

**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 or 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 dripperline 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

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, and 590 Nutrient Management.

**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 10 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 10 acres.

**Scenario Feature Measure:** Acres in System

**Scenario Unit:** Acre

**Scenario Typical Size:** 10

**Scenario Cost:** \$28,876.37

**Scenario Cost/Unit:** \$2,887.64

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	\$1.35	1800	\$2,430.00
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
<b>Labor</b>						
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	\$22.96	4	\$91.84
<b>Materials</b>						
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	\$3,403.71	1	\$3,403.71
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	95850	\$13,419.00
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	\$1.59	984	\$1,564.56

**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	\$169.60	1	\$169.60
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**Practice: 441 - Irrigation System, Microirrigation**

**Scenario: #2 - Surface PE Perennial Crops, filtered, no flow meter**

**Scenario Description:**

A micro-irrigation system, utilizing surface tubing (can be placed on trellis or above ground) with emitters to provide irrigation for an orchard, vineyard, field nursery stock or other specialty crop grown in a grid pattern. The typical system is a permanent system, installed over 20 acres of perennial crops on the ground surface or trellis. This system utilizes emitters at each tree or plant as the water application device. Durable, UV resistant tube/tape is used for a multi-year system. This system typically includes all fittings, control valves, pressure reducing/regulating valves, air vacuum release, a filter system (screen/disc), pressure gauges, submains, lateral lines, and emitters to deliver water to plants at or below the soil infiltration rate on a typical 20 acre site. Does not include Pump, Power source, Water source (well or reservoir). The water supply line from the water source to the field edge is an irrigation pipeline (430) and is not included as part of this system. Water supply is not filtered.

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, and 590 Nutrient Management.

**Before Situation:**

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

**After Situation:**

A surface placed 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:** 20

**Scenario Cost:** \$107,124.75

**Scenario Cost/Unit:** \$5,356.24

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
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, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	\$1.35	2700	\$3,645.00
<b>Labor</b>						
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	\$22.96	4	\$91.84
<b>Materials</b>						
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	106480	\$92,637.60
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
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	\$1.59	2520	\$4,006.80
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

**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	\$169.60	1	\$169.60
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**Practice: 441 - Irrigation System, Microirrigation**

**Scenario: #3 - Surface PE Perennial Crops**

**Scenario Description:**

A micro-irrigation system, utilizing surface PE tubing (can be placed on trellis or above ground) with emitters to provide irrigation for an orchard, vineyard, field nursery stock or other specialty crop grown in a grid pattern. The typical system is a permanent system, installed over 20 acres of perennial crops on the ground surface or trellis. This system utilizes emitters at each tree or plant as the water application device. Durable, UV resistant tube/tape is used for a multi-year system. This system typically includes all fittings, control valves, pressure reducing/regulating valves, air vacuum release, a filter system (screen/disc), pressure gauges, submains, lateral lines, computerized soil moisture sensors system, and emitters to deliver water to plants at or below the soil infiltration rate on a typical 20 acre site. Does not include Pump, Power source, Water source (well or reservoir). 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. Water supply is not filtered.

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, and 590 Nutrient Management.

**Before Situation:**

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

**After Situation:**

A surface placed 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:** 20

**Scenario Cost:** \$105,628.50

**Scenario Cost/Unit:** \$5,281.43

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
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, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	\$1.35	2700	\$3,645.00
<b>Labor</b>						
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	\$22.96	4	\$91.84
<b>Materials</b>						
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	106480	\$92,637.60
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	\$1.59	2520	\$4,006.80
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	\$3,403.71	1	\$3,403.71
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

**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	\$169.60	1	\$169.60
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**Practice: 441 - Irrigation System, Microirrigation**

**Scenario: #4 - Surface PE Container Nursery**

**Scenario Description:**

A micro-irrigation system, utilizing surface PE tubing (can be placed on trellis or above containers) with emitters to provide irrigation for container-grown nursery stock in a grid pattern. The typical system is a permanent system, installed over 10 acres of container-grown nursery stock. This system utilizes emitters at each tree or plant as the water application device. Durable, UV resistant tube/tape is used for a multi-year system. This system typically includes all fittings, control valves, pressure reducing/regulating valves, air vacuum release, a filter system (screen/disc), pressure gauges, submains, lateral lines, computerized soil moisture sensors system, and emitters to deliver water to plants at or below the soil infiltration rate on a typical 10 acre site. Does not include Pump, Power source, Water source (well or reservoir). 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. Water supply is not filtered.

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, and 590 Nutrient Management.

**Before Situation:**

A container-grown nursery stock has an inefficient sprinkler irrigation system causing irrigation water loss that impacts water quality and water quantity.

**After Situation:**

A surface placed microirrigation system is utilized to provide highly efficient irrigation to a container-grown nursery stock. 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:** \$99,386.27

**Scenario Cost/Unit:** \$9,938.63

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
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, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	\$1.35	1800	\$2,430.00
<b>Labor</b>						
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	\$22.96	4	\$91.84
<b>Materials</b>						
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	95850	\$89,140.50
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
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	\$3,403.71	1	\$3,403.71

**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	\$1.59	788	\$1,252.92
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	\$169.60	1	\$169.60
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**Practice: 441 - Irrigation System, Microirrigation**

**Scenario: #5 - Surface PE Perennial Filtered**

**Scenario Description:**

A micro-irrigation system, utilizing surface PE tubing (can be placed on trellis or above ground) with emitters to provide irrigation for an orchard, vineyard, field nursery stock or other specialty crop grown in a grid pattern. The typical system is a permanent system, installed over 20 acres of perennial crops on the ground surface or trellis. This system utilizes emitters at each tree or plant as the water application device. Durable, UV resistant tube/tape is used for a multi-year system. This system typically includes all fittings, control valves, pressure reducing/regulating valves, air vacuum release, a filter system (screen/disc), pressure gauges, submains, lateral lines, computerized soil moisture sensors system, and emitters to deliver water to plants at or below the soil infiltration rate on a typical 20 acre site. Does not include Pump, Power source, Water source (well or reservoir). An additional automatic-cleaning sand media filtration system or its equivalent is needed to prevent the passage of solids in sizes or quantities from the water source that might obstruct the emitter openings to ensure proper efficiency and uniformity of irrigation system. 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.

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, and 590 Nutrient Management.

**Before Situation:**

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

**After Situation:**

A surface placed 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:** 20

**Scenario Cost:** \$112,978.44

**Scenario Cost/Unit:** \$5,648.92

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
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, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	\$1.35	2700	\$3,645.00
<b>Labor</b>						
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	\$22.96	4	\$91.84
<b>Materials</b>						
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	\$3,403.71	1	\$3,403.71
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	106480	\$92,637.60
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	3	\$7,349.94

**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	\$1.59	2520	\$4,006.80
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

**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	\$169.60	1	\$169.60
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**Practice: 441 - Irrigation System, Microirrigation**

**Scenario: #6 - Surface Tape Annual Filtered, no Flow Meter**

**Scenario Description:**

A micro-irrigation system, utilizing surface drip tape to provide irrigation for vegetables. The typical system is a permanent system, installed over 10 acres of vegetables crops on the ground surface, with buried main lines and headers. This system utilizes closely spaced emitters as the water application device. This system typically includes all fittings, control valves, pressure reducing/regulating valves, air vacuum release, a filter system (screen/disc), pressure gauges, submains, to deliver water to plants at or below the soil infiltration rate on a typical 10 acre site. Does not include Pump, Power source, Water source (well or reservoir) and lateral lines (drip tape). An additional automatic-cleaning sand media filtration system or its equivalent is needed to prevent the passage of solids in sizes or quantities from the water source that might obstruct the emitter openings to ensure proper efficiency and uniformity of irrigation system. The water supply line from the water source to the field edge is an irrigation pipeline (430) and is not included as part of this system.

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, and 590 Nutrient Management.

**Before Situation:**

A vegetable field has an inefficient sprinkler irrigation system causing irrigation water loss that impacts water quality and water quantity.

**After Situation:**

A surface placed microirrigation system is utilized to provide highly efficient irrigation to a vegetable field. 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:** \$8,765.89

**Scenario Cost/Unit:** \$876.59

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	\$1.35	1100	\$1,485.00
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
<b>Labor</b>						
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	\$22.96	4	\$91.84
<b>Materials</b>						
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	1	\$277.62
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, 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	\$1.59	303	\$481.77
<b>Mobilization</b>						
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	\$169.60	1	\$169.60

**Practice: 441 - Irrigation System, Microirrigation**

**Scenario: #7 - Surface Tape Annual Crops**

**Scenario Description:**

A micro-irrigation system, utilizing surface drip tape to provide irrigation for vegetables. The typical system is a permanent system, installed over 10 acres of vegetables crops on the ground surface. This system utilizes closely spaced emitters as the water application device. This system typically includes all fittings, control valves, pressure reducing/regulating valves, air vacuum release, a filter system (screen/disc), pressure gauges, submains, computerized soil moisture sensors system, to deliver water to plants at or below the soil infiltration rate on a typical 10 acre site. Does not include Pump, Power source, Water source (well or reservoir) and lateral lines (drip tape). 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. Water supply is not filtered.

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, and 590 Nutrient Management.

**Before Situation:**

A vegetable field has an inefficient sprinkler irrigation system causing irrigation water loss that impacts water quality and water quantity.

**After Situation:**

A surface placed microirrigation system is utilized to provide highly efficient irrigation to a vegetable field. 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:** \$7,269.64

**Scenario Cost/Unit:** \$726.96

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	\$1.35	1100	\$1,485.00
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
<b>Labor</b>						
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	\$22.96	4	\$91.84
<b>Materials</b>						
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	\$3,403.71	1	\$3,403.71
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	\$1.59	303	\$481.77
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	1	\$277.62
<b>Mobilization</b>						
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	\$169.60	1	\$169.60

**Practice: 441 - Irrigation System, Microirrigation**

**Scenario: #8 - Surface Tape Annual Filtered**

**Scenario Description:**

A micro-irrigation system, utilizing surface drip tape to provide irrigation for vegetables. The typical system is a permanent system, installed over 10 acres of vegetables crops on the ground surface. This system utilizes closely spaced emitters as the water application device. This system typically includes all fittings, control valves, pressure reducing/regulating valves, air vacuum release, a filter system (screen/disc), pressure gauges, submains, computerized soil moisture sensors system, to deliver water to plants at or below the soil infiltration rate on a typical 10 acre site. Does not include Pump, Power source, Water source (well or reservoir) and lateral lines (drip tape). An additional automatic-cleaning sand media filtration system or its equivalent is needed to prevent the passage of solids in sizes or quantities from the water source that might obstruct the emitter openings to ensure proper efficiency and uniformity of irrigation system. 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.

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, and 590 Nutrient Management.

**Before Situation:**

A vegetable field has an inefficient sprinkler irrigation system causing irrigation water loss that impacts water quality and water quantity.

**After Situation:**

A surface placed microirrigation system is utilized to provide highly efficient irrigation to a vegetable field. 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:** \$12,169.60

**Scenario Cost/Unit:** \$1,216.96

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	\$1.35	1100	\$1,485.00
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
<b>Labor</b>						
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	\$22.96	4	\$91.84
<b>Materials</b>						
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	\$1.59	303	\$481.77
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	1	\$277.62
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	\$3,403.71	1	\$3,403.71
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**

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	\$169.60	1	\$169.60
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**Practice: 441 - Irrigation System, Microirrigation**

**Scenario: #9 - Surface PE Container Filtered**

**Scenario Description:**

A micro-irrigation system, utilizing surface PE tubing (can be placed on trellis or above containers) with emitters to provide irrigation for container-grown nursery stock in a grid pattern. The typical system is a permanent system, installed over 10 acres of container-grown nursery stock. Laterals are spaced every 5 ft. This system utilizes emitters at each tree or plant as the water application device. Durable, UV resistant tube/tape is used for a multi-year system. This system typically includes all fittings, control valves, pressure reducing/regulating valves, air vacuum release, a filter system (screen/disc), pressure gauges, submains, lateral lines, computerized soil moisture sensors system, and emitters to deliver water to plants at or below the soil infiltration rate on a typical 10 acre site. Does not include Pump, Power source, Water source (well or reservoir). An additional automatic-cleaning sand media filtration system or its equivalent is needed to prevent the passage of solids in sizes or quantities from the water source that might obstruct the emitter openings to ensure proper efficiency and uniformity of irrigation system. 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. Water supply is not filtered.

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, and 590 Nutrient Management.

**Before Situation:**

A container-grown nursery stock has an inefficient sprinkler irrigation system causing irrigation water loss that impacts water quality and water quantity.

**After Situation:**

A surface placed microirrigation system is utilized to provide highly efficient irrigation to a container-grown nursery stock. 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:** \$104,286.23

**Scenario Cost/Unit:** \$10,428.62

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
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, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	\$1.35	1800	\$2,430.00
<b>Labor</b>						
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	\$22.96	4	\$91.84
<b>Materials</b>						
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	95850	\$89,140.50
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, 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, 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, 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	\$1.59	788	\$1,252.92
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	\$3,403.71	1	\$3,403.71

**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	\$169.60	1	\$169.60
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**Practice: 441 - Irrigation System, Microirrigation**

**Scenario: #10 - Microjet**

**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, sand media/screen/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 20 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.

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, and 590 Nutrient Management.

**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:** 20

**Scenario Cost:** \$58,808.15

**Scenario Cost/Unit:** \$2,940.41

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
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, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	\$1.35	2700	\$3,645.00
<b>Labor</b>						
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	\$22.96	4	\$91.84
<b>Materials</b>						
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	47950	\$44,593.50
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, 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
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	\$3,403.71	1	\$3,403.71

**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	\$1.59	2520	\$4,006.80
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**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	\$169.60	1	\$169.60
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**Practice: 441 - Irrigation System, Microirrigation**

**Scenario: #11 - Microjet Filtered**

**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, sand media/screen/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 20 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.

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, and 590 Nutrient Management.

**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:** 20

**Scenario Cost:** \$66,158.09

**Scenario Cost/Unit:** \$3,307.90

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	\$1.35	2700	\$3,645.00
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
<b>Labor</b>						
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	\$22.96	4	\$91.84
<b>Materials</b>						
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, 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
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	\$1.59	2520	\$4,006.80
Flow Meter, with Electronic Index	1452	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	\$3,403.71	1	\$3,403.71

**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	3	\$7,349.94
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	47950	\$44,593.50

**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	\$169.60	1	\$169.60
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**Practice: 441 - Irrigation System, Microirrigation**

**Scenario: #12 - Seasonal High Tunnel Micro Irrigation System**

**Scenario Description:**

An irrigation system for vegetables or other specialty crops, irrigating inside of a high-tunnel poly-house. Water delivery to the plants by surface lines and/or subsurface applicators. Spacing of the plants will vary, w/ delivery lines spaced 60". Area in question is being converted from other means of less efficient irrigation. Payment includes on-ground mainline and drip tape, fittings, and apurtenances. Pump & supply line is not included in this payment and may be offered through associated practices 533 Pumping plant and 430 Irrigation Pipeline, or existing pump & supply lines will be used. Cost represents typical situations for conventional, organic, and transitioning to organic producers.

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, 328-Conservation Crop Rotation, and 590 Nutrient Management.

**Before Situation:**

A high tunnel has an inefficient surface irrigation system causing irrigation water loss that impacts water quality and water quantity.

**After Situation:**

A microirrigation system is utilized to provide highly efficient irrigation to crops grown in a high tunnel. Water applications are reduced and runoff eliminated. Offsite water quality is improved, and on site water use is reduced.

**Scenario Feature Measure:** Area Sq ft

**Scenario Unit:** Square Foot

**Scenario Typical Size:** 2,178

**Scenario Cost:** \$676.08

**Scenario Cost/Unit:** \$0.31

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<i>Materials</i>						
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	1	\$277.62
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	458	\$398.46