

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Water Management Engineering
Practice Code/Name	441 - Irrigation System, Microirrigation
Scenario ID	1
Scenario Name	SDI (Subsurface Drip Irrigation)

Scenario Description	<p>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 durable 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 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</p> <p>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.</p> <p>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.</p>
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Before Practice 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
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After Practice 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.
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Scenario Feature Measure	Acres in System
Scenario Unit	Acre
Scenario Typical Size	15

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$29,039.11	\$1,935.94
Equipment/Installation	\$1,750.00	\$116.67
Labor	\$0.00	\$0.00
Mobilization	\$0.00	\$0.00
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$30,789.11	\$2,052.61

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1485	Micro Irrigation, control valves and timers	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	\$2,537.00	1	\$2,537.00		This includes all automatic timers and control valves including automatic valves installed at the zone or block inlets. It does not include manual valves which are included in 10 % extra length of drip tubing.
Materials	1482	Micro Irrigation, media filter	Sand or media filter for Micro irrigation system. Includes filters, plumbing, connections and automatic controller. Unit is complete and installed.	Each	\$5,289.33	2	\$10,578.66		

Materials	1487	Micro Irrigation, buried drip tubing	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	\$0.07	171285	\$11,989.95	Assumes 4' row space, 25 rows x 100LF ea /acre = 10,875LF/acre x 1.05 = 11,419 LF/acre	A typical size system would be around 15 ac. An extra 5% is included to address all manual operating valves, flush control valves, and tubing waste required by installation
Materials	1484	Micro Irrigation, screen filter, ≥ 100 gpm	Screen filter for Micro irrigation system with 100 gpm or greater capacity. Includes filters, plumbing, connections and automatic controller. Unit is complete and installed.	Each	\$722.00	1	\$722.00		
Materials	1323	Pipe, PVC, dia. < 18", weight priced	Polyvinyl Chloride (PVC) pressure rated pipe priced by the weight of the pipe materials for pipes with diameters less than 18". Materials only.	Pound	\$1.52	1200	\$1,824.00	Pipe downstream of the filter e.g. mainline, sub main, manifold, flush manifold. Pipe upstream of the filter should use payment schedule for irrigation pipeline (Code 430)	
Materials	1452	Flow Meter, with Electronic Index	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	\$1,387.50	1	\$1,387.50	An SDI system is buried. A flow meter is needed to verify proper performance.	
Equipment/Installation	1987	Micro Irrigation, chemical injection equipment	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,750.00	1	\$1,750.00	A chemical injection system will nearly always be required to provide for periodic chemical injection to maintain the system.	

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Water Management Engineering
Practice Code/Name	441 - Irrigation System, Microirrigation
Scenario ID	2

Scenario Name Automated Surface Permanent PE tube with media filter laterals 9 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 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).

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

After Practice 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	Acre in System
Scenario Unit	Acre
Scenario Typical Size	10

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$28,379.86	\$2,837.99
Equipment/Installation	\$2,265.00	\$226.50
Labor	\$1,028.40	\$102.84
Mobilization	\$0.00	\$0.00
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$31,673.26	\$3,167.33

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1482	Micro Irrigation, media filter	Sand or media filter for Micro irrigation system. Includes filters, plumbing, connections and automatic controller. Unit is complete and installed.	Each	\$5,289.33	2	\$10,578.66		
Materials	1485	Micro Irrigation, control valves and timers	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	\$2,537.00	1	\$2,537.00		
Materials	976	Pipe, PVC, 2", SCH 40	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	\$1.05	500	\$525.00		

Materials	1488	Micro Irrigation, surface drip tubing or tape	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	\$0.28	52640	\$14,739.20	Assumes 9' row space, 11 rows x 435LF ea /acre x 1.10 = 5264 LF/ac	Lateral spacing is 9 feet 10 acres times 5264 per acre (incl 10% additional)
Equipment/Installation	1987	Micro Irrigation, chemical injection equipment	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,750.00	1	\$1,750.00		A chemical injection system will nearly always be required to provide for periodic chemical injection to maintain the system.
Equipment/Installation	1096	Trenching, Pipeline Plowing	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.03	500	\$515.00	Install 1323	
Labor	231	General Labor	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	\$25.71	40	\$1,028.40	Install permanent drip system	

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Water Management Engineering
Practice Code/Name	441 - Irrigation System, Microirrigation
Scenario ID	3
Scenario Name	Surface Permanent PE tube with media filter laterals 9 ft oc

Scenario Description	<p>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 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).</p> <p>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.</p> <p>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.</p>
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Before Practice Situation	An orchard has an inefficient surface irrigation system causing irrigation water loss that impacts water quality and water quantity.
After Practice 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	Acre in System
Scenario Unit	Acre
Scenario Typical Size	10

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$25,842.86	\$2,584.29
Equipment/Installation	\$2,265.00	\$226.50
Labor	\$1,028.40	\$102.84
Mobilization	\$0.00	\$0.00
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$29,136.26	\$2,913.63

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1482	Micro Irrigation, media filter	Sand or media filter for Micro irrigation system. Includes filters, plumbing, connections and automatic controller. Unit is complete and installed.	Each	\$5,289.33	2	\$10,578.66	Surface water source assumed	
Materials	976	Pipe, PVC, 2", SCH 40	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	\$1.05	500	\$525.00		
Materials	1488	Micro Irrigation, surface drip tubing or tape	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	\$0.28	52640	\$14,739.20	Assumes 9' row space, 11 rows x 435LF ea /acre x 1.10 = 5264 LF/ac	Lateral spacing is 9 feet 10 acres times 5264 per acre (incl 10% additional)
Equipment/Installation	1987	Micro Irrigation, chemical injection equipment	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,750.00	1	\$1,750.00		A chemical injection system will nearly always be required to provide for periodic chemical injection to maintain the system.

Equipment/Installation	1096	Trenching, Pipeline Plowing	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.03	500	\$515.00	Install 1323	
Labor	231	General Labor	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	\$25.71	40	\$1,028.40	Install permanent drip system	

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Water Management Engineering
Practice Code/Name	441 - Irrigation System, Microirrigation
Scenario ID	4
Scenario Name	Surface Permanent PE tube with disk filter laterals 9 ft oc

Scenario Description	<p>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 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).</p> <p>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.</p> <p>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.</p>
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Before Practice Situation	Ann orchard has an inefficient surface irrigation system causing irrigation water loss that impacts water quality and water quantity.
After Practice 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	Acre in System
Scenario Unit	Acre
Scenario Typical Size	10

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$19,845.52	\$1,984.55
Equipment/Installation	\$2,265.00	\$226.50
Labor	\$1,028.40	\$102.84
Mobilization	\$0.00	\$0.00
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$23,138.92	\$2,313.89

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1483	Micro Irrigation, disk filter	Disk filter for Micro irrigation system. Includes filters, plumbing, connections and automatic controller. Unit is complete and installed.	Each	\$2,290.66	2	\$4,581.32	Well water source assumed	
Materials	976	Pipe, PVC, 2", SCH 40	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	\$1.05	500	\$525.00		
Materials	1488	Micro Irrigation, surface drip tubing or tape	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	\$0.28	52640	\$14,739.20	Assumes 9' row space, 11 rows x 435LF ea /acre x 1.10 = 5264 LF/ac	Lateral spacing is 9 feet 10 acres times 5264 per acre (incl 10% additional)
Equipment/Installation	1987	Micro Irrigation, chemical injection equipment	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,750.00	1	\$1,750.00		A chemical injection system will nearly always be required to provide for periodic chemical injection to maintain the system.

Equipment/Installation	1096	Trenching, Pipeline Plowing	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.03	500	\$515.00	Install 1323	
Labor	231	General Labor	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	\$25.71	40	\$1,028.40	Install permanent drip system	

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Water Management Engineering
Practice Code/Name	441 - Irrigation System, Microirrigation
Scenario ID	5

Scenario Name 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).

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

After Practice 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	Acre in System
Scenario Unit	Acre
Scenario Typical Size	10

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$23,020.66	\$2,302.07
Equipment/Installation	\$2,265.00	\$226.50
Labor	\$1,028.40	\$102.84
Mobilization	\$0.00	\$0.00
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$26,314.06	\$2,631.41

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1482	Micro Irrigation, media filter	Sand or media filter for Micro irrigation system. Includes filters, plumbing, connections and automatic controller. Unit is complete and installed.	Each	\$5,289.33	2	\$10,578.66	Surface water source assumed	
Materials	1485	Micro Irrigation, control valves and timers	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	\$2,537.00	1	\$2,537.00		
Materials	976	Pipe, PVC, 2", SCH 40	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	\$1.05	500	\$525.00		

Materials	1488	Micro Irrigation, surface drip tubing or tape	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	\$0.28	33500	\$9,380.00	Assumes 14' row space, 7 rows x 435LF ea /acre x 1.10 = 3350 LF/ac	Lateral spacing is 9 feet 10 acres times 3350 per acre (incl 10% additional)
Equipment/Installation	1987	Micro Irrigation, chemical injection equipment	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,750.00	1	\$1,750.00		A chemical injection system will nearly always be required to provide for periodic chemical injection to maintain the system.
Equipment/Installation	1096	Trenching, Pipeline Plowing	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.03	500	\$515.00	Install 1323	

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Water Management Engineering
Practice Code/Name	441 - Irrigation System, Microirrigation
Scenario ID	6
Scenario Name	Surface Permanent PE tube with media filter laterals 14 ft oc

Scenario Description	<p>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).</p> <p>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.</p> <p>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.</p>
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Before Practice Situation	An orchard has an inefficient surface irrigation system causing irrigation water loss that impacts water quality and water quantity.
After Practice 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

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$20,483.66	\$2,048.37
Equipment/Installation	\$2,265.00	\$226.50
Labor	\$1,028.40	\$102.84
Mobilization	\$0.00	\$0.00
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$23,777.06	\$2,377.71

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1482	Micro Irrigation, media filter	Sand or media filter for Micro irrigation system. Includes filters, plumbing, connections and automatic controller. Unit is complete and installed.	Each	\$5,289.33	2	\$10,578.66	Surface water source assumed	
Materials	976	Pipe, PVC, 2", SCH 40	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	\$1.05	500	\$525.00		
Materials	1488	Micro Irrigation, surface drip tubing or tape	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	\$0.28	33500	\$9,380.00	Assumes 14' row space, 7 rows x 435LF ea /acre x 1.10 = 3350 LF/ac	Lateral spacing is 9 feet 10 acres times 3350 per acre (incl 10% additional)
Equipment/Installation	1987	Micro Irrigation, chemical injection equipment	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,750.00	1	\$1,750.00		A chemical injection system will nearly always be required to provide for periodic chemical injection to maintain the system.

Equipment/Installation	1096	Trenching, Pipeline Plowing	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.03	500	\$515.00	Install 1323	
Labor	231	General Labor	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	\$25.71	40	\$1,028.40	Install permanent drip system	

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Water Management Engineering
Practice Code/Name	441 - Irrigation System, Microirrigation
Scenario ID	7
Scenario Name	Surface Permanent PE tube with disk filter laterals 14 ft oc

Scenario Description	<p>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).</p> <p>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.</p> <p>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.</p>
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Before Practice Situation	An orchard has an inefficient surface irrigation system causing irrigation water loss that impacts water quality and water quantity.
After Practice 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	Acre in System
Scenario Unit	Acre
Scenario Typical Size	10

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$14,486.32	\$1,448.63
Equipment/Installation	\$2,265.00	\$226.50
Labor	\$1,028.40	\$102.84
Mobilization	\$0.00	\$0.00
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$17,779.72	\$1,777.97

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1483	Micro Irrigation, disk filter	Disk filter for Micro irrigation system. Includes filters, plumbing, connections and automatic controller. Unit is complete and installed.	Each	\$2,290.66	2	\$4,581.32	Well water source assumed	
Materials	976	Pipe, PVC, 2", SCH 40	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	\$1.05	500	\$525.00		
Materials	1488	Micro Irrigation, surface drip tubing or tape	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	\$0.28	33500	\$9,380.00	Assumes 14' row space, 7 rows x 435LF ea /acre x 1.10 = 3350 LF/ac	Lateral spacing is 9 feet 10 acres times 3350 per acre (incl 10% additional)
Equipment/Installation	1987	Micro Irrigation, chemical injection equipment	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,750.00	1	\$1,750.00		A chemical injection system will nearly always be required to provide for periodic chemical injection to maintain the system.

Equipment/Installation	1096	Trenching, Pipeline Plowing	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.03	500	\$515.00	Install 1323	
Labor	231	General Labor	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	\$25.71	40	\$1,028.40	Install permanent drip system	

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Water Management Engineering
Practice Code/Name	441 - Irrigation System, Microirrigation
Scenario ID	8
Scenario Name	Microjet

Scenario Description	<p>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 5 acre orchard. Typical tree spacing is 20' x 20' feet.</p> <p>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.</p> <p>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.</p>
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Before Practice Situation	An orchard has an inefficient irrigation system causing irrigation water loss that impacts water quality and water quantity.
After Practice 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	Acre in System
Scenario Unit	Acre
Scenario Typical Size	10

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$10,946.82	\$2,189.36
Equipment/Installation	\$2,265.00	\$453.00
Labor	\$617.04	\$123.41
Mobilization	\$0.00	\$0.00
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$13,828.86	\$2,765.77

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1483	Micro Irrigation, disk filter	Disk filter for Micro irrigation system. Includes filters, plumbing, connections and automatic controller. Unit is complete and installed.	Each	\$2,290.66	2	\$4,581.32		
Materials	1485	Micro Irrigation, control valves and timers	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	\$2,537.00	1	\$2,537.00		
Materials	1489	Micro Irrigation, emitters or sprays and tubing	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 has emitters is included in this item.	Foot	\$0.16	11975	\$1,916.00	Assumes 20' row space, 5 rows x 435LF ea /acre x 1.10 = 2395 LF/ac	Lateral spacing is 20 feet 5 acres times 2395 per acre (incl 10% additional)

Materials	1452	Flow Meter, with Electronic Index	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	\$1,387.50	1	\$1,387.50	You manage what you measure
Materials	976	Pipe, PVC, 2", SCH 40	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	\$1.05	500	\$525.00	
Equipment/Installation	1987	Micro Irrigation, chemical injection equipment	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,750.00	1	\$1,750.00	A chemical injection system will nearly always be required to provide for periodic chemical injection to maintain the system.

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Water Management Engineering
Practice Code/Name	441 - Irrigation System, Microirrigation
Scenario ID	9
Scenario Name	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 are not included.
 Associated Practices: Irrigation Pipeline (430), Irrigation Water Management (449)

Before Practice 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 Practice Situation
 An automated micro-irrigation system is installed over 10 acres of 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

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$14,713.16	\$1,471.32
Equipment/Installation	\$1,956.00	\$195.60
Labor	\$411.36	\$41.14
Mobilization	\$0.00	\$0.00
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$17,080.52	\$1,708.05

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1482	Micro Irrigation, media filter	Sand or media filter for Micro irrigation system. Includes filters, plumbing, connections and automatic controller. Unit is complete and installed.	Each	\$5,289.33	2	\$10,578.66	Assumes a surface water source	
Materials	1485	Micro Irrigation, control valves and timers	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	\$2,537.00	1	\$2,537.00		
Materials	1452	Flow Meter, with Electronic Index	10 inch Turbine Irrigation flow meter, with Electronic Index, Rate and Volume, permanently installed. Materials only.	Each	\$1,387.50	1	\$1,387.50		
Materials	976	Pipe, PVC, 2", SCH 40	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	\$1.05	200	\$210.00		
Equipment/Installation	1987	Micro Irrigation, chemical injection equipment	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,750.00	1	\$1,750.00		

Equipment/Installation	1096	Trenching, Pipeline Plowing	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.03	200	\$206.00	Install 1323	
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Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Water Management Engineering
Practice Code/Name	441 - Irrigation System, Microirrigation
Scenario ID	10
Scenario Name	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 are not included.
 Associated Practices: Irrigation Pipeline (430), Irrigation Water Management (449)

Before Practice 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 Practice Situation
 A micro-irrigation system is installed over 10 acres of 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

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$10,788.66	\$1,078.87
Equipment/Installation	\$1,956.00	\$195.60
Labor	\$411.36	\$41.14
Mobilization	\$0.00	\$0.00
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$13,156.02	\$1,315.60

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1482	Micro Irrigation, media filter	Sand or media filter for Micro irrigation system. Includes filters, plumbing, connections and automatic controller. Unit is complete and installed.	Each	\$5,289.33	2	\$10,578.66	Assumes a surface water source	
Materials	976	Pipe, PVC, 2", SCH 40	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	\$1.05	200	\$210.00		
Equipment/Installation	1987	Micro Irrigation, chemical injection equipment	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,750.00	1	\$1,750.00		
Equipment/Installation	1096	Trenching, Pipeline Plowing	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.03	200	\$206.00	Install 1323	
Labor	231	General Labor	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	\$25.71	16	\$411.36	Install permanent components of drip system	

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Water Management Engineering
Practice Code/Name	441 - Irrigation System, Microirrigation
Scenario ID	11
Scenario Name	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 are not included.
 Associated Practices: Irrigation Pipeline (430), Irrigation Water Management (449)

Before Practice 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 Practice Situation
 A micro-irrigation system is installed over 10 acres of 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 disk filter or its equivalent. The lateral lines are not included.

Scenario Feature Measure	Acres in System
Scenario Unit	Acre
Scenario Typical Size	10

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$4,791.32	\$479.13
Equipment/Installation	\$1,956.00	\$195.60
Labor	\$411.36	\$41.14
Mobilization	\$0.00	\$0.00
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$7,158.68	\$715.87

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1483	Micro Irrigation, disk filter	Disk filter for Micro irrigation system. Includes filters, plumbing, connections and automatic controller. Unit is complete and installed.	Each	\$2,290.66	2	\$4,581.32	Well water source assumed	
Materials	976	Pipe, PVC, 2", SCH 40	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	\$1.05	200	\$210.00		
Equipment/Installation	1987	Micro Irrigation, chemical injection equipment	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	\$1,750.00	1	\$1,750.00		
Equipment/Installation	1096	Trenching, Pipeline Plowing	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	\$1.03	200	\$206.00	Install 1323	
Labor	231	General Labor	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	\$25.71	16	\$411.36	Install permanent components of drip system	

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Water Management Engineering
Practice Code/Name	441 - Irrigation System, Microirrigation
Scenario ID	12
Scenario Name	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 Practice Situation
 Crops in a 2,000 SF greenhouse have an inefficient irrigation system causing irrigation water loss. A surface water source is available.

After Practice 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	Acres in System
Scenario Unit	Square Foot
Scenario Typical Size	2000

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$369.70	\$0.18
Equipment/Installation	\$0.00	\$0.00
Labor	\$0.00	\$0.00
Mobilization	\$0.00	\$0.00
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$369.70	\$0.18

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1489	Micro Irrigation, emitters or sprays and tubing	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 has emitters is included in this item.	Foot	\$0.16	500	\$80.00		
Materials	1617	Micro Irrigation, screen filter, < 100 gpm	Screen filter for Micro Irrigation used in small systems. Includes filter. No controls are included or needed.	Each	\$39.85	2	\$79.70	Well water assumed	
Materials	976	Pipe, PVC, 2", SCH 40	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	\$1.05	200	\$210.00		