reduce water consumption and provide a system to efficiently and uniformly apply water to meet plant needs. The mainline is installed with PS 430-Irrigation Pipeline. The system is installed with all fittings, control valves, pressure reducing/regulating valves, air/vacuum release, screen/disc filters, pressure gauges, submain, lateral lines, computerized soil moisture sensor system, and emitters to deliver water to the plants at or below the soil infiltration rate on a typical 10 acre site. The available water supply requires the use of an automatic-cleaning sand media water filtration system or its equivalent. The lateral lines are not included.

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: \$10,903.19

Scenario Cost/Unit: \$1,090.32

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,360.10	1	\$1,360.10
Trenching, Pipeline Plowing	1096	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.10	1500	\$1,650.00
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	\$24.74	16	\$395.84
Materials						
Micro Irrigation, media filter	1482	Sand or media filter for Micro irrigation system. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	\$2,449.98	2	\$4,899.96
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	\$3.79	640	\$2,425.60
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	\$171.69	1	\$171.69

Practice: 441 - Irrigation System, Microirrigation

Scenario: #11 - Surface Drip Tape with Disk Filter

Scenario Description:

A micro-irrigation system is installed over 10 acres of rotating vegetable crops. The system is installed with all fittings, control valves, pressure reducing/regulating valves, air/vacuum release, disk filter, pressure gauges, submain, lateral lines, computerized soil moisture sensor system, and emitters to deliver water to the plants at or below the soil infiltration rate on a typical 10 acre site. The seasonal drip tape used for the lateral lines is disposable, typically used for only one season, and not included. Where needed, a flowmeter can be added under practice 587.

Associated Practices: Irrigation Pipeline (430), Irrigation Water Management (449), Structures for Water Control (587)

Before Situation:

A 10 acre field of vegetable crops has an inefficient irrigation system causing irrigation water loss that impacts water quality, water quantity, and potential overdraft from the aquifer. A surface water source is available.

After Situation:

A micro-irrigation system is installed over 10 acres of rotating vegetable crops to reduce water consumption and provide a system to efficiently and uniformly apply water to meet plant needs. The mainline is installed with PS 430-Irrigation Pipeline. The system is installed with all fittings, control valves, pressure reducing/regulating valves, air/vacuum release, screen/disc filters, pressure gauges, submain, lateral lines, computerized soil moisture sensor system, and emitters to deliver water to the plants at or below the soil infiltration rate on a typical 10 acre site. The available water supply requires the use of a disk filter or its equivalent. The lateral lines are not included.

Scenario Feature Measure: Acres in System

Scenario Unit: Acre

Scenario Typical Size: 10

Scenario Cost: \$12,453.81

Scenario Cost/Unit: \$1,245.38

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Pipeline Plowing	1096	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.10	1500	\$1,650.00
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,360.10	1	\$1,360.10
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	\$24.74	16	\$395.84
Materials						
Micro Irrigation, disk filter	1483	Disk filter for Micro irrigation system. Includes plumbing, connections and automatic controller. Unit is complete and installed. Unit price per filter, not per filter station.	Each	\$3,225.29	2	\$6,450.58
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	\$3.79	640	\$2,425.60
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	\$171.69	1	\$171.69

Practice: 441 - Irrigation System, Microirrigation

Scenario: #12 - Greenhouse Irrigation

Scenario Description:

A micro-irrigation system is installed in a greenhouse or high tunnel. The system is installed with all fittings, control valves, pressure reducing/regulating valves, air/vacuum release, screen filter, pressure gauges, submain, lateral lines, and emitters to deliver water to potted plants or in-ground crops. Multiple outlet drip (MOD) emitters or microjets are used. No seasonal drip tape is included.

Associated Practices: Irrigation Pipeline (430), Irrigation Water Management (449)

Before Situation:

Crops in a 2,000 SF greenhouse have an inefficient irrigation system causing irrigation water loss. A surface water source is available.

After Situation:

A micro-spray or multiple outlet drip microirrigation system is utilized to provide highly efficient irrigation to a greenhouse. Water applications are reduced and runoff eliminated. Offsite water quality is improved, and on site water use is reduced.

Scenario Feature Measure: Sq Ft in Green House system.

Scenario Unit: Square Foot

Scenario Typical Size: 2,000

Scenario Cost: \$2,191.34

Scenario Cost/Unit: \$1.10

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Trenching, Pipeline Plowing	1096	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.10	500	\$550.00
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	\$24.74	8	\$197.92
Materials						
Micro Irrigation, drip irrigation system, small scale	2170	Permanently installed above ground, small scale, micro-irrigation system. Includes miniature emitters, tubes, or applicators placed along a water delivery line. Includes materials and shipping only.	Square Foot	\$0.11	2000	\$220.00
Micro Irrigation, screen filter, < 100 gpm	1617	Screen filter for Micro Irrigation used in small systems. Includes filter. No controls are included or needed.	Each	\$277.62	2	\$555.24
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	\$3.79	131	\$496.49
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	\$171.69	1	\$171.69