Practice: 595 - Integrated Pest Management (IPM)

Scenario: #1 - Basic IPM Field 1RC

Scenario Description: A basic IPM plan with LGU-approved pest monitoring techniques and pest thresholds (where available) is applied in Large Scale Field/Forage Crops to address one identified resource concern (e.g. Water Quality - Impacts to Human Drinking Water) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concern) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings). Associated Practices: Agrichemical Handling Facility (309), Brush Management (314), Herbaceous Cover (315), Conservation Crop Rotation (328), Residue and Tillage Management - No-Till/Strip Till/Directs Seed (329), Cover Crop (340), Residue and Tillage Management - Mulch Till (345), Residue and Tillage Management - Ridge Till (346), Field Border (386), Riparian Herbaceous Cover (390), Riparian Forest Buffer (391), Filter Strip (393), Irrigation Water Management (449), Mulching (484), Forage Harvest Management (511), and Nutrient Management (590)

Before Situation: Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to an identified resource concern (e.g. Water Quality – Impacts to Human Drinking Water).

After Situation: After implementing the 595 practice, a basic IPM system has been implemented with Land Grant University approved pest monitoring techniques and pest thresholds (where available) to help meet the minimum criteria for one identified rresource concern (e.g. Water Quality - Impacts to Human Drinking Water) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concern) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Acre

Scenario Typical Size: 40

Total Scenario Cost: $653.34

Scenario Cost/Unit: $16.33

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	2	$74.48
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	6	$578.86

Practice: 595 - Integrated Pest Management (IPM)

Scenario: #2 - Basic IPM Field >1RC

Scenario Description: A basic IPM plan with LGU-approved pest monitoring techniques and pest thresholds (where available) is applied in Large Scale Field/Forage Crops to address multiple identified resource concerns (e.g. Water Quality – Impacts to Human Drinking Water and Pollinator Impacts) with either risk prevention (e.g. planned pesticides have no risks to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings). Associated Practices: Agrichemical Handling Facility (309), Brush Management (314), Herbaceous Cover (315), Conservation Crop Rotation (328), Residue and Tillage Management - No-Till/Strip Till/Directs Seed (329), Cover Crop (340), Residue and Tillage Management - Mulch Till (345), Residue and Tillage Management - Ridge Till (346), Field Border (386), Riparian Herbaceous Cover (390), Riparian Forest Buffer (391), Filter Strip (393), Irrigation Water Management (449), Mulching (484), Forage Harvest Management (511), and Nutrient Management (590)

Before Situation: Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to two or more identified resource concerns (e.g. Water Quality – Impacts to Human Drinking Water and Impacts on Pollinators).

After Situation: After implementing the 595 practice, a basic IPM system has been implemented with Land Grant University approved pest monitoring techniques and pest thresholds (where available) to help meet the minimum criteria for two or more identified resource concerns (e.g. Water Quality - Impacts to Human Drinking Water and Impacts on Pollinators) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Acre

Scenario Typical Size: 40

Total Scenario Cost: $883.53

Scenario Cost/Unit: $22.09

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	3	$111.71
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	8	$771.81

Practice: 595 - Integrated Pest Management (IPM)

Scenario: #3 - Advanced Field All RCs

Scenario Description: A comprehensive IPM plan with LGU-approved pest prevention, avoidance and monitoring techniques and pest thresholds (where available) is applied in Large Scale Field/Forage Crops to address all identified resource concerns with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings). Associated Practices: Agrichemical Handling Facility (309), Brush Management (314), Herbaceous Cover (315), Conservation Crop Rotation (328), Residue and Tillage Management - No-Till/Strip Till/Directs Seed (329), Cover Crop (340), Residue and Tillage Management - Mulch Till (345), Residue and Tillage Management - Ridge Till (346), Field Border (386), Riparian Herbaceous Cover (390), Riparian Forest Buffer (391), Filter Strip (393), Irrigation Water Management (449), Mulching (484), Forage Harvest Management (511), and Nutrient Management (590)

Before Situation: Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to an identified resource concern (e.g. Water Quality – Impacts to Human Drinking Water).

After Situation: After implementing the 595 practice, a comprehensive IPM plan with Land Grant University approved pest prevention, avoidance and monitoring techniques and pest thresholds (where available) is applied to help meet the minimum criteria for all identified resource concerns with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Acre

Scenario Typical Size: 40

Total Scenario Cost: $1,306.67

Scenario Cost/Unit: $32.67

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	4	$148.95
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	12	$1,157.72

Practice: 595 - Integrated Pest Management (IPM)

Scenario: #4 - Basic IPM Fruit/Veg 1RC

Scenario Description: A basic IPM plan with LGU-approved pest monitoring techniques and pest thresholds (where available) is applied in Large Scale Small Fruit/Vegetable Crops to address one identified resource concern (e.g. Water Quality - Impacts to Human Drinking Water) with either risk prevention (e.g. planned pesticides no risk to the identified resource concern) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings). Associated Practices: Agrichemical Handling Facility (309), Brush Management (314), Herbaceous Cover (315), Conservation Crop Rotation (328), Residue and Tillage Management - No-Till/Strip Till/Directs Seed (329), Cover Crop (340), Residue and Tillage Management - Mulch Till (345), Residue and Tillage Management - Ridge Till (346), Field Border (386), Riparian Herbaceous Cover (390), Riparian Forest Buffer (391), Filter Strip (393), Irrigation Water Management (449), Mulching (484), Forage Harvest Management (511), and Nutrient Management (590)

Before Situation: Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to an identified resource concern (e.g. Water Quality – Impacts to Human Drinking Water).

After Situation: After implementing the 595 practice, a basic IPM system has been implemented with Land Grant University approved pest monitoring techniques and pest thresholds (where available) to help meet the minimum criteria for at least one identified resource concern (e.g. Water Quality - Impacts to Human Drinking Water) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concern) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Acre

Scenario Typical Size: 10

Total Scenario Cost: $920.76

Scenario Cost/Unit: $92.08

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	4	$148.95
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	8	$771.81

Practice: 595 - Integrated Pest Management (IPM)

Scenario: #5 - Basic IPM Fruit/Veg >1RC

Scenario Description: A basic IPM plan with LGU-approved pest monitoring techniques and pest thresholds (where available) is applied in Large Scale Small Fruit/Vegetable Crops to address multiple identified resource concerns (e.g. Water Quality - Impacts to Human Drinking Water and Pollinator Impacts) with either risk prevention (e.g. planned pesticides have no risk to identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings). Associated Practices: Agrichemical Handling Facility (309), Brush Management (314), Herbaceous Cover (315), Conservation Crop Rotation (328), Residue and Tillage Management - No-Till/Strip Till/Directs Seed (329), Cover Crop (340), Residue and Tillage Management - Mulch Till (345), Residue and Tillage Management - Ridge Till (346), Field Border (386), Riparian Herbaceous Cover (390), Riparian Forest Buffer (391), Filter Strip (393), Irrigation Water Management (449), Mulching (484), Forage Harvest Management (511), and Nutrient Management (590)

Before Situation: Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to two or more identified resource concerns (e.g. Water Quality – Impacts to Human Drinking Water and Impacts on Pollinators).

After Situation: After implementing the 595 practice, a basic IPM system has been implemented with Land Grant University approved pest monitoring techniques and pest thresholds (where available) to help meet the minimum criteria for two or more identified resource concerns (e.g. Water Quality - Impacts to Human Drinking Water and Impacts on Pollinators) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Acre

Scenario Typical Size: 10

Total Scenario Cost: $1,188.19

Scenario Cost/Unit: $118.82

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	6	$223.43
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	10	$964.76

Practice: 595 - Integrated Pest Management (IPM)

Scenario: #6 - Advanced IPM Fruit/Veg All RCs

Scenario Description: A comprehensive IPM plan with LGU-approved pest prevention, avoidance and monitoring techniques and pest thresholds (where available) is applied in Large Scale Small Fruit/Vegetable Crops to address all identified resource concerns with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings). Associated Practices: Agrichemical Handling Facility (309), Brush Management (314), Herbaceous Cover (315), Conservation Crop Rotation (328), Residue and Tillage Management - No-Till/Strip Till/Directs Seed (329), Cover Crop (340), Residue and Tillage Management - Mulch Till (345), Residue and Tillage Management - Ridge Till (346), Field Border (386), Riparian Herbaceous Cover (390), Riparian Forest Buffer (391), Filter Strip (393), Irrigation Water Management (449), Mulching (484), Forage Harvest Management (511), and Nutrient Management (590)

Before Situation: Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to an identified resource concern (e.g. Water Quality – Impacts to Human Drinking Water).

After Situation: After implementing the 595 practice, a comprehensive IPM plan with Land Grant University approved pest prevention, avoidance and monitoring techniques and pest thresholds (where available) is applied to help meet the minimum criteria for all identified resource concerns with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Acre

Scenario Typical Size: 10

Total Scenario Cost: $1,819.53

Scenario Cost/Unit: $181.95

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	10	$372.38
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	15	$1,447.15

Practice: 595 - Integrated Pest Management (IPM)

Scenario: #7 - Basic IPM Orchard 1RC

Scenario Description: A basic IPM plan with LGU-approved pest monitoring techniques and pest thresholds (where available) is applied in Large Scale Orchard/Specialty Crops to address one identified resource concern (e.g. Water Quality - Impacts to Human Drinking Water) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concern) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings). Associated Practices: Agrichemical Handling Facility (309), Brush Management (314), Herbaceous Cover (315), Conservation Crop Rotation (328), Residue and Tillage Management - No-Till/Strip Till/Directs Seed (329), Cover Crop (340), Residue and Tillage Management - Mulch Till (345), Residue and Tillage Management - Ridge Till (346), Field Border (386), Riparian Herbaceous Cover (390), Riparian Forest Buffer (391), Filter Strip (393), Irrigation Water Management (449), Mulching (484), Forage Harvest Management (511), and Nutrient Management (590)

Before Situation: Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to an identified resource concern (e.g. Water Quality – Impacts to Human Drinking Water).

After Situation: After implementing the 595 practice, a basic IPM system has been implemented with Land Grant University approved pest monitoring techniques and pest thresholds (where available) to help meet the minimum criteria for at least one identified resource concern (e.g. Water Quality - Impacts to Human Drinking Water) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concern) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Acre

Scenario Typical Size: 10

Total Scenario Cost: $1,188.19

Scenario Cost/Unit: $118.82

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total

Labor

Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	6	$223.43
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	10	$964.76

Practice: 595 - Integrated Pest Management (IPM)

Scenario: #8 - Basic IPM Orchard >1RC

Scenario Description: A basic IPM plan with LGU-approved pest monitoring techniques and pest thresholds (where available) is applied in Large Scale Orchard/Specialty Crops to address multiple identified resource concerns (e.g. Water Quality - Impacts to Human Drinking Water and Pollinator Impacts) with either risk prevention (e.g. planned pesticides have no risks to identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings). Associated Practices: Agrichemical Handling Facility (309), Brush Management (314), Herbaceous Cover (315), Conservation Crop Rotation (328), Residue and Tillage Management - No-Till/Strip Till/Directs Seed (329), Cover Crop (340), Residue and Tillage Management - Mulch Till (345), Residue and Tillage Management - Ridge Till (346), Field Border (386), Riparian Herbaceous Cover (390), Riparian Forest Buffer (391), Filter Strip (393), Irrigation Water Management (449), Mulching (484), Forage Harvest Management (511), and Nutrient Management (590)

Before Situation: Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to two or more identified resource concerns (e.g. Water Quality – Impacts to Human Drinking Water and Impacts on Pollinators).

After Situation: After implementing the 595 practice, a basic IPM system has been implemented with Land Grant University approved pest monitoring techniques and pest thresholds (where available) to help meet the minimum criteria for two or more identified resource concerns (e.g. Water Quality - Impacts to Human Drinking Water and Impacts on Pollinators) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Acre

Scenario Typical Size: 10

Total Scenario Cost: $1,819.53

Scenario Cost/Unit: $181.95

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	10	$372.38
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	15	$1,447.15

Practice: 595 - Integrated Pest Management (IPM)

Scenario: #9 - Advanced IPM Orchard All RCs

Scenario Description: A comprehensive IPM plan with LGU-approved pest prevention, avoidance and monitoring techniques and pest thresholds (where available) is applied in Large Scale Orchard/Specialty Crops to address all identified resource concerns with either risk prevention (e.g. planned pesticides have no risk to identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings). Associated Practices: Agrichemical Handling Facility (309), Brush Management (314), Herbaceous Cover (315), Conservation Crop Rotation (328), Residue and Tillage Management - No-Till/Strip Till/Directs Seed (329), Cover Crop (340), Residue and Tillage Management - Mulch Till (345), Residue and Tillage Management - Ridge Till (346), Field Border (386), Riparian Herbaceous Cover (390), Riparian Forest Buffer (391), Filter Strip (393), Irrigation Water Management (449), Mulching (484), Forage Harvest Management (511), and Nutrient Management (590)

Before Situation: Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to an identified resource concern (e.g. Water Quality – Impacts to Human Drinking Water).

After Situation: After implementing the 595 practice, a comprehensive IPM plan with Land Grant University approved pest prevention, avoidance and monitoring techniques and pest thresholds (where available) is applied to help meet the minimum criteria for all identified resource concerns with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Acre

Scenario Typical Size: 10

Total Scenario Cost: $2,860.49

Scenario Cost/Unit: $286.05

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	25	$930.96
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	20	$1,929.53

Practice: 595 - Integrated Pest Management (IPM)

Scenario: #10 - IPM S-Farm 1RC

Scenario Description: A basic IPM plan with LGU-approved pest monitoring techniques and pest thresholds (where available) is applied in Small Farm/Diversified Systems (e.g. CSA, organic, etc.) to address one identified resource concern (e.g. Water Quality - Impacts to Human Drinking Water) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concern) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings). This scenario attempts to capture the higher cost/acre of planning and implementing IPM techniques on smaller acreages with very diverse cropping systems. Associated Practices: Agrichemical Handling Facility (309), Brush Management (314), Herbaceous Cover (315), Conservation Crop Rotation (328), Residue and Tillage Management - No-Till/Strip Till/Directs Seed (329), Cover Crop (340), Residue and Tillage Management - Mulch Till (345), Residue and Tillage Management - Ridge Till (346), Field Border (386), Riparian Herbaceous Cover (390), Riparian Forest Buffer (391), Filter Strip (393), Irrigation Water Management (449), Mulching (484), Forage Harvest Management (511), and Nutrient Management (590)

Before Situation: Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to an identified resource concern (e.g. Water Quality – Impacts to Human Drinking Water).

After Situation: After implementing the 595 practice, a basic IPM system has been implemented with Land Grant University approved pest monitoring techniques and pest thresholds (where available) to help meet the minimum criteria for at least one identified resource concern resource concern (e.g. Water Quality - Impacts to Human Drinking Water) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concern) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $556.86

Scenario Cost/Unit: $556.86

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	2	$74.48
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	5	$482.38

Practice: 595 - Integrated Pest Management (IPM)

Scenario: #11 - IPM S-Farm >1RC

Scenario Description: A basic IPM plan with LGU-approved pest monitoring techniques and pest thresholds (where available) is applied in Small Farm/ Diversified Systems (e.g. CSA, organic, etc.) to address multiple identified resource concerns (e.g. Water Quality - Impacts to Human Drinking Water and Pollinator Impacts) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings). This scenario attempts to capture the higher cost/acre of planning and implementing IPM techniques on smaller acreages with very diverse cropping systems. Associated Practices: Agrichemical Handling Facility (309), Brush Management (314), Herbaceous Cover (315), Conservation Crop Rotation (328), Residue and Tillage Management - No-Till/Strip Till/Directs Seed (329), Cover Crop (340), Residue and Tillage Management - Mulch Till (345), Residue and Tillage Management - Ridge Till (346), Field Border (386), Riparian Herbaceous Cover (390), Riparian Forest Buffer (391), Filter Strip (393), Irrigation Water Management (449), Mulching (484), Forage Harvest Management (511), and Nutrient Management (590)

Before Situation: Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to two or more identified resource concerns (e.g. Water Quality – Impacts to Human Drinking Water and Impacts on Pollinators).

After Situation: After implementing the 595 practice, a basic IPM system has been implemented with Land Grant University approved pest monitoring techniques and pest thresholds (where available) to help meet the minimum criteria for two or more identified resource concerns (e.g. Water Quality - Impacts to Human Drinking Water and Impacts on Pollinators) with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $727.81

Scenario Cost/Unit: $727.81

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	4	$148.95
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	6	$578.86

Practice: 595 - Integrated Pest Management (IPM)

Scenario: #12 - Advanced IPM S-Farm All RCs

Scenario Description: A comprehensive IPM plan with LGU-approved pest prevention, avoidance and monitoring techniques and pest thresholds (where available) is applied in Small Farm/Diversified Systems (e.g. CSA, Organic, etc.) to address all identified resource concerns with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings. This scenario attempts to capture the higher cost/acre of planning and implementing IPM techniques on smaller acreages with very diverse cropping systems. Associated Practices: Agrichemical Handling Facility (309), Brush Management (314), Herbaceous Cover (315), Conservation Crop Rotation (328), Residue and Tillage Management - No-Till/Strip Till/Directs Seed (329), Cover Crop (340), Residue and Tillage Management - Mulch Till (345), Residue and Tillage Management - Ridge Till (346), Field Border (386), Riparian Herbaceous Cover (390), Riparian Forest Buffer (391), Filter Strip (393), Irrigation Water Management (449), Mulching (484), Forage Harvest Management (511), and Nutrient Management (590)

Before Situation: Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to an identified resource concern (e.g. Water Quality – Impacts to Human Drinking Water).

After Situation: After implementing the 595 practice, a comprehensive IPM plan with Land Grant University approved pest prevention, avoidance and monitoring techniques and pest thresholds (where available) is applied to help meet the minimum criteria for all identified resource concerns with either risk prevention (e.g. planned pesticides have no risk to the identified resource concerns) or risk mitigation (e.g. planned pesticides have appropriate mitigation planned from Agronomy Technical Note 5 for “Intermediate”, “High” or “Extra High” WIN-PST Final Hazard Ratings).

Scenario Feature Measure: Acres of management applied

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $1,091.72

Scenario Cost/Unit: $1,091.72

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	6	$223.43
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	9	$868.29

Practice: 595 - Integrated Pest Management (IPM)

Scenario: #13 - Risk Prevention IPM All RCs

Scenario Description: A comprehensive IPM plan based primarily on LGU-approved pest prevention and avoidance techniques is applied to prevent negative impacts on all identified resource concerns. LGU-approved pest monitoring techniques and pest thresholds may also be included, but suppression techniques cannot pose any hazards to identified resource concerns. This type of system is very difficult to achieve, but may be most commonly achieved in Organic Systems that already rely heavily on prevention and avoidance techniques. Associated Practices: Agrichemical Handling Facility (309), Brush Management (314), Herbaceous Cover (315), Conservation Crop Rotation (328), Residue and Tillage Management - No-Till/Strip Till/Directs Seed (329), Cover Crop (340), Residue and Tillage Management - Mulch Till (345), Residue and Tillage Management - Ridge Till (346), Field Border (386), Riparian Herbaceous Cover (390), Riparian Forest Buffer (391), Filter Strip (393), Irrigation Water Management (449), Mulching (484), Forage Harvest Management (511), and Nutrient Management (590)

Before Situation: Before practice conditions vary widely. Conditions range from the client is not using many pest suppression techniques (pesticides, tillage for weed control, burning, etc.) to the client is using many different pest suppression techniques for many different pests, but in all cases at least one planned pest suppression technique has risk to an identified resource concern (e.g. Water Quality – Impacts to Human Drinking Water).

After Situation: After implementing the 595 practice, a comprehensive IPM plan based primarily on Land Grant University approved pest prevention and avoidance techniques is applied to prevent negative impacts on all identified resource concerns. Land Grant University approved pest monitoring techniques and pest thresholds may also be included, but suppression techniques cannot pose any hazards to identified resource concerns.

Scenario Feature Measure: Acres of management applied

Scenario Unit: Acre

Scenario Typical Size: 10

Total Scenario Cost: $1,523.34

Scenario Cost/Unit: $152.33

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	15	$558.57
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	10	$964.76

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- 60 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 dipperline or tape for laterals, both a supply and a flushing manifold and numerous types of water control valves. This is an all-inclusive system starting with the filter station including all required system components out to the flush valves. The water supply line from the water source to the filter station is an irrigation pipeline (430) and is not included as part of this system 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, 610 - Salinity &Sodic Soil Management, 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 60 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

Total Scenario Cost: $29,398.09

Scenario Cost/Unit: $2,939.81

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	$1,470.45	1	$1,470.45
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	1800	$2,719.58
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	4	$86.58
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$202.55	1	$202.55
Materials						
Micro Irrigation, buried drip tape	2521	Tape that is installed underground for sub-surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tape is a minimum of 10 mil thick thick and has emitters built in. Includes labor and installtion.	Foot	$0.10	95832	$9,523.98
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	$1,323.03	1	$1,323.03
Micro Irrigation, Media Filter, 30" to 48" Dia. tank, Equipped for Automatic Flush	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	$5,211.81	2	$10,423.63
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.	Each	$336.75	1	$336.75

		Unit is complete and installed. Unit price per filter, not per filter station.				
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	$1.92	984	$1,890.60
Water Meter, Microirrigation, >2" and <= 8", with Volume Totalizer	2523	Microirrigation water meter greater than 2" and less than or equal to 8 inch diameter, with volume totalizer. Includes materials only.	Each	$1,420.94	1	$1,420.94

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 nusery 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, 610 - Salinity &Sodic Soil Management, 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

Total Scenario Cost: $57,615.04

Scenario Cost/Unit: $2,880.75

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	$1,470.45	1	$1,470.45
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	2700	$4,079.38
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	4	$86.58
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$202.55	1	$202.55
Materials						
Micro Irrigation, Media Filter, 30" to 48" Dia. tank, Equipped for Automatic Flush	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	$5,211.81	2	$10,423.63
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	$336.75	1	$336.75
Micro Irrigation, surface drip tubing	1488	Tubing is installed above ground for surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tubing has emitters built in.	Foot	$0.34	106480	$36,173.92
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	$1.92	2520	$4,841.79

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 nusery 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, 610 - Salinity &Sodic Soil Management, 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

Total Scenario Cost: $48,612.35

Scenario Cost/Unit: $2,430.62

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	$1,470.45	1	$1,470.45
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	2700	$4,079.38
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	4	$86.58
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$202.55	1	$202.55
Materials						
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	$336.75	1	$336.75
Micro Irrigation, surface drip tubing	1488	Tubing is installed above ground for surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tubing has emitters built in.	Foot	$0.34	106480	$36,173.92
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	$1.92	2520	$4,841.79
Water Meter, Microirrigation, >2" and <= 8", with Volume Totalizer	2523	Microirrigation water meter greater than 2" and less than or equal to 8 inch diameter, with volume totalizer. Includes materials only.	Each	$1,420.94	1	$1,420.94

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 with a 5 ft lateral spacing. 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, 610 - Salinity &Sodic Soil Management, 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 ontainer-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

Total Scenario Cost: $104,654.44

Scenario Cost/Unit: $10,465.44

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	$1,470.45	1	$1,470.45
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	1800	$2,719.58
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	4	$86.58
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$202.55	1	$202.55
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	$1,323.03	1	$1,323.03
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	$1.00	95832	$95,580.54
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	$336.75	1	$336.75
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	$1.92	788	$1,514.02
Water Meter, Microirrigation, >2" and <= 8", with Volume	2523	Microirrigation water meter greater than 2" and less than or equal to 8 inch diameter, with volume totalizer. Includes materials only.	Each	$1,420.94	1	$1,420.94

Totalizer						

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 nusery 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 quatities 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, 610 - Salinity &Sodic Soil Management, 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

Total Scenario Cost: $64,247.79

Scenario Cost/Unit: $3,212.39

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	$1,470.45	1	$1,470.45
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	2700	$4,079.38
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	4	$86.58
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$202.55	1	$202.55
Materials						
Micro Irrigation, Media Filter, 30" to 48" Dia. tank, Equipped for Automatic Flush	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	$5,211.81	3	$15,635.44
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	$336.75	1	$336.75
Micro Irrigation, surface drip tubing	1488	Tubing is installed above ground for surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tubing has emitters built in.	Foot	$0.34	106480	$36,173.92
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	$1.92	2520	$4,841.79

Water Meter, Microirrigation, >2" and <= 8", with Volume Totalizer	2523	Microirrigation water meter greater than 2" and less than or equal to 8 inch diameter, with volume totalizer. Includes materials only.	Each	$1,420.94	1	$1,420.94

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 quatities 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, 610 - Salinity &Sodic Soil Management, 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

Total Scenario Cost: $14,476.65

Scenario Cost/Unit: $1,447.66

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	$1,470.45	1	$1,470.45
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	1100	$1,661.97
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	4	$86.58
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$202.55	1	$202.55
Materials						
Micro Irrigation, Media Filter, 30" to 48" Dia. tank, Equipped for Automatic Flush	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	$5,211.81	2	$10,423.63
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	$49.31	1	$49.31
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	$1.92	303	$582.17

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, 610 - Salinity &Sodic Soil Management, 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

Total Scenario Cost: $5,473.97

Scenario Cost/Unit: $547.40

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	$1,470.45	1	$1,470.45
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	1100	$1,661.97
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	4	$86.58
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$202.55	1	$202.55
Materials						
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	$49.31	1	$49.31
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	$1.92	303	$582.17
Water Meter, Microirrigation, >2" and <= 8", with Volume Totalizer	2523	Microirrigation water meter greater than 2" and less than or equal to 8 inch diameter, with volume totalizer. Includes materials only.	Each	$1,420.94	1	$1,420.94

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 quatities 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, 610 - Salinity &Sodic Soil Management, 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

Total Scenario Cost: $15,897.59

Scenario Cost/Unit: $1,589.76

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	$1,470.45	1	$1,470.45
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	1100	$1,661.97
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	4	$86.58
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$202.55	1	$202.55
Materials						
Micro Irrigation, Media Filter, 30" to 48" Dia. tank, Equipped for Automatic Flush	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	$5,211.81	2	$10,423.63
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	$49.31	1	$49.31
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	$1.92	303	$582.17
Water Meter, Microirrigation, >2" and <= 8", with Volume Totalizer	2523	Microirrigation water meter greater than 2" and less than or equal to 8 inch diameter, with volume totalizer. Includes materials only.	Each	$1,420.94	1	$1,420.94

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 quatities 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, 610 - Salinity &Sodic Soil Management, 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 ontainer-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

Total Scenario Cost: $115,096.02

Scenario Cost/Unit: $11,509.60

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	$1,470.45	1	$1,470.45
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	1800	$2,719.58
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	4	$86.58
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$202.55	1	$202.55
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	$1,323.03	1	$1,323.03
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	$1.00	95850	$95,598.49
Micro Irrigation, Media Filter, 30" to 48" Dia. tank, Equipped for Automatic Flush	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	$5,211.81	2	$10,423.63
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	$336.75	1	$336.75

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	$1.92	788	$1,514.02
Water Meter, Microirrigation, >2" and <= 8", with Volume Totalizer	2523	Microirrigation water meter greater than 2" and less than or equal to 8 inch diameter, with volume totalizer. Includes materials only.	Each	$1,420.94	1	$1,420.94

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, 610 - Salinity &Sodic Soil Management, 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

Total Scenario Cost: $61,585.65

Scenario Cost/Unit: $3,079.28

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	$1,470.45	1	$1,470.45
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	2700	$4,079.38
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	4	$86.58
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$202.55	1	$202.55
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	$1,323.03	1	$1,323.03
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	$1.00	47950	$47,824.18
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	$336.75	1	$336.75
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	$1.92	2520	$4,841.79
Water Meter, Microirrigation, >2" and <= 8", with Volume Totalizer	2523	Microirrigation water meter greater than 2" and less than or equal to 8 inch diameter, with volume totalizer. Includes materials only.	Each	$1,420.94	1	$1,420.94

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, 610 - Salinity &Sodic Soil Management, 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

Total Scenario Cost: $77,221.09

Scenario Cost/Unit: $3,861.05

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Micro Irrigation, chemical injection equipment	1987	Chemical Injector Pump, plus chemigation check valve, injector ports, and appurtenances, Installation included.	Each	$1,470.45	1	$1,470.45
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	2700	$4,079.38
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	4	$86.58
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$202.55	1	$202.55
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	$1,323.03	1	$1,323.03
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	$1.00	47950	$47,824.18
Micro Irrigation, Media Filter, 30" to 48" Dia. tank, Equipped for Automatic Flush	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	$5,211.81	3	$15,635.44
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	$336.75	1	$336.75
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	$1.92	2520	$4,841.79

Water Meter, Microirrigation, >2" and <= 8", with Volume Totalizer	2523	Microirrigation water meter greater than 2" and less than or equal to 8 inch diameter, with volume totalizer. Includes materials only.	Each	$1,420.94	1	$1,420.94

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: 2178

Total Scenario Cost: $204.90

Scenario Cost/Unit: $0.09

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total

Materials

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	$49.31	1	$49.31
Micro Irrigation, surface drip tubing	1488	Tubing is installed above ground for surface drip irrigation, includes installation, and connections to the supply and flushing laterals. Tubing has emitters built in.	Foot	$0.34	458	$155.59

Practice: 430 - Irrigation Pipeline

Scenario: #1 - PVC (Iron Pipe Size), 4 inches or less

Scenario Description: Description: Below ground installation of PVC (Iron Pipe Size) pipeline. PVC (IPS) is manufactured in sizes (nominal diameter) from ½-inch to 36-inch; typical practice sizes range from 2-inch to 24-inch; and typical scenario size is 4-inch. Construct 1/4 mile (1,320 feet) of 4-inch, SDR-26, PVC pipeline with appurtenances, installed below ground with a minimum of 2 feet of ground cover. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements. Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use. Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface &Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation: Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation: Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Feet of Pipe

Scenario Unit: Foot

Scenario Typical Size: 1320

Total Scenario Cost: $7,385.52

Scenario Cost/Unit: $5.60

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	1320	$1,994.36
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	48	$1,038.92
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	1	$301.16
Materials						
Pipe, PVC, 4", SDR 26	989	Materials: - 4" - PVC - SDR 26 160 psi - ASTM D2241	Foot	$2.79	1452	$4,051.08

Practice: 430 - Irrigation Pipeline

Scenario: #2 - PVC (Iron Pipe Size) 10 inches or greater

Scenario Description: Description: Below ground installation of PVC (Iron Pipe Size) pipeline. PVC (IPS) is manufactured in sizes (nominal diameter) from ½-inch to 36-inch; typical practice sizes range from 2-inch to 24-inch; and typical scenario size is 12-inch. Construct 1/4 mile (1,320 feet) of 12-inch, Class 125 (SDR-32.5), PVC pipeline with appurtenances, installed below ground with a minimum of 2 feet of ground cover. The unit is weight of pipe material in pounds. 1,320 feet of 12-inch, Class 125 (SDR-32.5) PVC pipe weighs 9.505 lb/ft, or a total of 12,547 pounds. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements. Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use. Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface &Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation: Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation: Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 12547

Total Scenario Cost: $33,278.92

Scenario Cost/Unit: $2.65

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.46	1320	$4,573.54
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	48	$1,038.92
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$574.99	2	$1,149.98
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	$1.92	13801	$26,516.48

Practice: 430 - Irrigation Pipeline

Scenario: #3 - PVC (Plastic Irrigation Pipe) 8" or less

Scenario Description: Description: Below ground installation of PVC (Plastic Irrigation Pipe) pipeline. PVC (PIP) is manufactured in sizes (nominal diameter) from 4-inch to 27-inch; typical practice sizes range from 4-inch to 24-inch; and typical scenario size is 6-inch. Construct 1/4 mile (1,320 feet) of 6-inch, 50 PSI (SDR-81.0), PVC PIP with appurtenances, installed below ground with a minimum of 2 feet of ground cover. The unit is weight of pipe in pounds. 1,320 feet of 6-inch, 50 PSI (SDR-81.0) PVC PIP weighs 0.99 lb/ft, or a total of 1307 pounds. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements. Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use. Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface &Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation: Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation: Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 1307

Total Scenario Cost: $6,398.49

Scenario Cost/Unit: $4.90

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	1320	$1,994.36
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	48	$1,038.92
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32
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	$1.92	1438	$2,762.89

Practice: 430 - Irrigation Pipeline

Scenario: #4 - PVC (Plastic Irrigation Pipe) 10 inches or greater

Scenario Description: Description: Below ground installation of PVC (Plastic Irrigation Pipe) pipeline. PVC (PIP) is manufactured in sizes (nominal diameter) from 4-inch to 27-inch; typical practice sizes range from 4-inch to 24-inch; and typical scenario size is 12-inch. Construct 1/4 mile (1,320 feet) of 12-inch, Class 50 (SDR-81.0), PVC PIP with appurtenances, installed below ground with a minimum of 2 feet of ground cover. The unit is weight of pipe in pounds. 1,320 feet of 12-inch, Class 50 (SDR-81.0) PVC PIP weighs 3.594 lb/ft, or a total of 4,744 pounds. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements. Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use. Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface &Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation: Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation: Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 4744

Total Scenario Cost: $16,586.65

Scenario Cost/Unit: $3.50

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.46	1320	$4,573.54
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	64	$1,385.22
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32
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	$1.92	5218	$10,025.58

Practice: 430 - Irrigation Pipeline

Scenario: #5 - HDPE (Iron Pipe Size &Tubing) 4 inches to 8 inches

Scenario Description: Description: Below ground installation of HDPE (Iron Pipe Size &Tubing) pipeline. HDPE (IPS &Tubing) is manufactured in sizes (nominal diameter) from ½-inch to 24-inch; typical practice sizes range from 2-inch to 24-inch; and typical scenario size is 6-inch. Construct 1/4 mile (1,320 feet) of 6-inch, Class 130 (SDR-13.5), HDPE pipeline with appurtenances, installed below ground with a minimum 2 feet of ground cover. The unit is weight of pipe material in pounds. 1,320 feet of 8-inch, Class 130 (SDR-13.5), HDPE weighs 4.024 lb/ft, or a total of 5,312 pounds. Appurtenances include: fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements. Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use. Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface &Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation: Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation: Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 5312

Total Scenario Cost: $16,592.13

Scenario Cost/Unit: $3.12

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Fuser for HDPE Pipe	1383	Fusing machine for 1" to 12" diameter HDPE pipe joints. Equipment costs only. Does not include labor.	Hour	$23.79	5	$118.97
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	1320	$1,994.36
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.28	5843	$13,313.74
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	26	$562.75

Practice: 430 - Irrigation Pipeline

Scenario: #6 - HDPE (Iron Pipe Size &Tubing) 10" or greater

Scenario Description: Description: Below ground installation of HDPE (Iron Pipe Size &Tubing) pipeline. HDPE (IPS &Tubing) is manufactured in sizes (nominal diameter) from ½-inch to 24-inch; typical practice sizes range from 2-inch to 24-inch; and typical scenario size is 12-inch. Construct 1/4 mile (1,320 feet) of 12-inch, Class 130 (SDR-13.5), HDPE pipeline with appurtenances, installed below ground with a minimum 2 feet of ground cover. The unit is weight of pipe material in pounds. 1,320 feet of 8-inch, Class 130 (SDR-13.5), HDPE weighs 14.89 lb/ft, or a total of 19,655 pounds. Appurtenances include: fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements. Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use. Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface &Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation: Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation: Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 19655

Total Scenario Cost: $55,858.36

Scenario Cost/Unit: $2.84

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Fuser for HDPE Pipe	1383	Fusing machine for 1" to 12" diameter HDPE pipe joints. Equipment costs only. Does not include labor.	Hour	$23.79	16	$380.69
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.46	1320	$4,573.54
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	48	$1,038.92
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.28	21620	$49,262.90

Practice: 430 - Irrigation Pipeline

Scenario: #7 - Surface HDPE (Iron Pipe Size &Tubing)

Scenario Description: Description: On-ground surface installation of HDPE (Iron Pipe Size &Tubing) pipeline. HDPE (IPS &Tubing) is manufactured in sizes (nominal diameter) from ½-inch to 24-inch; typical practice sizes range from 2-inch to 24-inch; and typical scenario size is 2-inch. Construct 1/4 mile (1,320 feet) of 2-inch, Class 200 (SDR-9.0), HDPE pipeline with appurtenances, installed on the ground surface. The unit is weight of pipe material in pounds. 1,320 feet of 2-inch, Class 200 (SDR-9.0), HDPE weighs 0.744 lb/ft, or a total of 982 pounds. Appurtenances include: fittings, air vents, pressure relief valves, anchors, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 15% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements. Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use. Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface &Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation: Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation: Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 982

Total Scenario Cost: $3,156.26

Scenario Cost/Unit: $3.21

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	16	$346.31
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$83.16	2	$166.32
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.28	1108	$2,524.67
Equipment Installation						
Fuser for HDPE Pipe	1383	Fusing machine for 1" to 12" diameter HDPE pipe joints. Equipment costs only. Does not include labor.	Hour	$23.79	5	$118.97

Practice: 430 - Irrigation Pipeline

Scenario: #8 - HDPE (Corrugated Plastic Pipe)

Scenario Description: Description: Below ground installation of HDPE (Corrugated Plastic Pipe) pipeline. HDPE (CPP) Twin-Wall is manufactured in sizes (nominal diameter) from 4-inch to 60-inch; typical practice sizes range from 12-inch to 24-inch; and typical scenario size is 18-inch. Construct 1/8 mile (660 feet) of 18-inch, Twin-Wall, HDPE Corrugated Plastic Pipe (CPP) with a smooth interior, and appurtenances, installed below ground with a minimum 2 feet of ground cover. The unit is in weight of pipe material in pounds. 660 feet of 18-inch, Twin-Wall, HDPE CPP weighs 6.40 lb/ft, or a total of 4,224 pounds. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements. Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use. Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface &Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation: Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation: Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 4224

Total Scenario Cost: $13,063.88

Scenario Cost/Unit: $3.09

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	64	$1,385.22
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32
Materials						
Pipe, HDPE, corrugated single wall, <= 12" weight priced Compound	1380	High Density Polyethylene (HDPE) compound manufactured into single wall corrugated pipe or tubing. Materials only.	Pound	$1.75	4646	$8,120.36
Equipment Installation						
Trenching, Earth, 30" x 48"	1384	Trenching, earth, 30" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$4.48	660	$2,955.98

Practice: 430 - Irrigation Pipeline

Scenario: #9 - Steel (Iron Pipe Size) 8" or less

Scenario Description: Description: Below ground installation of Steel (Iron Pipe Size) pipeline. Steel (IPS) is manufactured in sizes (nominal diameter) from ½-inch to 36-inch; typical practice sizes range from 2-inch to 18-inch; and typical scenario size is 6-inch. Construct 1/4 mile (1,320 feet) of 6-inch, Schedule 10, Galvanized Steel Pipe with appurtenances, installed below ground with a minimum feet of ground cover. The unit is the weight of pipe material in pounds. 1,320 feet of 6-inch, Schedule 10, Galvanized Steel Pipe weighs 9.289 lb/ft, for t total of 12, 261 pounds. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity). Typical installation applies to soils with no special bedding requirements. Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use. Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface &Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation: Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation: Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 12261

Total Scenario Cost: $27,427.55

Scenario Cost/Unit: $2.24

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	1320	$1,994.36
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	64	$1,385.22
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32
Materials						
Pipe, steel, smooth wall, galvanized, weight priced	1381	Steel manufactured into galvanized smooth wall pipe	Pound	$1.74	13488	$23,445.65

Practice: 430 - Irrigation Pipeline

Scenario: #10 - Steel (Iron Pipe Size) 10" or greater

Scenario Description: Description: Below ground installation of Steel (Iron Pipe Size) pipeline. Steel (IPS) is manufactured in sizes (nominal diameter) from ½-inch to 36-inch; typical practice sizes range from 2-inch to 18-inch; and typical scenario size is 12-inch. Construct 1/4 mile (1,320 feet) of 12-inch, Schedule 10, Galvanized Steel Pipe with appurtenances, installed below ground with a minimum feet of ground cover. The unit is the weight of pipe material in pounds. 1,320 feet of 12-inch, Schedule 10, Galvanized Steel Pipe weighs 24.16 lb/ft, for t total of 31,891 pounds. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity). Typical installation applies to soils with no special bedding requirements. Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use. Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface &Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation: Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation: Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 31891

Total Scenario Cost: $68,231.85

Scenario Cost/Unit: $2.14

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.46	1320	$4,573.54
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	96	$2,077.84
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32
Materials						
Pipe, steel, smooth wall, galvanized, weight priced	1381	Steel manufactured into galvanized smooth wall pipe	Pound	$1.74	35080	$60,978.16

Practice: 430 - Irrigation Pipeline

Scenario: #11 - Surface Steel (Iron Pipe Size)

Scenario Description: Description: On-ground surface installation of Steel (Iron Pipe Size) pipeline. Steel (IPS) is manufactured in sizes (nominal diameter) from ½-inch to 36-inch; typical practice sizes range from 2-inch to 18-inch; and typical scenario size is 2-inch. Construct 1/4 mile (1,320 feet) of 2-inch, Schedule 40, Galvanized Steel Pipe with appurtenances, installed on the ground surface. The unit is weight of pipe material in pounds. 1,320 feet of 2-inch, Schedule 40, Galvanized Steel Pipe weighs 3.653 lb/ft, or a total of 4,822 pounds . Appurtenances include: couplings, fittings, air vents, pressure relief valves, anchors, expansion joints, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 15% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements. Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use. Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface &Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation: Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation: Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 4822

Total Scenario Cost: $10,677.57

Scenario Cost/Unit: $2.21

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	48	$1,038.92
Materials						
Pipe, steel, smooth wall, galvanized, weight priced	1381	Steel manufactured into galvanized smooth wall pipe	Pound	$1.74	5545	$9,638.65

Practice: 430 - Irrigation Pipeline

Scenario: #12 - Steel (Corrugated Steel Pipe)

Scenario Description: Description: Below ground installation of Corrugated Steel Pipe (CSP) pipeline. Steel (CSP) is manufactured in sizes (nominal diameter) from 12-inch to 72-inch; typical practice sizes range from 12-inch to 24-inch; and typical scenario size is 18-inch. Construct 1/8 mile (660 feet) of 18-inch, 14-gauge, Galvanized Corrugated Steel Pipe (CSP) with appurtenances, installed below ground with a minimum 2 feet of ground cover. The unit is weight of pipe material in pounds. 660 feet of 18-inch, 14-gauge, Galvanized CSP weighs 18.0 lb/ft, or a total of 11,800 pounds. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements. Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use. Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface &Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation: Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation: Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 11880

Total Scenario Cost: $17,722.25

Scenario Cost/Unit: $1.49

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	80	$1,731.53
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32
Equipment Installation						
Trenching, Earth, 30" x 48"	1384	Trenching, earth, 30" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$4.48	660	$2,955.98
Materials						
Pipe, CMP, 14-12 gauge, weight priced	1589	14 and 12 gauge galvanized helical corrugated metal pipe priced by the weight of the pipe materials. Materials only.	Pound	$0.91	13662	$12,432.42

Practice: 430 - Irrigation Pipeline

Scenario: #13 - Surface Aluminum (Aluminum Irrigation Pipe)

Scenario Description: Description: On-ground surface installation of Aluminum Irrigation Pipe (AIP) pipeline. AIP is manufactured in sizes (nominal diameter) from 2-inch to 12-inch; typical practice sizes range from 6-inch to 12-inch; and typical scenario size is 8-inch. Construct 1/8 mile (660 feet) of 8-inch, 0.050-inch wall, Aluminum Irrigation Pipe (AIP) with appurtenances, installed on the ground surface. The unit is weight of pipe in pounds of pipe material. 660 feet of 8-inch, 0.050-inch wall, AIP weighs 1.47 lb/ft, or a total of 970 pounds. Appurtenances include: couplings, fittings, air vents, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements. Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use. Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface &Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation: Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation: Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 970

Total Scenario Cost: $5,231.12

Scenario Cost/Unit: $5.39

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	8	$173.15
Materials						
Pipe, aluminum, smooth wall, weight priced	1382	Aluminum manufactured into smooth wall pipe	Pound	$4.74	1067	$5,057.97

Practice: 430 - Irrigation Pipeline

Scenario: #26 - HDPE (Iron Pipe Size &Tubing) 3" or less

Scenario Description: Below ground installation of HDPE (Iron Pipe Size &Tubing) pipeline. HDPE (IPS &Tubing) is manufactured in sizes (nominal diameter) from ½-inch to 24-inch; typical practice sizes range from 2-inch to 24-inch; and typical scenario size is 3-inch. Construct 1/4 mile (1,320 feet) of 3-inch, Class 130 (SDR-13.5), HDPE pipeline with appurtenances, installed below ground with a minimum 2 feet of ground cover. The unit is weight of pipe material in pounds. 1,320 feet of 3-inch, Class 130 (SDR-13.5), HDPE weighs 1.23 lb/ft, or a total of 1,625 pounds. Appurtenances include: fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements. Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use. Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface &Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation: Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation: Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Pounds of Pipe

Scenario Unit: Pound

Scenario Typical Size: 1625

Total Scenario Cost: $7,302.37

Scenario Cost/Unit: $4.49

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.28	1785	$4,067.27
Equipment Installation						
Fuser for HDPE Pipe	1383	Fusing machine for 1" to 12" diameter HDPE pipe joints. Equipment costs only. Does not include labor.	Hour	$23.79	5	$118.97
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	1320	$1,994.36
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	24	$519.46
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32

Practice: 430 - Irrigation Pipeline

Scenario: #27 - PVC (Plastic Irrigation Pipeline) 1"

Scenario Description: Description: Below ground installation of 1 inch diameter PVC (Plastic Irrigation Pipe) pipeline. Construct 600 feet of 1-inch, SCH 40, PVC PIP with appurtenances, installed below ground with a minimum of 2 feet of ground cover. The units are feet. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements. Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use. Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface &Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation: Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation: Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Length of pipe

Scenario Unit: Linear Foot

Scenario Typical Size: 600

Total Scenario Cost: $2,485.05

Scenario Cost/Unit: $4.14

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	600	$906.53
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	24	$519.46
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32
Materials						
Pipe, PVC, 1", SCH 40	973	Materials: - 1" - PVC - SCH 40 - ASTM D1785	Foot	$0.69	660	$456.75

Practice: 430 - Irrigation Pipeline

Scenario: #28 - PVC (Plastice Irrigation Pipe) 2"

Scenario Description: Description: Below ground installation of 2 inch diameter PVC (Plastic Irrigation Pipe) pipeline. Construct 600 feet of 2-inch, SCH 40 PVC PIP with appurtenances, installed below ground with a minimum of 2 feet of ground cover. The units are feet. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements. Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use. Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface &Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation: Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation: Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Length of pipe

Scenario Unit: Pound

Scenario Typical Size: 600

Total Scenario Cost: $2,997.16

Scenario Cost/Unit: $5.00

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	600	$906.53
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	24	$519.46
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32
Materials						
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.47	660	$968.85

Practice: 430 - Irrigation Pipeline

Scenario: #29 - PVC (Plastic Irrigation Pipeline) 3"

Scenario Description: Description: Below ground installation of 3 inch diameter PVC (Plastic Irrigation Pipe) pipeline. Construct 600 feet of 3-inch, SCH 40 PVC PIP with appurtenances, installed below ground with a minimum of 2 feet of ground cover. The units are feet. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements. Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use. Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface &Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation: Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation: Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Length of pipe

Scenario Unit: Linear Foot

Scenario Typical Size: 600

Total Scenario Cost: $4,014.45

Scenario Cost/Unit: $6.69

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32
Equipment Installation						
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	600	$906.53
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	24	$519.46
Materials						
Pipe, PVC, 3", SCH 40	977	Materials: - 3" - PVC - SCH 40 - ASTM D1785	Foot	$3.01	660	$1,986.15

Practice: 430 - Irrigation Pipeline

Scenario: #31 - PVC (Iron Pipe Size) 6 inches to 8 inches

Scenario Description: Below ground installation of PVC (Iron Pipe Size) pipeline. PVC (IPS) is manufactured in sizes (nominal diameter) from ½-inch to 36-inch; typical practice sizes range from 2-inch to 24-inch; and typical scenario size is 12-inch. Construct 1/4 mile (1,320 feet) of 8-inch, Schedule 40 PVC pipeline with appurtenances, installed below ground with a minimum of 2 feet of ground cover. The unit is feet of pipe. Appurtenances include: couplings, fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 20% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements. Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use. Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface &Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation: Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation: Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Feet of Pipeline

Scenario Unit: Linear Foot

Scenario Typical Size: 1320

Total Scenario Cost: $22,548.95

Scenario Cost/Unit: $17.08

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Pipe, PVC, 8", SCH 40	981	Materials: - 8" - PVC - SCH 40 - ASTM D1785	Foot	$10.33	1584	$16,361.50
Equipment Installation						
Trenching, Earth, loam, 24" x 48"	54	Trenching, earth, loam, 24" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$3.46	1320	$4,573.54
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	48	$1,038.92
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$574.99	1	$574.99

Practice: 430 - Irrigation Pipeline

Scenario: #32 - HDPE (Iron Pipe Size &Tubing) 3" or less

Scenario Description: Description: Below ground installation of HDPE (Iron Pipe Size &Tubing) pipeline. HDPE (IPS &Tubing) is manufactured in sizes (nominal diameter) from ½-inch to 24-inch; typical practice sizes range from 2-inch to 24-inch; and typical scenario size is 3-inch. Construct 1/4 mile (1,320 feet) of 3-inch, Class 130 (SDR-13.5), HDPE pipeline with appurtenances, installed below ground with a minimum 2 feet of ground cover. The unit is weight of pipe material in pounds. 1,320 feet of 3-inch, Class 130 (SDR-13.5), HDPE weighs 1.23 lbs/ft, or a total of 1,625 pounds. Appurtenances include: fittings, air vents, pressure relief valves, thrust blocks, risers, and inline valves, and are included in the cost of pipe material (additional 10% of pipe material quantity). Cost of appurtenances does not include flow meters or backflow preventers. Typical installation applies to soils with no special bedding requirements. Resource Concerns: Inefficient Use of Irrigation Water; Inefficient Energy Use. Associated Practices: 436 - Irrigation Reservoir; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 443 - Irrigation System, Surface &Subsurface; 447 - Irrigation System, Tailwater Recovery; 533 - Pumping Plant; 634 - Waste Transfer.

Before Situation: Pipeline needed to replace or supplement inefficient irrigation conveyance systems.

After Situation: Pipeline installed to convey and/or distribute water to irrigation systems or reservoirs, minimizing non-beneficial water use, reducing soil erosion, and/or reducing energy use.

Scenario Feature Measure: Weight of Pipe

Scenario Unit: Pound

Scenario Typical Size: 1625

Total Scenario Cost: $7,345.66

Scenario Cost/Unit: $4.52

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Fuser for HDPE Pipe	1383	Fusing machine for 1" to 12" diameter HDPE pipe joints. Equipment costs only. Does not include labor.	Hour	$23.79	5	$118.97
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	1320	$1,994.36
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	26	$562.75
Materials						
Pipe, HDPE, smooth wall, weight priced	1379	High Density Polyethylene (HDPE) compound manufactured into smooth wall pipe. Materials only.	Pound	$2.28	1785	$4,067.27
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32

Practice: 449 - Irrigation Water Management

Scenario: #1 - Basic IWM 30 acres or less

Scenario Description: A low Intensity irrigation water management system for producers using a checkbook method (crop grown, soil moisture conditions prior to irrigation, dates of irrigation start and stop, depths of irrigation applied, duration of irrigations, and amount of rainfall). For a typical scenario, soil moisture is determined by the feel method, volumes of irrigation water are based on energy or water district bills, records are kept on paper copies, and calculations are made by hand. Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities. Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface, 587-Structure for water Control, 328-Conservation Crop Rotation, and 590-Nutrient Management.

Before Situation: The irrigator decides when to irrigate based on general crop or soil appearance or limited soil moisture monitoring. System run times are based on past apparent success. The typical irrigated field is a 30 acre corn field with a surface irrigation system.

After Situation: Irrigations are scheduled based on measured crop water requirements. Records are used to evaluate results of past irrigation events and influence future irrigations. The irrigator keeps records of soil moisture, crop water use, rainfall amounts and irrigation timing and amounts. At the end of the irrigation season all the data has been reviewed and evaluated. Improvements planned for the next season have been determined.

Scenario Feature Measure: Irrigated Area Managed

Scenario Unit: Acre

Scenario Typical Size: 30

Total Scenario Cost: $867.92

Scenario Cost/Unit: $28.93

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total

Labor

Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	20	$867.92

Practice: 449 - Irrigation Water Management

Scenario: #2 - Basic IWM over 30 acres

Scenario Description: A low Intensity irrigation water management system for producers using a checkbook method (crop grown, soil moisture conditions prior to irrigation, dates of irrigation start and stop, depths of irrigation applied, duration of irrigations, and amount of rainfall). For a typical scenario, soil moisture is determined by the feel method, volumes of irrigation water are based on energy or water district bills, records are kept on paper copies, and calculations are made by hand. Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities. Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface, 587-Structure for water Control, 328-Conservation Crop Rotation, and 590-Nutrient Management.

Before Situation: The irrigator decides when to irrigate based on general crop or soil appearance or limited soil moisture monitoring. System run times are based on past apparent success. The typical irrigated field is a 50 acre corn field with a sprinkler irrigation system.

After Situation: Irrigations are scheduled based on measured crop water requirements. Records are used to evaluate results of past irrigation events and influence future irrigations. The irrigator keeps records of soil moisture, crop water use, rainfall amounts and irrigation timing and amounts. At the end of the irrigation season all the data has been reviewed and evaluated. Improvements planned for the next season have been determined.

Scenario Feature Measure: Irrigated Area Managed

Scenario Unit: Acre

Scenario Typical Size: 50

Total Scenario Cost: $780.91

Scenario Cost/Unit: $15.62

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	4	$86.58
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	16	$694.34

Practice: 449 - Irrigation Water Management

Scenario: #3 - Annual Crops, Vegetables, 1st Year

Scenario Description: This practice includes the installation of soil moisture sensors such as tensiometers, gyp blocks, capacitance sensors etc, that are installed and read to determine point in time soil moisture by depth; and the labor of using the equipment over a 12-week growing season for the first year. The installation includes the purchase of soil moisture meters and sensors, installation equipment, and labor to install and utilize sensors and readings in making IWM decisions during first year. Typical Scenario involves installation of resistance sensor blocks in a 20 acre field of irrigated cropland. Producer periodically monitors soil moisture sensors and manually turn on and off the water supply in accordance with the soil moisture readings and keep records for each irrigation cycle (run time, inches applied, and total flow recorded) during the 12-week growing season. Meters used to read sensors may be portable. Subscription to real-time weather records and rainfall record keeping is used. Soil moisture data is reviewed 3 times per week at each sensor site (two sensors per site) with one sensor site per 10 acres. Record keeping involves a weekly analysis, monthly documentation, and a year-end report. Resource Concerns: Insufficient Water - Inefficient use of irrigation water, and Degraded Plant Condition - Undesirable plant productivity and health, and Inefficient Energy Use - Equipment and facilities. Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface, 587-Structure for water Control, 328-Conservation Crop Rotation, and 590-Nutrient Management.

Before Situation: The farmer decides when to irrigate based on general crop or soil appearance or limited soil moisture monitoring. System run times are based on past apparent success. The typical irrigated field is a 20 acre annual crops with sprinkler or micro irrigation.

After Situation: Producer has installed 2 sensors at each monitoring site at different depths. Producer uses periodic soil moisture measurements to schedule irrigation more effectively resulting in improved irrigation water managment and reduced energy use. Records are used to evaluate results of past irrigation events and influence future irrigations. The irrigator keeps records of soil moisture, crop water use, rainfall amounts and irrigation timing and amounts. At the end of the irrigation season all the data has been reviewed and evaluated. Improvements planned for the next season have been determined.

Scenario Feature Measure: Irrigated Area Managed

Scenario Unit: Acre

Scenario Typical Size: 20

Total Scenario Cost: $1,292.24

Scenario Cost/Unit: $64.61

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	16	$346.31
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	8	$347.17
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$83.16	2	$166.32
Materials						
Soil Moisture Meter	1455	Soil Moisture Sensor Reader. Equipment only.	Each	$285.50	1	$285.50
Soil Moisture Sensor	1456	Soil moisture resistance sensor W/10' cables. Equipment only.	Each	$36.74	4	$146.94

Practice: 449 - Irrigation Water Management

Scenario: #4 - Annual Crops, Vegetables, 1st Year, with Data Logger

Scenario Description: This practice includes the installation of electrical soil moisture sensors such as capacitance or resistance sensors that are monitored to determine soil moisture. The installation includes the purchase of soil moisture sensors, installation equipment (probe or auger), and a data logger to log continuous soil moisture data that can be downloaded to a personal computer and associated graphing software. Scenario also includes the labor associated with using the equipment and readings in making IWM decisions over a 12-week growing season for the first year. Typical Scenario involves installation of resistance sensor blocks in a 20 acre field of irrigated cropland. Producer periodically monitors soil moisture sensors and manually turn on and off the water supply in accordance with the soil moisture readings and keep records for each irrigation cycle (run time, inches applied, and total flow recorded) during the 12-week growing season. Subscription to real-time weather records and rainfall record keeping is used. Soil moisture data is reviewed 3 times per week at each sensor site (two sensors per site) with one sensor site per 10 acres. Record keeping involves a weekly analysis, monthly documentation, and a year-end report. Resource Concerns: Insufficient Water - Inefficient use of irrigation water, and Degraded Plant Condition - Undesirable plant productivity and health, and Inefficient Energy Use - Equipment and facilities. Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface, 587-Structure for water Control, 328-Conservation Crop Rotation, and 590-Nutrient Management.

Before Situation: The farmer decides when to irrigate based on general crop or soil appearance or limited soil moisture monitoring. System run times are based on past apparent success. The typical irrigated field is a 20 acre annual crops with sprinkler or micro irrigation.

After Situation: Producer has installed 2 sensors at each monitoring site at different depths. Producer periodically downloads continuously recorded soil moisture measurements to schedule irrigation more effectively resulting in improved irrigation water managment and reduced energy use. Records are used to evaluate results of past irrigation events and influence future irrigations. The irrigator keeps records of soil moisture, crop water use, rainfall amounts and irrigation timing and amounts. At the end of the irrigation season all the data has been reviewed and evaluated. Improvements planned for the next season have been determined.

Scenario Feature Measure: Irrigated Area Managed

Scenario Unit: Acre

Scenario Typical Size: 20

Total Scenario Cost: $2,199.73

Scenario Cost/Unit: $109.99

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	16	$346.31
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	8	$347.17
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$83.16	2	$166.32
Materials						
Data Logger	1453	Data Logger W/Graphic Output for water management. Materials only.	Each	$596.50	2	$1,192.99
Soil Moisture Sensor	1456	Soil moisture resistance sensor W/10' cables. Equipment only.	Each	$36.74	4	$146.94

Practice: 449 - Irrigation Water Management

Scenario: #5 - Annual Crops, Vegetables, 2nd and 3rd Year

Scenario Description: A system to monitor irrigation water applied to field crops over a 12-week growing season. Soil moisture data is reviewed 3 times per week at each sensor site (two sensors per site) with one sensor site per 10 acres. Subscription to real-time weather records and rainfall record keeping is used. The producer must manually turn on and off the water supply in accordance with the soil moisture readings and keep records for each irrigation cycle (run time, inches applied, and total flow recorded). Record keeping involves a weekly analysis, monthly documentation, and a year-end report. Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities. Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface, 587-Structure for water Control, 328-Conservation Crop Rotation, and 590-Nutrient Management.

Before Situation: The farmer decides when to irrigate based on general crop or soil appearance or limited soil moisture monitoring. System run times are based on past apparent success. The typical irrigated field is a 20 acre anual crops with sprinkler or micro irrigation.

After Situation: Producer uses periodic soil moisture measurements to schedule irrigation more effectively resulting in improved irrigation water managment and reduced energy use. Records are used to evaluate results of past irrigation events and influence future irrigations. The irrigator keeps records of soil moisture, crop water use, rainfall amounts and irrigation timing and amounts. At the end of the irrigation season all the data has been reviewed and evaluated. Improvements planned for the next season have been determined.

Scenario Feature Measure: Irrigated Area Managed

Scenario Unit: Acre

Scenario Typical Size: 20

Total Scenario Cost: $693.47

Scenario Cost/Unit: $34.67

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	16	$346.31
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	8	$347.17

Practice: 449 - Irrigation Water Management

Scenario: #6 - Perennial Crops, Orchards, 1st Year

Scenario Description: This practice includes the installation of soil moisture sensors such as tensiometers, gyp blocks, capacitance sensors etc, that are installed and read to determine point in time soil moisture by depth; and the labor of using the equipment over a 26-week growing season for the first year. The installation includes the purchase of soil moisture meters and sensors, installation equipment, and labor to install and utilize sensors and readings in making IWM decisions during first year. Typical Scenario involves installation of resistance sensor blocks in a 20 acre field of irrigated cropland. Producer periodically monitors soil moisture sensors and manually turn on and off the water supply in accordance with the soil moisture readings and keep records for each irrigation cycle (run time, inches applied, and total flow recorded) during the 26-week growing season. Meters used to read sensors may be portable. Subscription to real-time weather records and rainfall record keeping is used. Soil moisture data is reviewed 3 times per week at each sensor site (two sensors per site) with one sensor site per 10 acres. Record keeping involves a weekly analysis, monthly documentation, and a year-end report. Resource Concerns: Insufficient Water - Inefficient use of irrigation water, and Degraded Plant Condition - Undesirable plant productivity and health, and Inefficient Energy Use - Equipment and facilities. Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface, 587-Structure for water Control, 328-Conservation Crop Rotation, and 590-Nutrient Management.

Before Situation: The farmer decides when to irrigate based on general crop or soil appearance or limited soil moisture monitoring. System run times are based on past apparent success. The typical irrigated field is a 20 acre perennial crops with sprinkler or micro irrigation.

After Situation: Producer has installed 2 sensors at each monitoring site at different depths. Producer uses periodic soil moisture measurements to schedule irrigation more effectively resulting in improved irrigation water managment and reduced energy use. Records are used to evaluate results of past irrigation events and influence future irrigations. The irrigator keeps records of soil moisture, crop water use, rainfall amounts and irrigation timing and amounts. At the end of the irrigation season all the data has been reviewed and evaluated. Improvements planned for the next season have been determined.

Scenario Feature Measure: <Unknown>

Scenario Unit: Acre

Scenario Typical Size: 20

Total Scenario Cost: $1,508.68

Scenario Cost/Unit: $75.43

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	26	$562.75
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	8	$347.17
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$83.16	2	$166.32
Materials						
Soil Moisture Meter	1455	Soil Moisture Sensor Reader. Equipment only.	Each	$285.50	1	$285.50
Soil Moisture Sensor	1456	Soil moisture resistance sensor W/10' cables. Equipment only.	Each	$36.74	4	$146.94

Practice: 449 - Irrigation Water Management

Scenario: #7 - Perennial Crops, Orchards, 1st Year, with Data Logger

Scenario Description: This practice includes the installation of electrical soil moisture sensors such as capacitance or resistance sensors that are monitored to determine soil moisture. The installation includes the purchase of soil moisture sensors, installation equipment (probe or auger), and a data logger to log continuous soil moisture data that can be downloaded to a personal computer and associated graphing software. Scenario also includes the labor associated with using the equipment and readings in making IWM decisions over a 26-week growing season for the first year. Typical Scenario involves installation of resistance sensor blocks in a 20 acre field of irrigated cropland. Producer periodically monitors soil moisture sensors and manually turn on and off the water supply in accordance with the soil moisture readings and keep records for each irrigation cycle (run time, inches applied, and total flow recorded) during the 26-week growing season. Subscription to real-time weather records and rainfall record keeping is used. Soil moisture data is reviewed 3 times per week at each sensor site (two sensors per site) with one sensor site per 10 acres. Record keeping involves a weekly analysis, monthly documentation, and a year-end report. Resource Concerns: Insufficient Water - Inefficient use of irrigation water, and Degraded Plant Condition - Undesirable plant productivity and health, and Inefficient Energy Use - Equipment and facilities. Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface, 587-Structure for water Control, 328-Conservation Crop Rotation, and 590-Nutrient Management.

Before Situation: The farmer decides when to irrigate based on general crop or soil appearance or limited soil moisture monitoring. System run times are based on past apparent success. The typical irrigated field is a 20 acre perennial crops with sprinkler or micro irrigation.

After Situation: Producer has installed 2 sensors at each monitoring site at different depths. Producer periodically downloads continuously recorded soil moisture measurements to schedule irrigation more effectively resulting in improved irrigation water managment and reduced energy use. Records are used to evaluate results of past irrigation events and influence future irrigations. The irrigator keeps records of soil moisture, crop water use, rainfall amounts and irrigation timing and amounts. At the end of the irrigation season all the data has been reviewed and evaluated. Improvements planned for the next season have been determined.

Scenario Feature Measure: <Unknown>

Scenario Unit: Acre

Scenario Typical Size: 20

Total Scenario Cost: $2,416.17

Scenario Cost/Unit: $120.81

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	26	$562.75
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	8	$347.17
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$83.16	2	$166.32
Materials						
Data Logger	1453	Data Logger W/Graphic Output for water management. Materials only.	Each	$596.50	2	$1,192.99
Soil Moisture Sensor	1456	Soil moisture resistance sensor W/10' cables. Equipment only.	Each	$36.74	4	$146.94

Practice: 449 - Irrigation Water Management

Scenario: #8 - Perennial Crops, Orchards, 2nd and 3rd Year

Scenario Description: A system to monitor irrigation water applied to specialty crops over a 26-week growing season. Soil moisture data is reviewed 3 times per week at each sensor site (two sensors per site) with one sensor site per 10 acres. Subscription to real-time weather records and rainfall record keeping is used. The producer must manually turn on and off the water supply in accordance with the soil moisture readings and keep records for each irrigation cycle (run time, inches applied, and total flow recorded). Record keeping involves a weekly analysis, monthly documentation and a year-end report. Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities. Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface, 587-Structure for water Control, 328-Conservation Crop Rotation, and 590-Nutrient Management.

Before Situation: The farmer decides when to irrigate based on general crop or soil appearance or limited soil moisture monitoring. System run times are based on past apparent success. The typical irrigated field is a 20 acre perennial crops with sprinkler or micro irrigation.

After Situation: Producer uses periodic soil moisture measurements to schedule irrigation more effectively resulting in improved irrigation water managment and reduced energy use. Records are used to evaluate results of past irrigation events and influence future irrigations. The irrigator keeps records of soil moisture, crop water use, rainfall amounts and irrigation timing and amounts. At the end of the irrigation season all the data has been reviewed and evaluated. Improvements planned for the next season have been determined.

Scenario Feature Measure: Irrigated Area Managed

Scenario Unit: Acre

Scenario Typical Size: 20

Total Scenario Cost: $909.92

Scenario Cost/Unit: $45.50

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	26	$562.75
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	8	$347.17

Practice: 449 - Irrigation Water Management

Scenario: #9 - Field Crops, Grains, 1st Year

Scenario Description: This practice includes the installation of soil moisture sensors such as tensiometers, gyp blocks, capacitance sensors etc, that are installed and read to determine point in time soil moisture by depth; and the labor of using the equipment over a 19-week growing season for the first year. The installation includes the purchase of soil moisture meters and sensors, installation equipment, and labor to install and utilize sensors and readings in making IWM decisions during first year. Typical Scenario involves installation of resistance sensor blocks in a 50 acre field of irrigated cropland. Producer periodically monitors soil moisture sensors and manually turn on and off the water supply in accordance with the soil moisture readings and keep records for each irrigation cycle (run time, inches applied, and total flow recorded) during the 19-week growing season. Meters used to read sensors may be portable. Subscription to real-time weather records and rainfall record keeping is used. Soil moisture data is reviewed 3 times per week at each sensor site (two sensors per site) with one sensor site per 25 acres. Record keeping involves a weekly analysis, monthly documentation, and a year-end report. Resource Concerns: Insufficient Water - Inefficient use of irrigation water, and Degraded Plant Condition - Undesirable plant productivity and health, and Inefficient Energy Use - Equipment and facilities. Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface, 587-Structure for water Control, 328-Conservation Crop Rotation, and 590-Nutrient Management.

Before Situation: The farmer decides when to irrigate his field crops (ex: corn, soybeans, wheat) based on general crop or soil appearance or limited soil moisture monitoring. System run times are based on past apparent success. The typical irrigated field is a 50 acre corn field with sprinkler irrigation.

After Situation: Producer has installed 2 sensors at each monitoring site at different depths. Producer uses periodic soil moisture measurements to schedule irrigation more effectively resulting in improved irrigation water managment and reduced energy use. Records are used to evaluate results of past irrigation events and influence future irrigations. The irrigator keeps records of soil moisture, crop water use, rainfall amounts and irrigation timing and amounts. At the end of the irrigation season all the data has been reviewed and evaluated. Improvements planned for the next season have been determined.

Scenario Feature Measure: Irrigated Area Managed

Scenario Unit: Acre

Scenario Typical Size: 50

Total Scenario Cost: $882.43

Scenario Cost/Unit: $17.65

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	4.75	$102.81
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	8	$347.17
Materials						
Soil Moisture Meter	1455	Soil Moisture Sensor Reader. Equipment only.	Each	$285.50	1	$285.50
Soil Moisture Sensor	1456	Soil moisture resistance sensor W/10' cables. Equipment only.	Each	$36.74	4	$146.94

Practice: 449 - Irrigation Water Management

Scenario: #10 - Field Crops, Grains, 1st Year, with Data Logger

Scenario Description: This practice includes the installation of soil moisture sensors such as tensiometers, gyp blocks, capacitance sensors etc, that are installed and read to determine point in time soil moisture by depth; and the labor of using the equipment over a 19-week growing season for the first year. The installation includes the purchase of soil moisture sensors, installation equipment (probe or auger), and a data logger to log continuous soil moisture data that can be downloaded to a personal computer and associated graphing software. Scenario also includes the labor associated with using the equipment and readings in making IWM decisions over a 19-week growing season for the first year.Typical Scenario involves installation of resistance sensor blocks in a 50 acre field of irrigated cropland. Producer periodically monitors data lo manually turn on and off the water supply in accordance with the soil moisture readings and keep records for each irrigation cycle (run time, inches applied, and total flow recorded) during the 19-week growing season. Meters used to read sensors may be portable. Subscription to real-time weather records and rainfall record keeping is used. Soil moisture data is reviewed 3 times per week at each sensor site (two sensors per site) with one sensor site per 25 acres. Record keeping involves a weekly analysis, monthly documentation, and a year-end report. Resource Concerns: Insufficient Water - Inefficient use of irrigation water, and Degraded Plant Condition - Undesirable plant productivity and health, and Inefficient Energy Use - Equipment and facilities. Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface, 587-Structure for water Control, 328-Conservation Crop Rotation, and 590-Nutrient Management.

Before Situation: The farmer decides when to irrigate his field crops (ex: corn, soybeans, wheat) based on general crop or soil appearance or limited soil moisture monitoring. System run times are based on past apparent success. The typical irrigated field is a 50 acre corn field with sprinkler irrigation.

After Situation: Producer has installed 2 sensors at each monitoring site at different depths. Producer uses periodic soil moisture measurements to schedule irrigation more effectively resulting in improved irrigation water managment and reduced energy use. Records are used to evaluate results of past irrigation events and influence future irrigations. The irrigator keeps records of soil moisture, crop water use, rainfall amounts and irrigation timing and amounts. At the end of the irrigation season all the data has been reviewed and evaluated. Improvements planned for the next season have been determined.

Scenario Feature Measure: Irrigated Area Managed

Scenario Unit: Acre

Scenario Typical Size: 50

Total Scenario Cost: $1,789.91

Scenario Cost/Unit: $35.80

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	4.75	$102.81
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	8	$347.17
Materials						
Data Logger	1453	Data Logger W/Graphic Output for water management. Materials only.	Each	$596.50	2	$1,192.99
Soil Moisture Sensor	1456	Soil moisture resistance sensor W/10' cables. Equipment only.	Each	$36.74	4	$146.94

Practice: 449 - Irrigation Water Management

Scenario: #11 - Field Crops, Grains, 2nd and 3rd Year

Scenario Description: A system to monitor irrigation water applied to field crops over a 19-week growing season. Soil moisture data is reviewed 3 times per week at each sensor site (two sensors per site) with one sensor site per 25 acres. Subscription to real-time weather records and rainfall record keeping is used. The producer must manually turn on and off the water supply in accordance with the soil moisture readings and keep records for each irrigation cycle (run time, inches applied, and total flow recorded). Record keeping involves a weekly analysis, monthly documentation, and a year-end report. Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities. Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface, 587-Structure for water Control, 328-Conservation Crop Rotation, and 590-Nutrient Management.

Before Situation: The farmer decides when to irrigate his field crops (ex: corn, soybeans, wheat) based on general crop or soil appearance or limited soil moisture monitoring. System run times are based on past apparent success. The typical irrigated field is a 50 acre corn field with sprinkler irrigation.

After Situation: Producer has installed 2 sensors at each monitoring site at different depths. Producer uses periodic soil moisture measurements to schedule irrigation more effectively resulting in improved irrigation water managment and reduced energy use. Records are used to evaluate results of past irrigation events and influence future irrigations. The irrigator keeps records of soil moisture, crop water use, rainfall amounts and irrigation timing and amounts. At the end of the irrigation season all the data has been reviewed and evaluated. Improvements planned for the next season have been determined.

Scenario Feature Measure: Irrigated Are Managed

Scenario Unit: Acre

Scenario Typical Size: 50

Total Scenario Cost: $449.98

Scenario Cost/Unit: $9.00

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	4.75	$102.81
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	8	$347.17

Practice: 449 - Irrigation Water Management

Scenario: #17 - 1st Year, Computer Record Keeping System

Scenario Description: This practice includes the installation of a computer-based system and weather station that is monitored to determine crop water use, status of heat and/or frost conditions to permit the producer to make informed irrigation decisions of high value crops. Data is automatically transmitted from diaelectric soil moisture sensors to a computer program that recommends irrigation cycles based on actual soil moisture conditions and local weather data. Requires manually turning on and off the water supply according to system recommendations. The installation includes the purchase and installation of equipment, and a data logger to log continuous weather data including rainfall, temp, solar radiation, humidity, wind speed and soil moisture sensors that can be downloaded to a personal computer and associated graphing software. Typical Scenario involves installation on a 25 acre field of irrigated cropland. Producer periodically monitors the station during the growing season to determine timing and amounts of water to apply based on soil moisture sensors, field checks and weather station data. Producer keeps records of collected data and resulting irrigation decisions. This scenario only applies to year one of IWM. The appropriate labor-only IWM scenario applies in subsequent contract years. Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Water Quality; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities. Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface

Before Situation: To meet crop water requirements, the producer schedules irrigations based on the calendar and what has apparently worked in the past. For cooling/frost protection, irrigation start and run times are based on broad regional weather forecasts.

After Situation: Producer has installed a weather station and periodically downloads continuously recorded data that is used to schedule irrigation more effectively resulting in improved irrigation water management and reduced energy use. Field checks are made by irrigator to ground truth station data with crop.

Scenario Feature Measure: Acreage of cropfield

Scenario Unit: Acre

Scenario Typical Size: 25

Total Scenario Cost: $7,030.10

Scenario Cost/Unit: $281.20

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Data Logger with Telemetry System	1454	Data Logger W/Graphic Output for water management and telemetry - data communication device with power supply in a weather proof enclosure. Equipment only.	Each	$1,679.44	1	$1,679.44
Soil Moisture Meter	1455	Soil Moisture Sensor Reader. Equipment only.	Each	$285.50	1	$285.50
Soil Moisture Sensor	1456	Soil moisture resistance sensor W/10' cables. Equipment only.	Each	$36.74	2	$73.47
Solar Panels, fixed cost portion	1031	Fixed cost portion of the Solar Panels. This portion is a base cost for all Solar Panels and is not dependant on KiloWatt. The total cost of any Solar Panels will include this fixed cost plus a variable cost portion. The completed Solar Panels will include all materials (electrical, controllers, service drops and etc). This cost will include material, labor and equipment.	Each	$460.51	1	$460.51
Switches and Controls, temp sensors	1192	Temperature and soil moisture sensors installed as part of an electronic monitoring (with or without wireless telecommunications) commonly used to control pumps and irrigation systems	Each	$627.96	1	$627.96
Weather Station, Advanced	2550	Advance Weather Station which collects and records recording rainfall, humidity, barometric pressure, wind speed, temperature, and solar radiation from a solar powered self-standing tripod to an advance weather recording console. Used for both 449 advance irrigation water management and for Activity 202 water quality monitoring .	Each	$1,024.76	1	$1,024.76
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$83.16	1	$83.16
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	40	$865.76

Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	20	$1,929.53

Practice: 449 - Irrigation Water Management

Scenario: #18 - Use Computer Record Keeping System

Scenario Description: Irrigation water is applied to high value crops based on data automatically transmitted from diaelectric soil moisture sensors to a computer program that recommends irrigation cycles based on actual soil moisture conditions and local weather data. This scenario assumes all system components are in place (sensors, transmitter, etc.) Requires manually turning on and off the water supply according to system recommendations. Includes monthly recording of flowmeter readings and the time to manage and monitor the system for the entire growing system. Records are kept to compare system recommendations to actual application rates from flow meter data. Typical Scenario involves installation on a 25 acre field of irrigated cropland. Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Water Quality; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities. Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkler, 443-Irrigation System Surface and Subsurface

Before Situation: To meet crop water requirements, the producer schedules irrigations based on the calendar and what has apparently worked in the past. For cooling/frost protection, irrigation start and run times are based on broad regional weather forecasts.

After Situation: Producer has an installed weather station and periodically downloads continuously recorded data that is used to schedule irrigation more effectively resulting in improved irrigation water management and reduced energy use. Field checks are made by irrigator to ground truth station data with crop.

Scenario Feature Measure: Acre of cropfield

Scenario Unit: Acre

Scenario Typical Size: 25

Total Scenario Cost: $1,155.19

Scenario Cost/Unit: $46.21

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	40	$865.76
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	3	$289.43

Practice: 670 - Lighting System Improvement

Scenario: #1 - Lighting - CFL

Scenario Description: To install dimmable CFLs to replace incandescent lamps on a one-for-one basis. Light fixtures do not have to be replaced. A typical poultry house has 48 fixtures. CFL requirements: minimum 8 Watt, 4100 Kelvin, dimmable, grow-out bulb; industrial grade; suitably protected from dirt accumulation. In high humidity environments or areas subject to wash down, gasketted or weatherproof housings are required to prevent corrosion and premature failure.

Before Situation: An inefficient lighting system such as one using incandescent lamps has been identified by an on-farm energy audit.

After Situation: More efficient lighting is provided by Compact Fluorescent Lamps (CFLs) in order to reduce energy use as evidenced by the energy audit. Associated practices/activities: 122-AgEMP - HQ and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each lamp replaced

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $18.35

Scenario Cost/Unit: $18.35

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	0.167	$3.61
Materials						
Lighting, bulb, CFL, 8 watt	1166	8 watt compact fluorescent lamp (CFL), typically 4100 Kelvin, dimmable, grow-out bulb, industrial grade, suitably protected from dirt accumulation. Materials only.	Each	$14.73	1	$14.73

Practice: 670 - Lighting System Improvement

Scenario: #2 - Lighting - LED

Scenario Description: To install dimmable LEDs to replace incandescent lamps on a one-for-one basis. Light fixtures do not have to be replaced. A typical poultry house has 48 fixtures. LED requirements: minimum 6 Watt, 3700 Kelvin, dimmable, grow-out bulb; industrial grade; suitably protected from dirt accumulation. In high humidity environments or areas subject to wash down, gasketted or weatherproof housings are required to prevent corrosion and premature failure. If lighting controls are needed, add Controller-Automatic as a seperate line item.

Before Situation: An inefficient lighting system such as one using incandescent lamps has been identified by an on-farm energy audit.

After Situation: More efficient lighting is provided by Light-Emitting Diode (LED) lamps in order to reduce energy use as evidenced by the energy audit.Associated practices/activities: 122-AgEMP - HQ and 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each lamp replaced

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $23.43

Scenario Cost/Unit: $23.43

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	0.167	$3.61
Materials						
Lighting, bulb, LED, 6 watt	1167	6 watt light emitting diode (LED), typically 3700 Kelvin, dimmable, grow-out bulb; industrial grade; suitably protected from dirt accumulation. Materials only.	Each	$19.82	1	$19.82

Practice: 670 - Lighting System Improvement

Scenario: #3 - Lighting-High Bay LED

Scenario Description: The lighting system consists of a 150 watt light emitting diode (LED), typically 5,000 Kelvin bulb, 14,000 lumens, with industrial grade fixture typically used to replace a Metal Halide (PSMH) lamp or four to eight lamp fluorescent fixtures in high bay locations. This or equal or better shall be detailed in ASABE S612-compliant energy audit). Associated materials for installation of replacement fixtures are included. Appropriate disposal of existing lamps, ballasts and other materials is required. If lighting controls are needed, add Controller-Automatic as a seperate line item.

Before Situation: An inefficient lighting system such as one using incandescent lamps has been identified by an on-farm energy audit.

After Situation: More efficient lighting is provided by Light-Emitting Diode (LED) lamps in order to reduce energy use as evidenced by the energy audit.Associated practices/activities: 122-AgEMP - HQ and 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each fixture

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $691.80

Scenario Cost/Unit: $691.80

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	2	$74.48
Materials						
Lighting, Fixture, High Bay, LED, 150-200 watt	2602	150-200 watt light emitting diode (LED), typically 5000 Kelvin bulb, 11,000-24,000 lumens; industrial grade with fixture; typically replaces up to 400 watt equivalent metal halide; suitably protected from dirt accumulation. Includes materials only.	Each	$617.32	1	$617.32

Practice: 670 - Lighting System Improvement

Scenario: #4 - Lighting - Linear Fluorescent

Scenario Description: The lighting system consists of a four-foot, three-lamp fixture with a single electronic ballast. The high-efficiency lighting system uses high-efficiency T8 or T5 fluorescent lamps or equal or better such as LED T8 lamps. Associated materials for installation of replacement or retro fit of fixtures are included. Appropriate disposal of existing lamps, ballasts and other materials is required. If lighting controls are needed, add Controller-Automatic as a seperate line item.

Before Situation: Inefficient lighting (such as incandescent or T12 fluorescent tubes driven by magnetic ballasts) as evidenced by an on-farm energy audit.

After Situation: High-efficiency lighting system which reduces energy use. The new lighting equipment will provide suitable light levels and reduce overall power requirements (kW) compared to the existing lighting system as evidenced by the energy audit. Associated practices/activities: may include 122-AgEMP - HQ and 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each fixture replaced or retro fixed

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $349.94

Scenario Cost/Unit: $349.94

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	1	$37.24
Materials						
Lighting, fixture, Fluorescent, 75 watt	1168	75 watt fluorescent lamp fixture with T5 or T8 lamps and ballast. Materials only.	Each	$312.70	1	$312.70

Practice: 670 - Lighting System Improvement

Scenario: #5 - Lighting - Pulse-Start Metal Halide

Scenario Description: The lighting system consists of a Pulse-Start Metal Halide (PSMH) lamp with a matched ballast or light-emitting diode (LED) equivalent fixtures (as detailed in ASABE S612-compliant energy audit). Associated materials for installation of replacement fixtures are included. Appropriate disposal of existing lamps, ballasts and other materials is required. If lighting controls are needed, add Controller-Automatic as a seperate line item.

Before Situation: Inefficient high-bay or exterior lighting (such as mercury vapor, T12 fluorescent, or similar) as evidenced by an on-farm energy audit.

After Situation: High-efficiency lighting system which reduces energy use. The new lighting equipment will provide suitable light levels and reduce overall power requirements (kW) compared to the existing lighting system as evidenced by the energy audit. Associated practices/activities: may include 122-AgEMP - HQ and activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each fixture replaced

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $655.51

Scenario Cost/Unit: $655.51

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	1	$37.24
Materials						
Lighting, Fixture, High Bay, LED, 150-200 watt	2602	150-200 watt light emitting diode (LED), typically 5000 Kelvin bulb, 11,000-24,000 lumens; industrial grade with fixture; typically replaces up to 400 watt equivalent metal halide; suitably protected from dirt accumulation. Includes materials only.	Each	$617.32	1	$617.32
Lighting, Pulse Start Metal Halide	2425	Replacement of lighting with PSMH Light.	Watt	$0.95	1	$0.95

Practice: 670 - Lighting System Improvement

Scenario: #6 - Automatic Controller System

Scenario Description: The typical scenario consists of an automatic control system installed on an existing manually controlled agricultural system. Typical components may include any of the following: wiring, sensors, data logger, logic controller, communication link, software, switches, and relay.

Before Situation: A manually controlled system is existing in an agricultural facility that causes the inefficient use of energy, as evidenced by an on-farm energy audit.

After Situation: An on-farm energy audit has determined that energy use can be reduced through use of an automatic controller that helps regulates the energy consumption of the existing system. Associated practices/activities may include: 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: Each system

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $309.31

Scenario Cost/Unit: $309.31

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	4	$148.95
Materials						
Switches and Controls, programmable controller	1193	Programmable logic controller (with or without wireless telecommunications) commonly used to control pumps and irrigation systems	Each	$160.35	1	$160.35

Practice: 468 - Lined Waterway or Outlet

Scenario: #1 - Turf Reinforced Matting

Scenario Description: Existing channel has excessive erosion and design velocities exceed the use of vegetation. Rock riprap is not readily available or too costly. TRM(Turf Reinforced Matting) works with vegetation to provide a long term solution for high velocity situations. TRM is typically installed over 100% of the width of the waterway to prevent scour and aid in waterway establishment. Cost include excavation, spoiling of excess material, and furnishing, installing TRM and vegetation establishment. Lined waterway width is measured from top of bank to top of bank. If non-TRM areas exist use Mulching (484). Associated practices are Subsurface Drain (606), Underground Outlet (620), Structure for Water Control (587), Grassed Waterway (412), Lined Outlet (468),and Critical Area Seeding (342).

Before Situation: Excessive sedimentation and soil erosion as a result of ephemeral or classic gully erosion. Effective soil stress and velocities are generally too high to establish a grassed waterway.

After Situation: A 300 ' long by 15' wide by 1.5' deep trapezoidal or parabolic shaped waterway lined was installed with Turf Reinforced Matting (TRM). 1/2 the channel is excavated. Excess excavation is spoiled in the immediate area. The practice is installed using a dozer, loader, or excavator. Site prepared for vegetation establishment including seed. lime, fert., etc. TRM is installed by laborers. If non-TRM areas exist, use Mulching (484). The material provides immediate and long-term protection against scouring of the channel.

Scenario Feature Measure: Square Foot of Waterway

Scenario Unit: Square Foot

Scenario Typical Size: 4500

Total Scenario Cost: $3,921.48

Scenario Cost/Unit: $0.87

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Cultipacking	1100	Includes equipment, power unit and labor costs.	Acre	$9.89	0.1	$0.99
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$2.58	125	$322.34
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$8.09	0.1	$0.81
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$25.14	0.1	$2.51
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$1.05	83	$86.77
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$13.12	0.1	$1.31
Materials						
Four Species Mix, Cool Season, Introduced Perennial (2 grasses, 2 legumes)	2317	Cool season grass and legume mix. Includes material and shipping only.	Acre	$49.65	0.1	$4.96
Lime, ENM	75	Fertilizer: Limestone Spread on field.	Ton	$113.27	0.2	$22.65
Nitrogen (N), Urea	71	Price per pound of N supplied by Urea. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.60	3	$1.80
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.78	6	$4.70
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.44	6	$2.61
Turf reinforcement mat	1212	Synthetic turf reinforcement mat with staple anchoring. Includes materials, equipment and labor.	Square Yard	$5.85	500	$2,922.89
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes	Hour	$43.40	1	$43.40

		crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.				

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	1	$301.16
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	$202.55	1	$202.55

Practice: 468 - Lined Waterway or Outlet

Scenario: #2 - Rock Lined - 12"

Scenario Description: Rock Riprap is installed over 100% of the width of the waterway to prevent scour. Velocity of around 8'/sec dictates 9" rock. Cost includes excavation, spoiling of excess material, geotextile underlayment and installing Rock Riprap. Lined waterway width is measured from inside top to inside top of lined channel, typically top of bank. Associated practices are Subsurface Drain (606), Underground Outlet (620), Structure for Water Control (587), Grassed Waterway (412), Lined Outlet (468),and Critical Area Seeding (342).

Before Situation: Excessive sedimentation and soil erosion as a result of ephemeral or classic gully erosion. Effective soil stress and velocities are generally too high or saturated soil conditions make it difficult to establish a grassed waterway.

After Situation: Installed a 300 ' long by 15' wide by 1.5' deep trapezoidal or parabolic shaped waterway lined with riprap (D100 = 12", Velocity ~ 8 ft/sec). 3/4 the channel depth is excavated. Excess excavation is spoiled in the immediate area. Geotextile underlayment is installed by laborers. Completed rock protects channel against future scour and keeps sediment out of the water course and water bodies.

Scenario Feature Measure: Square Foot of Waterway

Scenario Unit: Square Foot

Scenario Typical Size: 4500

Total Scenario Cost: $22,144.98

Scenario Cost/Unit: $4.92

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$2.58	250	$644.68
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$193.59	21	$4,065.45
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	$103.78	21	$2,179.45
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	42	$1,358.37
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	$21.64	21	$454.53
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	3	$130.19
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic Yard	$21.70	100	$2,169.63
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$33.78	312	$10,540.37
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32

Practice: 468 - Lined Waterway or Outlet

Scenario: #3 - Rock Lined - 24"

Scenario Description: Riprap is installed over 100% of the width of the waterway to prevent scour. Velocity of around 11'/sec dictates 18" rock. Cost include excavation, spoiling of excess material, geotextile underlayment and installing 18" Rock Riprap. Lined waterway width is measured from inside top to inside top of lined channel, typically top of bank. Associated practices are Subsurface Drain (606), Underground Outlet (620), Structure for Water Control (587), Grassed Waterway (412), Lined Outlet (468),and Critical Area Seeding (342).

Before Situation: Excessive sedimentation and soil erosion as a result of ephemeral or classic gully erosion. Effective soil stress and velocities are generally too high or saturated soil conditions make it difficult to establish a grassed waterway.

After Situation: Installed a 300 ' long by 15' wide by 1.5' deep trapezoidal or parabolic shaped waterway lined with riprap (D100 = 18", Velocity ~ 11 ft/sec). 3/4 the channel is excavated, before excavation for riprap. Excess excavation is spoiled in the immediate area. Waterway is excavated and rock is placed using a hydraulic excavator. Geotextile underlayment is installed by laborers.

Scenario Feature Measure: Square Foot of Waterway

Scenario Unit: Square Foot

Scenario Typical Size: 4500

Total Scenario Cost: $37,317.85

Scenario Cost/Unit: $8.29

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$2.58	417	$1,075.33
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	$193.59	38	$7,356.53
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	$103.78	38	$3,943.76
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	76	$2,458.00
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	$21.64	38	$822.48
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	5	$216.98
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic Yard	$21.70	84	$1,822.49
Rock Riprap, graded, angular, material and shipping	1200	Graded Rock Riprap for all gradation ranges. Includes materials and delivery only.	Ton	$33.78	563	$19,019.96
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32

Practice: 468 - Lined Waterway or Outlet

Scenario: #4 - Rock, Grouted

Scenario Description: Rock Riprap is installed over 100% of the width of the waterway to prevent scour. Velocity of around 8'/sec dictates 9" rock. Rock of this size not readily available, therefore must also grout rock with cement. Cost includes excavation, spoiling of excess material, geotextile underlayment installing Rock Riprap and grouting with cement. Lined waterway width is measured from inside top to inside top of lined channel, typically top of bank. Associated practices are Subsurface Drain (606), Underground Outlet (620), Structure for Water Control (587), Grassed Waterway (412), Lined Outlet (468),and Critical Area Seeding (342).

Before Situation: Excessive sedimentation and soil erosion as a result of ephemeral or classic gully erosion. Effective soil stress and velocities are generally too high or saturated soil conditions make it difficult to establish a grassed waterway.

After Situation: Installed a 100 ' long by 15' wide by 1.5' deep trapezoidal or parabolic shaped waterway lined with riprap (D100 = 12", Velocity ~ 8 ft/sec). 3/4 the channel depth is excavated. Excess excavation is spoiled in the immediate area. Geotextile underlayment is installed by laborers. Completed rock also grouted to protect channel against future scour and keeps sediment out of the water course and water bodies.

Scenario Feature Measure: Square Foot of Waterway

Scenario Unit: Square Foot

Scenario Typical Size: 1500

Total Scenario Cost: $13,583.58

Scenario Cost/Unit: $9.06

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$2.58	84	$216.61
Rock Riprap, grouted	1757	Grouted Rock Riprap, placed, includes materials, equipment and labor to transport and place.	Cubic Yard	$162.44	70	$11,370.53
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	$103.78	1	$103.78
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	1	$32.34
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	$21.64	8	$173.15
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	8	$347.17
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic Yard	$21.70	34	$737.67
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32

Practice: 468 - Lined Waterway or Outlet

Scenario: #5 - Grassed waterway with stone center

Scenario Description: Typical practice is 1244 ' long by 35' wide by 1.2' deep parabolic channel. 50% of width lined with rock riprap. A waterway that is a shaped or graded channel and is established with suitable vegetation on sides included in cost and center with rock riprap to carry surface water at a non-erosive velocity to a stable outlet. Installation of 50% of width allows higher velocity but size is based on vegetative values. This practice addresses Concentrated Flow Erosion (Classic Gully &Ephemeral Erosion) and Excessive Sediment in surface waters. Waterway area measured from top of bank toSubu top of bank. Costs include excavation and associated work to construct the overall shape and grade of the waterway and install rock. Cost for waterway included SF of installed rock. Associated Practices: Diversion (362), Critical Area Seeding (342), Mulching (484), Underground Outlet (620), Structure for Water Control (587), Subsurface Drainage (606), Water and Sediment Control Basin (638).

Before Situation: The field has a small gulley which is cutting deeper into the field as time goes on, so it needs to be stopped or controlled. Excessive sedimentation and soil erosion as a result from ephemeral or classic gully erosion. Gully has formed in field as a result of excessive runoff and poor cropping techniques. Stone center waterway is also commonly installed to covey runoff from concentrated flows, terrarces, diversions, or water control structures or similar practices to a suitable, stable outlet when velocities are slightly higher than allowed for grassed waterway.

After Situation: Installed waterway is 1244' long by 35' wide by 1.2' deep parabolic earthen channel. 50% of width has rock rip-rap installed. Non rock area to be seeded, lime, fertilizer, etc to establish vegetation. If erosion control blankets or mulching for seedbed establishment/protection are needed, use conservation practice Mulching (484) for remaining 50%. Rock center generally eliminates need for Drainage tile,but if needed, will be installed accoring to Subsurface Drain (606). Outlets, if needed will be installed using Structure for Water Control (587). If inlet Structures are needed with the drainage tile, then those will be installed using Underground Outlet (620).

Scenario Feature Measure: SF of installed Rock Riprap

Scenario Unit: Square Foot

Scenario Typical Size: 21780

Total Scenario Cost: $83,079.10

Scenario Cost/Unit: $3.81

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Four Species Mix, Cool Season, Introduced Perennial (2 grasses, 2 legumes)	2317	Cool season grass and legume mix. Includes material and shipping only.	Acre	$49.65	0.5	$24.82
Lime, ENM	75	Fertilizer: Limestone Spread on field.	Ton	$113.27	1	$113.27
Nitrogen (N), Urea	71	Price per pound of N supplied by Urea. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.60	15	$9.02
Phosphorus, P2O5	73	Price per pound of P2O5 supplied by Superphosphate. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.78	30	$23.52
Potassium, K2O	74	K2O supplied by Muriate Of Potash. Price is not per pound of total product applied, no conversion is needed.	Pound	$0.44	30	$13.07
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic Yard	$83.15	940	$78,164.26
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	8	$173.15
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	2	$86.79
Equipment Installation						
Cultipacking	1100	Includes equipment, power unit and labor costs.	Acre	$9.89	0.5	$4.94
Excavation, common earth, large equipment, 50 ft	1222	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$1.88	776	$1,456.58
Fertilizer, ground application, dry bulk	950	Dry bulk fertilizer application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$8.09	0.5	$4.04

Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$133.90	10	$1,339.00
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$25.14	0.5	$12.57
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$1.05	806	$842.62
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$13.12	0.5	$6.56

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32
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	$202.55	1	$202.55

Practice: 516 - Livestock Pipeline

Scenario: #1 - 2 inches or less buried by LF

Scenario Description: Buried pipeline is installed using PE or equivalent pipe. Pipe size is 2 inches or less and site soils allow for normal excavation. (I.e., soils are not clayey and depth of soil is adequate for burying pipeline to a frost-free depth.) Construct 1000 feet of 1.5 -inch, Schedule 40, PVC Pipeline with appurtenances. The scenario unit is linear feet of pipe. Appurtenances include: couplings, fittings, thrust blocks, gate valves (2), air release valves (2), drain valve (1), and pressure relief valve (1), and are included in the cost of pipe material (additional 10% of pipe material quantity). Revegetation is not included. Resource Concerns: Inadequate Livestock Water, Inefficient Energy Use. Associated Practices: Critical Area Planting (342), Fence (382), Prescribed Grazing (528), Pumping Plant (533), Spring Development (574), Watering Facility (614), and Water Harvesting Catchment (636).

Before Situation: Water supplies need to be conveyed through pipelines for use by livestock or wildlife.

After Situation: Pipeline(s) convey and/or distribute water to storage and/or watering facilities, for use by livestock or wildlife.

Scenario Feature Measure: Linear foot of pipe

Scenario Unit: Foot

Scenario Typical Size: 1000

Total Scenario Cost: $3,232.49

Scenario Cost/Unit: $3.23

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	9	$194.80
Materials						
Pipe, PVC, 1 ½", SCH 40	975	Materials: - 1 1/2" - PVC - SCH 40 - ASTM D1785	Foot	$1.12	1000	$1,116.70
Equipment Installation						
Trenching, Pipeline Plowing	1096	Includes equipment and labor for plowing small diameter lines in common earth (< 3")	Foot	$1.32	1000	$1,318.68
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32

Practice: 516 - Livestock Pipeline

Scenario: #2 - Over 2 inches, buried by LF

Scenario Description: Buried pipeline is installed using PE or equivalent pipe. Pipe size is over 2 inches in diameter and site soils allow for normal excavation. (I.e., soils are not clayey and depth of soil is adequate for burying pipeline to a frost-free depth.) Construct 1000 feet of 4 -inch, Schedule 40, PVC Pipeline with appurtenances. The scenario unit is linear feet of pipe. Appurtenances include: couplings, fittings, thrust blocks, gate valves (2), air release valves (2), drain valve (1), and pressure relief valve (1), and are included in the cost of pipe material (additional 10% of pipe material quantity). Revegetation is not included. Resource Concerns: Inadequate Livestock Water, Inefficient Energy Use. Associated Practices: Critical Area Planting (342), Fence (382), Prescribed Grazing (528), Pumping Plant (533), Spring Development (574), Watering Facility (614), and Water Harvesting Catchment (636).

Before Situation: Water supplies need to be conveyed through pipelines for use by livestock or wildlife.

After Situation: Pipeline(s) convey and/or distribute water to storage and/or watering facilities, for use by livestock or wildlife.

Scenario Feature Measure: Linear feet of pipe

Scenario Unit: Foot

Scenario Typical Size: 1000

Total Scenario Cost: $6,492.68

Scenario Cost/Unit: $6.49

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.51	1000	$1,510.88
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	9	$194.80
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32
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	$1.92	2178	$4,184.69

Practice: 516 - Livestock Pipeline

Scenario: #3 - 2 inches or less on surface by LF

Scenario Description: Surface pipeline is installed using PE or equivalent pipe. Pipe size is 2 inches or less. Construct 1000 feet of 1.5 -inch, PE Pipeline with appurtenances. The scenario unit is linear feet of pipe. Appurtenances include: couplings, fittings, thrust blocks, gate valves (2), air release valves (2), drain valve (1), and pressure relief valve (1), and are included in the cost of pipe material (additional 10% of pipe material quantity). Revegetation is not included. Resource Concerns: Inadequate Livestock Water, Inefficient Energy Use. Associated Practices: Critical Area Planting (342), Fence (382), Prescribed Grazing (528), Pumping Plant (533), Spring Development (574), Watering Facility (614), and Water Harvesting Catchment (636).

Before Situation: Water supplies need to be conveyed through pipelines for use by livestock or wildlife.

After Situation: Pipeline(s) convey and/or distribute water to storage and/or watering facilities, for use by livestock or wildlife.

Scenario Feature Measure: Linear foot of pipe

Scenario Unit: Foot

Scenario Typical Size: 1000

Total Scenario Cost: $1,023.15

Scenario Cost/Unit: $1.02

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	8	$173.15
Materials						
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$0.85	1000	$850.00

Practice: 516 - Livestock Pipeline

Scenario: #4 - Boring, Pipeline, All sizes

Scenario Description: Pipeline is bored under road or stream using seamless pipe that meets or exceeds main pipeline size and pressure rating. Site location does not allow for open trench. (I.e., No permit can be obtained for open trench on road crossing and/or digging open trench across stream) Bore 100 feet of 4 -inch, Pipeline. Appurtenances include: couplings and fittings to connect to planned pipeline and are included in the cost of pipe material (additional 10% of pipe material quantity). The scenario unit is linear feet of bored pipe from coupler to coupler. Revegetation is not included. Resource Concerns: Inadequate Livestock Water, Inefficient Energy Use. Associated Practices: Critical Area Planting (342), Fence (382), Prescribed Grazing (528), Pumping Plant (533), Spring Development (574), Watering Facility (614), and Water Harvesting Catchment (636).

Before Situation: Water supplies need to be conveyed through pipelines for use by livestock or wildlife.

After Situation: Pipeline(s) convey and/or distribute water to storage and/or watering facilities, for use by livestock or wildlife.

Scenario Feature Measure: Linear feet of pipe

Scenario Unit: Foot

Scenario Typical Size: 100

Total Scenario Cost: $12,295.84

Scenario Cost/Unit: $122.96

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	8	$258.74
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	$21.64	8	$173.15
Equipment Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$65.99	8	$527.88
Horizontal Boring, Greater Than 3" diameter	1132	Includes equipment, labor and setup.	Foot	$101.03	100	$10,102.75
Materials						
Pipe, PE, 4", DR 9	1002	Materials: - 4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$6.31	100	$631.00
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32

Practice: 484 - Mulching

Scenario: #1 - Natural Material - Full Coverage

Scenario Description: Application of straw mulch or other other state approved natural material to reduce erosion and facilitate the establishment of vegetative cover. Mulch provides full coverage and is typically used with critical area planting. Assumes 125 bales/acre (3 bales/1000 sq ft)

Before Situation: Typical scenario ranges from a 0.1 to 1.0 acre disturbed site around a newly constructed structural practice. The potential for soil erosion is high and mulch is needed to stabilize the soil and facilitate the establishment of vegetative cover.

After Situation: Straw mulch has been applied to areas needing mulch. Erosion and sedimentation is reduced, water and soil quality is protected, and vegetative cover is established.

Scenario Feature Measure: Area Covered by Mulch

Scenario Unit: Acre

Scenario Typical Size: 1

Total Scenario Cost: $549.31

Scenario Cost/Unit: $549.31

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	10	$216.44
Equipment Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	1	$25.65
Materials						
Straw	1237	Small grain straw (non organic and certified organic). Includes materials only.	Ton	$122.89	2.5	$307.23

Practice: 484 - Mulching

Scenario: #2 - Erosion Control Blanket

Scenario Description: Installation of erosion control blanket on critical areas with steep slopes, grassed waterways or diversions.. Blanket is typically made of coconut coir, wood fiber, straw and is typically covered on both sides with polypropylene netting. Used to help control erosion and establish vegetative cover.

Before Situation: There are areas of concentrated flow and a grassed waterway is being installed. Soil erosion is a concern and there is little to no vegetation.

After Situation: The erosion control blanket is placed on concentrated flow areas and secured with ground stables. Soil erosion is minimized and vegetative cover is established.

Scenario Feature Measure: Area Covered by Mulch

Scenario Unit: Square Foot

Scenario Typical Size: 5000

Total Scenario Cost: $862.95

Scenario Cost/Unit: $0.17

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	8	$173.15
Materials						
Erosion Control Blanket, biodegradable	1213	Biodegradable erosion control blanket, typically a composite of natural fibers with reinforcing polymer netting. Materials and shipping only.	Square Yard	$1.24	556	$689.80

Practice: 484 - Mulching

Scenario: #3 - Synthetic Material

Scenario Description: Installation of geotextile, biodegradable plastic, polyethylene plastic, or other state approved synthetic mulch to conserve soil moisture, moderate soil temperature, and provide erosion control. Payment based on actual area covered by mulching material.

Before Situation: Site conditions very. Typically scenarios include new tree and shrub plantings, irrigated orchards or vineyards, or annual and perennial specialty crops. Water quantity and soil moisture is a concern.

After Situation: Synthetic mulch is applied in rows with a mulch layer or by other mechanized means. Soil moisture is conserved, and energy use associated with irrigation is decreased.

Scenario Feature Measure: Area Covered by Mulch

Scenario Unit: Acre

Scenario Typical Size: 1

Total Scenario Cost: $12,891.68

Scenario Cost/Unit: $12,891.68

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.66	4840	$12,891.68

Practice: 484 - Mulching

Scenario: #4 - Tree and Shrub

Scenario Description: Fabric or other suitable natural or synthetic mulch is installed with a new tree and shrub planting to facilitate growth. Rate is per tree/shrub and assumes 1 square yard of barrier fabric and 5 staples/tree.

Before Situation: Site conditions vary. Typical scenario is an installation of 100 native trees and shrubs to enhance wildlife habitat. Sites are often remote and trees may not be planted in rows, requiring each tree to be mulched individually

After Situation: Barrier fabric squares are installed with 5 sod staples each, around individual trees and shrubs to facilitate growth. Desirable vegetation is established.

Scenario Feature Measure: Number of Trees Mulched

Scenario Unit: Each

Scenario Typical Size: 100

Total Scenario Cost: $266.36

Scenario Cost/Unit: $2.66

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total

Equipment Installation

Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.66	100	$266.36

Practice: 484 - Mulching

Scenario: #5 - Leaf Mulching

Scenario Description: Municipally collected leaves are loaded into a manure spreader with a front-end loader and spread on a 15 acre field that is annually planted to a low residue crop (such as vegetables, silage, and soybeans). The leaves are typically delivered and stockpiled no more than seven days then spread with a manure spreader at a rate of 8-10 tons/acre. The typical depth is 3 to 6 inches. The leaves provide a protective mulch layer over winter until it is time to prepare the field for the subsequent crop.

Before Situation: An annually planted 15 acre field is planted with low residue crops such as vegetables, silage and soybeans. The field is tilled in the fall immediately following harvest resulting in bare soil subject to soil erosion and organic matter depletion over time.

After Situation: Municipally collected leaves are spread on a 15 acre field with a typical depth of 3 to 6 inches. The leaves provide a protective mulch layer over winter until it is time to prepare the field for the subsequent crop. The leaf mulch layer provides soil cover which reduces soil erosion.

Scenario Feature Measure: Acre of land with applied leaf mulch

Scenario Unit: Acre

Scenario Typical Size: 15

Total Scenario Cost: $1,434.64

Scenario Cost/Unit: $95.64

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Manure, compost, application	955	Loading, hauling and spreading manure/compost by ground equipment. Includes equipment, power unit and labor costs.	Hour	$127.52	11.25	$1,434.64

Practice: 484 - Mulching

Scenario: #6 - Wood Chips

Scenario Description: Application of wood chips around trees, shrubs, or potted grass plantings to reduce erosion, and facilitate the establishment of vegetative cover. Mulch provides full coverage and is typically used with critical area planting. Assumes one (1) cubic yard of wood chips per 100 square feet of area. Associated practices: Hedgerow Planting (422), Windbreak (380), Waste Storage Facility (313),etc.

Before Situation: Typical scenario ranges from a 0.1 to 1.0 acre of recently disturbed soil where vegetation has been planted or a structure has been built. The potential for soil erosion is high and mulch is needed to stabilize the soil and facilitate the establishment of vegetative cover.

After Situation: Wood chips has been applied to areas needing mulch. Erosion and sedimentation is reduced, water and soil quality is protected, and vegetative cover is established.

Scenario Feature Measure: Area Mulched

Scenario Unit: Square Foot

Scenario Typical Size: 1000

Total Scenario Cost: $296.20

Scenario Cost/Unit: $0.30

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	1	$21.64
Equipment Installation						
Aggregate, Wood Chips	1098	Includes materials, equipment and labor	Cubic Yard	$24.89	10	$248.91
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	1	$25.65

Practice: 590 - Nutrient Management

Scenario: #1 - 590 Basic

Scenario Description: A basic nutrient management system is implemented on a typical 25 acre cropland or hayland field where there is no manure application. Implementation results in the proper rate, source, method of placement, and timing of nutrients. Typical installation involves soil testing, analysis, consultant services that provide nutrient recommendations and an associated nutrient budget, and record keeping. Nitrogen-urease inhibitors are used for surface applied urea products. The technical recommendations are based on land grant university guidelines or crop removal rates. Producer records demonstrating implementation of the 4 R's of the nutrient management criteria are required. Associated practices: Conservation Crop Rotation (328), Residue and Tillage Management - No-Till/ Strip Till/ Direct Seed (329), Cover Crop (340), Filter Strip (393), Irrigation Water Management (449), Drainage Water Management (554), and Integrated Pest Management (595).

Before Situation: Cropland or hayland with no manure application either is not practicing any nutrient management or the practices do not meet the standard. Soil tests are not completed on a regular basis and fertilizer applications are not based on nutrient recommendations. Improper management has caused water quality degradation through excess nutrients transported through runoff and soil erosion to surface waters and/or to groundwater through leaching. Urea products are typically surface applied without inhibitors increasing losses. Soil quality may also be degraded by excess or inadequate nutrients.

After Situation: A nutrient management system that meets the NRCS 590 standard is developed on a 25 acre field of cropland or hayland. The development and implementation of a nutrient management plan benefits plant productivity and reduces off-site degradation by maximizing nutrient use efficiency by the crop and minimizing the potential of nutrient losses in leaching and runoff caused by over-application. A nutrient budget is developed for each field based on soil test analysis and land grant university or crop removal rates. Pre-plant soil tests are used to determine the annual nutrient budget and post-harvest soil and/or tissue tests are used to re-evaluate the adequacy of the plant's nutrient recommendations in meeting crop needs while minimizing phosphorus application and residual nitrogen. Post-harvest testing ensures proper utilization of nutrients thus reducing the potential for off-site impacts. Urease inhibitors are used for surface applications of urea products to reduce losses. The producer maintains records that are provided annually of the current soil tests, analysis, amount of application, and forms and rates of nutrients for each field, including post-harvest analysis. Management results in nutrient applications that minimize nutrient runoff and leaching, and/or the buildup of excess nutrient concentrations.

Scenario Feature Measure: Per acre of applied management

Scenario Unit: Acre

Scenario Typical Size: 25

Total Scenario Cost: $450.52

Scenario Cost/Unit: $18.02

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	2	$43.29
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	1	$96.48
Materials						
Nitrogen-Urease inhibitor	260	Nitrogen-Urease inhibitor	Acre	$10.59	25	$264.85
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$10.13	2	$20.25
Equipment Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	1	$25.65

Practice: 590 - Nutrient Management

Scenario: #2 - 590 Basic Organic

Scenario Description: A basic nutrient management system for organic production is implemented on a typical 15 acre field of organic cropland or hayland. Implementation results in the proper rate, source, method of placement, and timing of organic nutrients. Typical installation involves soil and manure testing, analysis, consultant services that provide nutrient recommendations and an associated nutrient budget, and record keeping. The technical recommendations are based on land grant university recommendations or crop removal rates. Producer records demonstrating implementation of the 4 R's of the nutrient management criteria are required. Effective nutrient management enables organic producers to effectively utilize organic fertilizers, manure, and/or compost appropriately, which improves soil quality and minimizes runoff of nutrients from fields to surface water. Associated practices: Conservation Crop Rotation (328), Residue and Tillage Management - No-Till/ Strip Till/ Direct Seed (329), Cover Crop (340), Filter Strip (393), Irrigation Water Management (449), Drainage Water Management (554), and Integrated Pest Management (595).

Before Situation: Nutrient management practices are either not observed or do not meet the standard on the organic cropland or hayland. Organic cropland or hayland either is not practicing any nutrient management or the practices do not meet the standard. Soil tests are not completed on a regular basis and organic fertilizer applications and amendments are not based on nutrient recommendations. Improper management has caused water quality degradation through excess nutrients transported through runoff and soil erosion to surface waters and/or to groundwater through leaching. Soil quality may also be degraded by excess or inadequate nutrients.

After Situation: An organic nutrient management system that meets the NRCS 590 standard and NOP regulations is developed on a typical 15 acre field of organic cropland or hayland. The development and implementation of a nutrient management plan benefits plant productivity and reduces off-site degradation by maximizing nutrient use efficiency by the crop and minimizing the potential of nutrient losses in leaching and runoff caused by over-application. A nutrient budget is developed for each field based on soil test analysis and land grant university or crop removal rates. Pre-plant soil tests are used to determine the annual nutrient budget and post-harvest soil and/or tissue tests are used to re-evaluate the adequacy of the plant's nutrient recommendations in meeting crop needs while minimizing phosphorus application and residual nitrogen. Post-harvest testing ensures proper utilization of nutrients thus reducing the potential for off-site impacts. The producer maintains records that are provided annually of the current soil tests, analysis, amount of application, and forms and rates of nutrients for each field, including post-harvest analysis. Specialized training is required by attending annual workshops and/or conferences. Management results in nutrient applications that minimize nutrient runoff and leaching, and/or the buildup of excess nutrient concentrations.

Scenario Feature Measure: Per acre of applied management

Scenario Unit: Acre

Scenario Typical Size: 15

Total Scenario Cost: $358.31

Scenario Cost/Unit: $23.89

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	1	$21.64
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	2	$74.48
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	1	$96.48
Materials						
Test, Compost Analysis	307	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$47.08	2	$94.17
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$10.13	2	$20.25
Equipment Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	2	$51.29

Practice: 590 - Nutrient Management

Scenario: #3 - 590 Small Farm Diversified

Scenario Description: A nutrient management system is implemented on a small/diversified farm such as community supported agriculture farms, truck farms, and market gardens, where numerous variable crops are grown on relatively small acreages (0.25 to 10 acres) and multiple harvests per year. Due to the variability of crops and small acreage, a more intensive and diversified management approach is necessary to ensure proper nutrient utilization. Implementation results in the proper rate, source, method of placement, and timing of nutrients. Typical installation involves soil testing, analysis, consultant services that provide nutrient recommendations and an associated nutrient budget, and record keeping. The technical recommendations are based on land grant university recommendations or crop removal rates. Producers typically attend one workshop to acquire the knowledge required to implement the practice. Producer records demonstrating implementation of the 4 R's of the nutrient management criteria are required. Associated practices: Conservation Crop Rotation (328), Residue and Tillage Management - No-Till/ Strip Till/ Direct Seed (329), Cover Crop (340), Filter Strip (393), Irrigation Water Management (449), Drainage Water Management (554), and Integrated Pest Management (595).

Before Situation: Nutrient management practices are either not observed or do not meet the standard. Soil tests are not completed on a regular basis and fertilizer applications are not based on nutrient recommendations. Improper management has caused water quality degradation through excess nutrients transported through runoff and soil erosion to surface waters and/or to groundwater through leaching. Soil quality may also be degraded by excess or inadequate nutrients.

After Situation: A nutrient management system that meets the NRCS 590 standard is developed on a small/diversified farm. Producer has acquired necessary technical knowledge to implement according to 590 standard. The development and implementation of a nutrient management plan benefits plant productivity and reduces off-site degradation by maximizing nutrient use efficiency by the crop and minimizing the potential of nutrient losses in leaching and runoff caused by over-application. A nutrient budget is developed for each field or "crop block" based on soil test analysis and land grant university or crop removal rates. The producer maintains records that are provided annually of the current soil tests, analysis, amount of application, and forms and rates of nutrients for each field or "crop block", including post-harvest analysis. Management results in nutrient applications that minimize nutrient runoff and leaching, and/or the buildup of excess nutrient concentrations.

Scenario Feature Measure: Per small/diversified farm

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $457.67

Scenario Cost/Unit: $457.67

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	1	$21.64
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	1	$37.24
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	2	$192.95
Materials						
Test, Compost Analysis	307	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$47.08	2	$94.17
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$27.10	3	$81.29
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$10.13	3	$30.38

Practice: 590 - Nutrient Management

Scenario: #4 - 590 Basic Manure

Scenario Description: A basic nutrient management system is implemented on a typical 25 acre cropland or hayland field where manure or compost is applied in addition to commercial fertilizer. Implementation results in the proper rate, source, method of placement, and timing of nutrients. Typical installation involves soil and manure testing testing, analysis, consultant services that provide nutrient recommendations and an associated nutrient budget, and record keeping. Nitrogen-urease inhibitors are used for surface applied urea products. The technical recommendations are based on land grant university recommendations or crop removal rates. Risk assessments including phosphorus index and nitrogen index are completed with applications of manure. Producer records demonstrating implementation of the 4 R's of the nutrient management criteria are required. Associated practices: Conservation Crop Rotation (328), Residue and Tillage Management - No-Till/ Strip Till/ Direct Seed (329), Cover Crop (340), Filter Strip (393), Irrigation Water Management (449), Drainage Water Management (554), and Integrated Pest Management (595).

Before Situation: Cropland or hayland with manure or compost application either is not practicing any nutrient management or the practices do not meet the standard. Soil and manure tests are not completed on a regular basis and fertilizer applications are not based on nutrient recommendations. Improper management has caused water quality degradation through excess nutrients transported through runoff and soil erosion to surface waters and/or to groundwater through leaching. Urea products are typically surface appied without inhibitors increasing losses. Soil quality may also be degraded by excess or inadequate nutrients.

After Situation: A nutrient management system that meets the NRCS 590 standard is developed on a typical 25 acre cropland or hayland field. The development and implementation of a nutrient management plan benefits plant productivity and reduces off-site degradation by maximizing nutrient use efficiency by the crop and minimizing the potential of nutrient losses in leaching and runoff caused by over-application. A nutrient budget is developed for each field based on soil test analysis and land grant university guidelines or crop removal rates. Pre-plant soil tests are used to determine the annual nutrient budget and post-harvest soil and/or tissue tests are used to re-evaluate the adequacy of the plant's nutrient recommendations in meeting crop needs while minimizing phosphorus application and residual nitrogen. Post-harvest testing ensures proper utilization of nutrients thus reducing the potential for off-site impacts. Pre side-dress soil nitrogen tests or pre-top dress tissue tests are used prior to the rapid biomass growth of the plant to assist the producer in evaluating the mineralization nitrogen from manures in providing adequate nitrogen to meet the crop requirements. Urease inhibitors are used for surface applications of urea products to reduce losses. The producer maintains records that are provided annually of the current soil tests, analysis, amount of application, and forms and rates of nutrients for each field, including post-harvest analysis. Management results in nutrient applications that minimize nutrient runoff and leaching, and/or the buildup of excess nutrient concentrations.

Scenario Feature Measure: Per acre of applied management

Scenario Unit: Acre

Scenario Typical Size: 25

Total Scenario Cost: $644.05

Scenario Cost/Unit: $25.76

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	2	$43.29
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	1	$37.24
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	1	$96.48
Materials						
Nitrogen-Urease inhibitor	260	Nitrogen-Urease inhibitor	Acre	$10.59	25	$264.85
Test, Manure Analysis	306	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$47.16	2	$94.33
Test, Soil Nitrogen Testing	311	Pre-Side Dress/Deep Soil Testing. Includes materials and shipping only.	Each	$12.11	3	$36.32
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$10.13	2	$20.25
Equipment Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	2	$51.29

Practice: 590 - Nutrient Management

Scenario: #5 - Manure Injection

Scenario Description: This scenario describes the implementation of a basic nutrient management system on planning units 40 acres or larger of cropland or hayland where manure is injected (below soil surface 4"-6"). The planned NM system will meet the current 590 standard. Implementation will result in the proper rate, source, method of placement, and timing of nutrients while minimizing off-site degradation or the excessive built up of N and P. Risk assessments including PI (phosphorus index) and NI (nitrogen index) will be completed and manure applications will be planned and prioritized based on risk results. Records demonstrating implementation of the 4 R's of the NM plan will be required along with copies of risk assessments.

Before Situation: In this geographic area, a fertility program is either non existent or does not meet the 590 nutrient management standard. Soil testing and manure testing is not completed on a regular basis and applications of nutrients are not based on land grant university recommendations or a nutrient budget. Nutrients and surface-applied manure are transported to surface waters through runoff or erosion or to groundwater through leaching in quantities that degrade water quality and limit use of intended purposes. Soil quality may be degraded by excess or inadequate nutrients. Fields have little or no erosion protection often times resulting in wind, sheet, rill, and ephemeral erosion.

After Situation: A nutrient management system that includes manure injection (below the soil surface approximately 4-6") will be developed to meet the NRCS 590 standard. The development and implementation of a nutrient management plan (NMP) will benefit plant productivity and reduce off-site degradation. A nutrient management budget will be developed for each field(s) based on soil tests and manure test analysis along with land grant university recommendations or crop removal rates. On a planning unit soil testing is completed according to LGU recommendations. The use of pre-plant soil tests and manure analysis for available plant nutrients will assist with the proper development of the annual nutrient budget. Applications of manure are based on risk assessments (PI - phosphorus index). Records will be provided annually documenting current soil tests and manure tests analyses, date and rate of application, form and placement of nutrients for each field, including post harvest yields. Manure applications are injected 4-6" below the soil surface to minimize nutrient runoff and to capture ammonia-N that otherwise might be lost to volatilization.

Scenario Feature Measure: Acre

Scenario Unit: Acre

Scenario Typical Size: 40

Total Scenario Cost: $2,902.51

Scenario Cost/Unit: $72.56

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	1	$37.24
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	1	$96.48
Materials						
Test, Manure Analysis	306	Moisture, Total N, P, K. Includes materials and shipping only.	Each	$47.16	1	$47.16
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$10.13	2	$20.25
Equipment Installation						
Manure, compost, injection	956	Loading, hauling and injecting manure/compost by ground equipment. Includes equipment, power unit and labor costs.	Gallon	$0.01	184000	$2,675.73
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	1	$25.65

Practice: 590 - Nutrient Management

Scenario: #6 - 590 Advanced

Scenario Description: This scenario describes the implementation of advanced nutrient management system on cropland. The planned NM system will meet the current 590 standard. Payment for implementation is to defray the costs of soil testing, tissue testing, analysis, consultant services that provide nutrient recommendations based on LGU recommendations or crop removal rates and an associated nutrient budget, recordkeeping, and monitoring on an advanced level. Records demonstrating implementation of the 4 R's of at the NM plan will be required. This scenario goes beyond the basic NM system by using technologies that improve efficiency and effectiveness of nutrient management by utilizing advanced testing, modeling, and precision application techniques and tools. Advanced nutrient management techniques ensure that the right rate, proper timing, and proper placement of nutrients minimize non-point source pollution and provide proper amounts of nutrients to the crop where it is needed and not applying where it is not needed. Associated practices: Conservation Crop Rotation (328), Residue and Tillage Management - No-Till/ Strip Till/ Direct Seed (329), Cover Crop (340), Filter Strip (393), Irrigation Water Management (449), Drainage Water Management (554), and Pest Management (595).

Before Situation: In this geographic area, a fertility program is already in place, however, applied nutrients are applied across large acreages based on a lack of representative soil samples and/ or tissue analyses. The current NM system may or may not meet 590 standards, however, could be improved by reducing energy inputs. Because whole fields are fertilized with the same rate, excess nutrients may be applied in some areas while inadequate amounts of nutrients are applied in other areas. Due to the mono-application rate, excess nutrients are transported to surface waters through runoff or erosion or to ground water from leaching in quantities that degrade water quality and limit use of intended purposes. Soil quality may be degraded by excess or inadequate nutrients. Applications do not consider the detrimental affects of improper timing or improper rates. Whole fields with like crops and rotation are fertilized the same.

After Situation: Advanced soil and tissue testing is completed in a fashion that provides a representative assessment of nutrient concentrations in each field or management zone. An application rate (prescription) is developed for each zone or field based on representative soil and tissue analysis that accounts for actual plant nutrient status. Nutrient applications are based on LGU recommendations with adjustments based on advanced testing and modeling. Soil testing is completed annually for N and at least once every three years for P-K. A nutrient budget is developed for each field annually. Application of nutrients is completed so that non-point source pollution is minimized. Nutrients are applied based on realistic yield expectations. Records are maintained for all nutrient applications and soil testing. Record keeping will include all soil tests, analysis, zone maps, nutrient prescriptions and budgets, and as-applied applications.

Scenario Feature Measure: Per acre of applied management

Scenario Unit: Acre

Scenario Typical Size: 40

Total Scenario Cost: $1,445.70

Scenario Cost/Unit: $36.14

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	2	$74.48
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	2	$192.95
Materials						
Nitrogen-Urease inhibitor	260	Nitrogen-Urease inhibitor	Acre	$10.59	40	$423.77
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$27.10	3	$81.29
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$10.13	3	$30.38
Equipment Installation						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$38.47	2	$76.94
Fertilizer, precision application	952	Fertilizer application performed by light bar/GPS navigation system. Includes equipment, power unit and labor costs.	Acre	$13.51	40	$540.25
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	1	$25.65

Practice: 590 - Nutrient Management

Scenario: #7 - 590 Adaptive Strip Trials

Scenario Description: The practice scenario is for the implementation of nutrient management on a small plot. Scenario includes implementing replicated strip trials on a field plot to evaluate, identify and implement various nutrient use efficiency improvement methods for timing, rate, method of application, or source of nutrients. Associated practices: Conservation Crop Rotation (328), Residue and Tillage Management - No-Till/ Strip Till/ Direct Seed (329), Cover Crop (340), Filter Strip (393), Irrigation Water Management (449), Drainage Water Management (554), and Pest Management (595).

Before Situation: The practice will be installed on cropland (small grain rotation or typical corn-soybean rotation) to address water quality degradation, air quality degradation and energy concerns. The scenario applies to non-organic and organic operations.

After Situation: Installation of this scenario will result in adopting the four R's of nutrient management (right source, right rate, right timing and right placement) by following the procedures outlined in Agronomy Technical Note 7 - Adaptive Nutrient Management. Implementation involves establishing the replicated plots to evaluate one or more of the 4 R's. The plot will consist of 7 replicated plots designed, laid out, managed and evaluated with the assistance of technical service provider certified in nutrient management planning and implementation. Results are used to make nutrient application decisions to address water quality degradation issues and nutrient use efficiencies. Yields will be measured and statistically summarized following the procedures in Agronomy Technical Note 6 - Adaptive Nutrient Management. The yields for each plot will be adjusted to the appropriate moisture content.

Scenario Feature Measure: Per application

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $1,880.35

Scenario Cost/Unit: $1,880.35

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	16	$346.31
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	10	$964.76
Materials						
Test, Plant Tissue Test	301	Tissue analysis for crops. Includes materials and shipping only.	Each	$27.10	14	$379.36
Test, Soil Nitrogen Testing	311	Pre-Side Dress/Deep Soil Testing. Includes materials and shipping only.	Each	$12.11	14	$169.50
Test, Soil Test, Standard	299	Includes materials, shiping, labor, and equipment costs.	Each	$10.13	2	$20.25
Equipment Installation						
Satellite imagery, aerial photography, infrared	966	Infrared imagery	Acre	$0.17	1	$0.17

Practice: 500 - Obstruction Removal

Scenario: #1 - Removal and Disposal of Brush and Trees < 6 inch Diameter

Scenario Description: Remove and disposal of brush and trees < 6 inches in diameter by demolition, excavation or other means required for removal. Dispose of all brush and trees so that it does not impede subsequent work or cause onsite or offsite damage. Dispose of all brush and trees by removal to an approved landfill, wood chipping and or land distribution, or recycling center, burial at an approved location or burning. If burning is used, implement appropriate smoke management to protect public health and safety. Remove and dispose of brush and trees in order to apply conservation practices or facilitate the planned land use. Brush and tree removal will address the resource concerns of the prevention or hindrance to the installation of conservation practices or present a hazard to their use and enjoyment. Associated Practices: Animal Mortality Facility (316), Composting Facility (317), Contour Farming (330), Diversion (362), Early Successional Habitat Development and Management (647), Grass Waterway (412), Heavy Use Area Protection (561), Livestock Pipeline (516), Stripcropping (585), Subsurface Drainage (606), Terrace (600), Underground Outlet (620), Upland Wildlife Habitat Management (645), Waste Storage Facility (313).

Before Situation: On any land where existing obstructions interfere with planned land use development, public safety or infrastructure including habitat fragmentation for grassland dependent birds. The site may be abandoned mine lands, construction sites, recreation areas, farms, ranches, and areas affected by natural disasters. This is not intended for the removal of obstructions from aquatic environments.

After Situation: The typical area will be a 2.0 acre impaired area. The removal of brush and trees < 6 inch diameter will be performed with the use of equipment and hand labor. Dispose of all brush and trees from the obstruction removal so that it does not impede subsequent work or cause onsite or offsite damage. Revegetate or otherwise protect from erosion disturbed areas as soon as possible. Refer to NRCS Conservation Practice Standard 342, Critical Area Planting for seedbed preparation, seeding, fertilizing, and mulching requirements. The practice is to improve site conditions in order to apply conservation practices or facilitate better use of the landscape.

Scenario Feature Measure: Land Area

Scenario Unit: Acre

Scenario Typical Size: 2

Total Scenario Cost: $2,531.86

Scenario Cost/Unit: $1,265.93

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.29	8	$186.35
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	$21.64	8	$173.15
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	8	$297.91
Equipment Installation						
Brush Chipper, 6" capacity	938	Brush Chipper, 6" capacity, typically 35 HP. Includes chipper and power unit. Labor not included.	Hour	$25.01	8	$200.09
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$146.00	8	$1,168.03
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	8	$205.17
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	1	$301.16

Practice: 500 - Obstruction Removal

Scenario: #2 - Removal and Disposal of Brush and Trees > 6 inch Diameter

Scenario Description: Remove and disposal of brush and trees > 6 inches in diameter by demolition, excavation or other means required for removal. Dispose of all brush and trees so that it does not impede subsequent work or cause onsite or offsite damage. Dispose of all brush and trees by removal to an approved landfill, wood chipping and or land distribution, or recycling center, burial at an approved location or burning. If burning is used, implement appropriate smoke management to protect public health and safety. Remove and dispose of brush and trees in order to apply conservation practices or facilitate the planned land use. Brush and tree removal will address the resource concerns of the prevention or hindrance to the installation of conservation practices or present a hazard to their use and enjoyment. Associated Practices: Animal Mortality Facility (316), Composting Facility (317), Contour Farming (330), Diversion (362), Early Successional Habitat Development and Management (647), Grass Waterway (412), Heavy Use Area Protection (561), Livestock Pipeline (516), Stripcropping (585), Subsurface Drainage (606), Terrace (600), Underground Outlet (620), Upland Wildlife Habitat Management (645), Waste Storage Facility (313).

Before Situation: On any land where existing obstructions interfere with planned land use development, public safety or infrastructure including habitat fragmentation for grassland dependent birds. The site may be abandoned mine lands, construction sites, recreation areas, farms, ranches, and areas affected by natural disasters. This is not intended for the removal of obstructions from aquatic environments.

After Situation: The typical area will be a 2.0 acre impaired area. The removal of brush and trees > 6 inch diameter will be performed with the use of equipment and hand labor. Dispose of all brush and trees from the obstruction removal so that it does not impede subsequent work or cause onsite or offsite damage. Revegetate or otherwise protect from erosion disturbed areas as soon as possible. Refer to NRCS Conservation Practice Standard 342, Critical Area Planting for seedbed preparation, seeding, fertilizing, and mulching requirements. The practice is to improve site conditions in order to apply conservation practices or facilitate better use of the landscape.

Scenario Feature Measure: Land Area

Scenario Unit: Acre

Scenario Typical Size: 2

Total Scenario Cost: $5,066.17

Scenario Cost/Unit: $2,533.08

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	12	$388.11
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	$21.64	12	$259.73
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	12	$446.86
Equipment Installation						
Brush Chipper, 15" capacity	1868	Brush Chipper, 15" capacity, typically 165 HP. Includes chipper and power unit. Does not include labor.	Hour	$76.76	12	$921.11
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	$228.55	12	$2,742.61
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	12	$307.75

Practice: 500 - Obstruction Removal

Scenario: #3 - Brush and Tree Removal with Hand Tools

Scenario Description: Cut brush and trees using hand tools such as a chainsaw. Remove brush and trees using a pick-up truck, chipper or other means required for removal. Dispose of all brush and trees so that it does not impede subsequent work or cause onsite or offsite damage. Dispose of all brush and trees by removal to an approved landfill, wood chipping and or land distribution, or recycling center, burial at an approved location or burning. If burning is used, implement appropriate smoke management to protect public health and safety. Remove and dispose of brush and trees in order to apply conservation practices or facilitate the planned land use. Brush and tree removal will address the resource concerns of the prevention or hindrance to the installation of conservation practices or present a hazard to their use and enjoyment. Associated Practices: Animal Mortality Facility (316), Composting Facility (317), Contour Farming (330), Diversion (362), Early Successional Habitat Development and Management (647), Grass Waterway (412), Heavy Use Area Protection (561), Livestock Pipeline (516), Stripcropping (585), Subsurface Drainage (606), Terrace (600), Underground Outlet (620), Upland Wildlife Habitat Management (645), Waste Storage Facility (313).

Before Situation: On any land where existing obstructions interfere with planned land use development, public safety or infrastructure including habitat fragmentation for grassland dependent birds. The site may be abandoned mine lands, construction sites, recreation areas, farms, ranches, and areas affected by natural disasters. This is not intended for the removal of obstructions from aquatic environments.

After Situation: The typical area will be a 1.0 acre impaired area. The cutting of brush and trees was performed using hand tools and manual labor. Removal of brush and trees occured using a pick-up truck, chipper or other method. Dispose of all brush and trees from the obstruction removal so that it does not impede subsequent work or cause onsite or offsite damage. Revegetate or otherwise protect from erosion disturbed areas as soon as possible. Refer to NRCS Conservation Practice Standard 342, Critical Area Planting for seedbed preparation, seeding, fertilizing, and mulching requirements. The practice is to improve site conditions in order to apply conservation practices or facilitate better use of the landscape.

Scenario Feature Measure: Land Area

Scenario Unit: Acre

Scenario Typical Size: 1

Total Scenario Cost: $998.57

Scenario Cost/Unit: $998.57

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	6	$129.86
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	6	$223.43
Equipment Installation						
Brush Chipper, 15" capacity	1868	Brush Chipper, 15" capacity, typically 165 HP. Includes chipper and power unit. Does not include labor.	Hour	$76.76	6	$460.55
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$5.14	6	$30.85
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	6	$153.88

Practice: 500 - Obstruction Removal

Scenario: #4 - Removal and Disposal of Fence

Scenario Description: Remove and disposal of all existing fences by demolition, excavation or other means required for removal. Dispose of all fence materials from the site so that it does not impede subsequent work or cause onsite or offsite damage. Dispose of all materials by removal to an approved landfill, wood chipping and land distribution, or recycling center, burial at an approved location or burning. If burning is used, implement appropriate smoke management to protect public health and safety. Remove and dispose of the unwanted fence obstruction in order to apply conservation practices such as Upland Wildlife Habitat Management (645) or facilitate the planned land use. Fence removal will address the resource concerns of the prevention or hindrance to the installation of conservation practices or present a hazard to their use and enjoyment and reduce hazards to wildlife. Associated Practices: Animal Mortality Facility (316), Composting Facility (317), Contour Farming (330), Diversion (362), Grass Waterway (412), Heavy Use Area Protection (561), Livestock Pipeline (516), Stripcropping (585), Subsurface Drainage (606), Terrace (600), Underground Outlet (620), Waste Storage Facility (313).

Before Situation: On any land where existing fence interferes with planned land use development, public safety, wildlife movement and habitat, or infrastructure. The site may be abandoned mine lands, construction sites, recreation areas, farms, ranches, and areas affected by natural disasters. This is not intended for the removal of obstructions from aquatic environments.

After Situation: The typical fence will be 2640 in linear feet. The removal of the fence will be performed with the use of equipment and hand labor. Dispose of all debris from the fence removal so that it does not impede subsequent work or cause onsite or offsite damage. Revegetate or otherwise protect from erosion disturbed areas as soon as possible. Refer to NRCS Conservation Practice Standard 342, Critical Area Planting for seedbed preparation, seeding, fertilizing, and mulching requirements. The practice is to improve site conditions in order to apply conservation practices or facilitate better use of the landscape such as Upland Wildlife Habitat Management (645).

Scenario Feature Measure: Length of Fence

Scenario Unit: Foot

Scenario Typical Size: 2640

Total Scenario Cost: $2,762.90

Scenario Cost/Unit: $1.05

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.29	20	$465.88
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	$21.64	20	$432.88
Equipment Installation						
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$52.50	20	$1,050.06
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	20	$512.92
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	1	$301.16

Practice: 500 - Obstruction Removal

Scenario: #5 - Rock blasting and disposal

Scenario Description: Remove and disposal of rock and or boulders by drilling and blasting for removal. Dispose of all rocks and or boulders so that it does not impede subsequent work or cause onsite or offsite damage. Dispose of all rock and or boulders by removal to an approved location, or reuse location. Remove and dispose all rock and or boulders in order to apply conservation practices or facilitate the planned land use. Rocks and or boulders will address the resource concerns of the prevention or hindrance to the installation of conservation practices or present a hazard to their use and integrity. Associated practices: Waste Storage Facility(313), Grassed waterway (412), Terrace (600), Heavy Use Area Protection (561), Underground outlet (620), Pipeline (516)

Before Situation: On any land where existing obstructions interfere with planned land use development, public safety or infrastructure. The site may be abandoned mine lands, construction sites, recreation areas, farms, ranches, and areas affected by natural disasters. This is not intended for the removal of obstructions from aquatic environments.

After Situation: The typical area will be have rock extending to the surface or within the excavation limits of the practice to be installed. The removal of rock and or boulders will be performed by drilling and blasting required for removal with the use of heavy equipment and hand labor. Typically done on larger projects like waster storage facility where the location must be done in an area with rock formations. Rock is pre-blasted and removed during the excavatoni process. Material un suitable for fill is hauled away and buried or stockpiled for alternate uses. Dispose of all rocks and boulders from the obstruction removal so that it does not impede subsequent work or cause onsite or offsite damage. Revegetate or otherwise protect from erosion disturbed areas as soon as possible. Refer to NRCS Conservation Practice Standard 342, Critical Area Planting for seedbed preparation, seeding, fertilizing, and mulching requirements. The practice is to improve site conditions in order to apply conservation practices or facilitate better use of the landscape.

Scenario Feature Measure: Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 500

Total Scenario Cost: $22,530.78

Scenario Cost/Unit: $45.06

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	48	$1,552.42
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.29	40	$931.76
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	$21.64	40	$865.76
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	2	$74.48
Equipment Installation						
Drilling and Blasting Rock, Bulk	1395	Bulk drilling &blasting of rock or boulders not requiring blasting mats (typically a min. 100 CY). Includes all equipment, labor and supplies to complete the blast.	Cubic Yard	$14.49	500	$7,246.80
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	$103.78	48	$4,981.60
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$143.20	40	$5,727.97
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$574.99	2	$1,149.98

Practice: 500 - Obstruction Removal

Scenario: #6 - Rock, Mechanical Destruction

Scenario Description: Remove and disposal of rock and or boulders by mechanical destruction. Work typically done on projects like waste storage facility or pipelines where rock formations were not anticipated or small in quantity. Requires either a man held jack hammer or track hoe with a rock pecker to break up rock. Rock loaded and or boulders removed with equipment to an approved location, or reuse location. Additional work may include burial of unsuitable materials. This process allows appliction of conservation practices or facilitate the planned land use. Removal address the resource concerns of the prevention or hindrance to the installation of conservation practices or present a hazard to their use and integrity. Associated practices: Waste Storage Facility(313), Grassed waterway (412), Terrace (600), Heavy Use Area Protection (561), Underground outlet (620), Pipeline (516)

Before Situation: On any land where existing obstructions interfere with planned land use development, public safety or infrastructure. The site may be abandoned mine lands, construction sites, recreation areas, farms, ranches, and areas affected by natural disasters. This is not intended for the removal of obstructions from aquatic environments.

After Situation: The site had 50 CY rock extending above required bottom of excavation or within the excavation limits of the practice to be installed. The removal of rock and or boulders was performed by jack hammering with an equipment mouted rock pecker. Material then removed with heavy equipment and hauled away. Material un suitable for fill is hauled away and buried or stockpiled for alternate uses. Revegetate or otherwise protect from erosion disturbed areas as soon as possible. Refer to . The practice is to improve site conditions in order to apply conservation practices or facilitate better use of the landscape.

Scenario Feature Measure: Volume of rock removed

Scenario Unit: Cubic Yard

Scenario Typical Size: 50

Total Scenario Cost: $2,453.89

Scenario Cost/Unit: $49.08

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	12	$388.11
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	$21.64	8	$173.15
Equipment Installation						
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.60	6	$51.63
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$133.90	6	$803.40
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	$103.78	2	$207.57
Truck, dump, 12 CY	1215	Dump truck for moving bulk material. Typically capacity is 16 ton or 12 cubic yards. Includes equipment only.	Hour	$113.86	2	$227.72
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32

Practice: 500 - Obstruction Removal

Scenario: #7 - Removal and Disposal of Steel and or Concrete Structures

Scenario Description: Remove and disposal of steel and or concrete structures by demolition, excavation or other means required for removal. Dispose of all steel and or concrete structures so that it does not impede subsequent work or cause onsite or offsite damage. Dispose of all steel and or concrete structures by removal to an approved location, or reuse location. Remove and dispose all steel and or concrete structures in order to apply conservation practices or facilitate the planned land use. Steel and or concrete structure removal will address the resource concerns of the prevention or hindrance to the installation of conservation practices or present a hazard to their use. Associated Practices: Waste StorageFacility (313), Heavy use area protection (561), Undergrount outlet (620), Struture for water Control (587), Roof Runoff Structure (558), and Critical Area Planting (342)

Before Situation: On any land where existing obstructions interfere with planned land use development, public safety or infrastructure. The site may be abandoned mine lands, construction sites, recreation areas, farms, ranches, and areas affected by natural disasters. This is not intended for the removal of obstructions from aquatic environments.

After Situation: 2000 square feet of exiting concrete that isremoved to install and undergound outlet for a Roof Gutter system and establish proper grade for a new Heavy use area. Part of the removal includes 30 feet of 3' high concrete retaining wall. The removal of steel and or concrete structures was performed by demolition and excavation with the use of heavy equipment and hand labor. All steel and or concrete waste from the obstruction was removed so that it does not impede subsequent work or cause onsite or offsite damage.

Scenario Feature Measure: Land Area

Scenario Unit: Square Foot

Scenario Typical Size: 2000

Total Scenario Cost: $10,882.06

Scenario Cost/Unit: $5.44

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	48	$1,552.42
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	$21.64	24	$519.46
Equipment Installation						
Auger, Post driver attachment	934	Auger or post driver attachment to a tractor or skidsteer. Does not include power unit. Labor not included.	Hour	$8.60	24	$206.51
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$73.86	24	$1,772.61
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	$103.78	24	$2,490.80
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$143.20	24	$3,436.78
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	3	$903.47

Practice: 500 - Obstruction Removal

Scenario: #8 - Removal and Disposal of Wood Structures

Scenario Description: Remove and disposal of wood structures by demolition, excavation or other means required for removal. Wood structure removal will address the resource concerns of the prevention or hindrance to the installation of conservation practices or present a hazard to their use. Dispose of all wood structures by removal to an approved location, landfill, or reuse location. Materials are sorted for salvage. Wood materials are ground up for mulch.This process allows implementation of additional conservation practices to address a resource concern in that immediate area. Associated Practices: Animal Mortality Facility (316), Composting Facility (317), Contour Farming (330), Diversion (362), Grass Waterway (412), Heavy Use Area Protection (561), Livestock Pipeline (516), Stripcropping (585), Subsurface Drainage (606), Terrace (600), Underground Outlet (620), Waste Storage Facility (313).

Before Situation: On any land where existing obstructions interfere with planned land use development, public safety or infrastructure. The site may be abandoned mine lands, construction sites, recreation areas, farms, ranches, and areas affected by natural disasters. This is not intended for the removal of obstructions from aquatic environments.

After Situation: An existing 32,000 SF poultry facility is removed to allow remidiation of the old dirt floor. Materials are systematically removed and slavaged with none usable material consolidated and landfilled. Wood materials that are suitable are ground up for mulch and stockpiled for remediation work. Work includes hand labor, , grinding, heavy equipment and trucking. The removed facility now allows the existing dirtfloor to be remidiated under a seperate practice.

Scenario Feature Measure: Building footprint

Scenario Unit: Square Foot

Scenario Typical Size: 32000

Total Scenario Cost: $29,101.52

Scenario Cost/Unit: $0.91

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	96	$3,104.85
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.29	88	$2,049.88
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	$21.64	128	$2,770.45
Equipment Installation						
Chainsaw	937	Equipment and power unit costs. Labor not included.	Hour	$5.14	64	$329.04
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$73.86	64	$4,726.96
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$52.50	64	$3,360.18
Truck, dump, 18 CY	1400	Dump truck for moving bulk material. Typically capacity is 25 ton or 18 cubic yards. Includes equipment only.	Hour	$143.20	24	$3,436.78
Tub Grinder, 350 HP	1404	TUB grinder-350 HP, 10'6" diameter tub opening, 8' diameter inside base. Includes equipment cost only.	Hour	$266.20	32	$8,518.52
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32
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	$202.55	1	$202.55

Practice: 319 - On-Farm Secondary Containment Facility

Scenario: #1 - Earthen Containment

Scenario Description: An earthen containment wall with a flexible membrane liner is installed around an existing storage tank to address water quality degradation due to excessive release of organics into ground and surface waters, or excessive sediment and turbidity in surface waters. This facility does not have a roof. Associated practices: Heavy Use Area Protection (561).

Before Situation: An agricultural operation has a single walled fuel/oil storage tank(s) without any spill prevention protection. The producer has an SPCC plan that was developed in accordance with EPA requirements, which requires an above ground secondary containment facility for on-farm oil products.

After Situation: A flexible membrane liner is installed around a 10,000 gallon tank. The containment volume is desgiend for 125% of the tank volume (10,000 gallons x 125%= 12,500 gallons). The bottom dimensions of the containment facility are 40ft x 24ft. The wall is 2.5ft high with a 2ft top width and 2:1 side slopes. The total volume of earthfill is 114 cubic yards. The flexible liner size is 1,872 square feet. The tank(s) will be moved or raised to install the base materials. Hauled in earthfill will be used to construct the dike. The flexible liner will be installed in conformance with the design and specifications. The complete structure provides an environmentally safe facility for storage and handling of oil products stored on the property. Any accidental spills will be contained protecting water quality.

Scenario Feature Measure: Cubic Yard of compacted earthen wall

Scenario Unit: Cubic Yard

Scenario Typical Size: 114

Total Scenario Cost: $15,932.60

Scenario Cost/Unit: $139.76

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$31.47	18	$566.50
Fuel Containment Facility, Gate valve 2 inch diameter	1735	Metal 2 inch diameter gate valve. Materials only.	Each	$280.31	1	$280.31
Geotextile, non-woven, heavy weight	1210	Non-woven greater than 8 ounce/square yard geotextile with staple anchoring. Materials and shipping only.	Square Yard	$4.15	208	$864.13
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.47	50	$73.40
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Yard	$6.12	1872	$11,451.15
Equipment Installation						
Crane, truck mounted, hydraulic, 12 ton	1734	12 ton capacity truck mounted hydraulic crane. Equipment cost only.	Hour	$107.74	2	$215.48
Earthfill, Dumped and Spread	51	Earthfill, dumped and spread without compaction effort, includes equipment and labor	Cubic Yard	$4.00	114	$455.85
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.87	126	$614.05
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	2	$64.68
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	$21.64	4	$86.58
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$574.99	1	$574.99
Mobilization, medium	1139	Equipment with 70-150 HP or typical weights between 14,000 and	Each	$301.16	2	$602.32

equipment		30,000 pounds.				
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$83.16	1	$83.16

Practice: 319 - On-Farm Secondary Containment Facility

Scenario: #2 - Concrete Containment Wall

Scenario Description: A reinforced concrete containment wall with a concrete slap is installed around an existing storage tank to address water quality degradation due to the excessive release of organics into ground and surface waters or excessive sediment and turbidity in surface waters. Due to topography, limited site space and/or geological conditions a fabricated structure is needed. Structure will provide an environmentally safe facility for handling and storage of these products. Associated practices may include: Heavy Use Area Protection (561).

Before Situation: An agricultural operation has an existing single wall fuel/oil storage tank(s) without any spill prevention protection. The producer has an SPCC plan that was developed in accordance with EPA requirements, which requires an above ground secondary containment facility for on-farm oil products.

After Situation: A 4,700 gallon tank is contained within the new structure. The containment volume is designed for 125% of the tank volume (4,700 gallons X 125% = 5,875 gallons). The structure will provide an environmentally safe facility for handling and storage of these products. Typical containment dimensions are 196 sqft bottom x 6" thick slab with 6" thick x 4' tall formed sidewalls. Tanks will be moved or raised to install base materials. The fabricated containment structure will be installed in conformance with the design and specifications. The on-farm oil products stored on the farm have secondary containment of accidental release that controls the excessive release of organics, suspended sediments, and turbidity.

Scenario Feature Measure: Volume of concrete in the wall

Scenario Unit: Cubic Yard

Scenario Typical Size: 4.3

Total Scenario Cost: $5,070.44

Scenario Cost/Unit: $1,179.17

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$449.19	4.3	$1,931.52
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$288.82	4.2	$1,213.04
Crane, truck mounted, hydraulic, 12 ton	1734	12 ton capacity truck mounted hydraulic crane. Equipment cost only.	Hour	$107.74	2	$215.48
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$31.47	4.2	$132.18
Fuel Containment Facility, Gate valve 2 inch diameter	1735	Metal 2 inch diameter gate valve. Materials only.	Each	$280.31	1	$280.31
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.47	30	$44.04
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	2	$64.68
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	3	$903.47
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	$202.55	1	$202.55
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces	Each	$83.16	1	$83.16

		of equipment if all hauled simultaneously.				

Practice: 319 - On-Farm Secondary Containment Facility

Scenario: #3 - Single Wall Tank Replacement With A Double Wall Tank or Dike Tank

Scenario Description: An existing single wall, fuel storage tank is replaced with a new double wall tank to address resource concerns related to water quality due to the excessive release of organics into the ground and surface waters, or excessive sediment and turbidity in surface waters. Local or state regulations require the use of double wall tanks or on-farm space limitations preclude the use of an open secondary containment facility. Associated practices: Heavy Use Area Protection (561).

Before Situation: An agricultural operation has an existing single wall fuel/oil storage tank(s) without any spill prevention protection. The producer has an SPCC plan that was developed in accordance with EPA requirements, which requires an above ground secondary containment facility for on-farm oil products. The tank is very old, in disrepair and is leaking. There are space limitations on the operation which preclude the installation of an open secondary containment system.

After Situation: An existing single wall, fuel storage tank is replaced with a new double wall tank as per the SPCC plan. Installation is based on a new tank and a “used” double wall tank does not meet the requirements. A 1000 gallon antiroll tank (U/L 142-23 Secondary Containment Vessel) double walled tank that meets EPA regulations is installed. The double wall tank provides an environmentally safe facility for storage and handling of oil products stored on the property. Any accidental spills will be contained protecting water quality.

Scenario Feature Measure: Tank volume

Scenario Unit: Gallon

Scenario Typical Size: 1000

Total Scenario Cost: $3,172.01

Scenario Cost/Unit: $3.17

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	1	$32.34
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	2	$74.48
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	1	$301.16
Materials						
Tank, storage tank, double wall, 4000 gallon, horizontal, steel, above ground	1733	Double wall horizontal steel storage tank. Includes cradles, coating, fittings, labor, equipment. Excludes foundations, pumps or piping.	Gallon	$2.66	1000	$2,656.30
Equipment Installation						
Crane, truck mounted, hydraulic, 12 ton	1734	12 ton capacity truck mounted hydraulic crane. Equipment cost only.	Hour	$107.74	1	$107.74

Practice: 378 - Pond

Scenario: #1 - Excavated, all spoil

Scenario Description: A low-hazard water impoundment structure is installed by excavating a pit and spreading the spoil outside the pool area. Structure is installed on agricultural lands to maintain or improve water quality and to provide water for livestock, fish and wildlife, fire control, developing renewable energy systems, and other related uses. The pond is created solely by excavating material and impounds less than 3 feet against the embankment or spoil. The excavated material is spoiled, not placed in a designed embankment. An earthen spillway is constructed as needed. The resource concerns addressed include inadequate livestock water, excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition. Associated Practices: Critical area Seeding (382), Livestock Pipeline (516), Pond Sealing or Lining, Flexible Membrane (521A), Pumping Plant (533), Watering Facility (614),Structure for Water Control (587), Aquatic Organism Passage (396).

Before Situation: Agricultural land has inadequate livestock water, excessive suspended sediment and turbidity in surface water, damage from sediment deposition and/or reduced capacity of conveyances by sediment deposition. An area exists where water could naturally pool or run off to create a pond for livestock, wildlife, fire control, developing renewable energy systems, and other related uses, and to maintain or improve water quality. Failure of the pond will not result in loss of life; damage to homes, commercial or industrial buildings, main highways, or railroads; or in interruption of the use or service of public utilities.

After Situation: A low-hazard water impoundment pond is constructed by excavating 3,100 cubic yards. The spoil is spread outside the pool area using a dozer or similar excavation equipment. Water quality and/or quantity resource concerns are addressed.

Scenario Feature Measure: Excavated Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 3100

Total Scenario Cost: $7,949.88

Scenario Cost/Unit: $2.56

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	40	$1,293.69
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	8	$297.91
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	5	$216.98
Equipment Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$146.00	40	$5,840.15
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	1	$301.16

Practice: 378 - Pond

Scenario: #2 - Excavated, embankment less than 3 ft

Scenario Description: An earthen embankment, low-hazard water impoundment structure with a principal spillway conduit and earthen auxiliary spillway (if needed) is constructed on agricultural land to improve water quality and to provide water for livestock, fish and wildlife, recreation, fire control, crop and orchard irrigation, and other related uses. The resource concerns addressed include inadequate livestock water, excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition. Associated Practices: Critical area Seeding (382), Livestock Pipeline (516), Pond Sealing or Lining, Flexible Membrane (521A), Pumping Plant (533), Watering Facility (614),Structure for Water Control (587), Aquatic Organism Passage (396).

Before Situation: Agricultural land has inadequate livestock water, excessive suspended sediment and turbidity in surface water, damage from sediment deposition and/or reduced capacity of conveyances by sediment deposition. An area exists where water could naturally pool or run off to create a pond for livestock, wildlife, fire control, or irrigation. Failure of the pond will not result in loss of life; damage to homes, commercial or industrial buildings, main highways, or railroads; or in interruption of the use or service of public utilities.

After Situation: A low hazard pond is constructed by excavating the pool area, preparing the foundation as designed, and using 800 cubic yards to create a 500 foot embankment. The maximum embankment height is less than 3 feet at the auxiliary spillway. The emergency spill way is earthen. If auxiliary controls are needed, use appropriate practice standard. Water quality and/or quantity resource concerns are addressed.

Scenario Feature Measure: Embankment Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 800

Total Scenario Cost: $3,283.22

Scenario Cost/Unit: $4.10

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	16	$595.81
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	2	$86.79
Equipment Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$146.00	8	$1,168.03
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	$103.78	8	$830.27
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32

Practice: 378 - Pond

Scenario: #3 - Embankment Pond without Pipe

Scenario Description: An earthen embankment structure with an earthen auxiliary spillway is constructed on agricultural land to maintain or improve water quality or to provide water for livestock, fish and wildlife, recreation, fire control, developing renewable energy systems, and other related uses. The resource concerns addressed include inadequate livestock water, excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition. Associated Practices: Critical area Seeding (382), Livestock Pipeline (516), Pond Sealing or Lining, Flexible Membrane (521A), Pumping Plant (533), Watering Facility (614),Structure for Water Control (587), Aquatic Organism Passage (396).

Before Situation: Agricultural land has inadequate livestock water, excessive suspended sediment and turbidity in surface water, damage from sediment deposition and/or reduced capacity of conveyances by sediment deposition. An area exists where water could naturally pool or run off to create a pond for livestock, wildlife, fire control, developing renewable energy systems, and other related uses, and to maintain or improve water quality. Failure of the pond will not result in loss of life; damage to homes, commercial or industrial buildings, main highways, or railroads; or in interruption of the use or service of public utilities.

After Situation: An impoundment pond is constructed by excavating the pool area, constructing the auxiliary spillway, preparing the foundation as designed, and using 3100 cubic yards to create an embankment. The product of the storage times the effective height of the dam is less than 3,000. The effective height of the dam is 35 feet or less. The earthen auxiliary spillway will be constructed as designed. No principle spillway pipe will be used. Water quality and/or quantity resource concerns are addressed.

Scenario Feature Measure: Embankment Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 3100

Total Scenario Cost: $17,305.42

Scenario Cost/Unit: $5.58

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	80	$2,587.37
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	$21.64	40	$865.76
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	8	$347.17
Equipment Installation						
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$146.00	40	$5,840.15
Roller, vibratory, towed	1330	Towed vibratory smooth or tamping foot (sheepsfoot) roller compactor typically 25 ton. Equipment cost only. Does not include pulling equipment. Add Tractor or Dozer.	Hour	$65.25	40	$2,610.16
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	$103.78	40	$4,151.33
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	3	$903.47

Practice: 378 - Pond

Scenario: #4 - Embankment Pond with Pipe

Scenario Description: An earthen embankment with principle spillway conduit and earthen auxiliary spillway is constructed on agricultural land to maintain or improve water quality and to provide water for livestock, fish and wildlife, recreation, fire control, developing renewable energy systems, and other related uses. The resource concerns addressed include inadequate livestock water, excessive suspended sediment and turbidity in surface water, damage from sediment deposition, and reduced capacity of conveyances by sediment deposition. Associated Practices: Critical area Seeding (382), Livestock Pipeline (516), Pond Sealing or Lining, Flexible Membrane (521A), Pumping Plant (533), Watering Facility (614),Structure for Water Control (587), Aquatic Organism Passage (396).

Before Situation: Agricultural land has inadequate livestock water, excessive suspended sediment and turbidity in surface water, damage from sediment deposition and/or reduced capacity of conveyances by sediment deposition. An area exists where water could naturally pool or run off to create a pond for livestock, wildlife, fire control, developing renewable energy systems, and other related uses, and to maintain or improve water quality. Failure of the pond will not result in loss of life; damage to homes, commercial or industrial buildings, main highways, or railroads; or in interruption of the use or service of public utilities.

After Situation: The typical low hazard pond is constructed by excavating the pool area, constructing the auxiliary spillway, preparing the foundation as designed, and using 3100 cubic yards to create an embankment. The product of the storage times the effective height of the dam is less than 3,000. The effective height of the dam is 35 feet or less. The principal spillway is installed using an approved conduit material. The earthen auxiliary spillway will be constructed as designed.

Scenario Feature Measure: Embankment Volume

Scenario Unit: Cubic Yard

Scenario Typical Size: 3100

Total Scenario Cost: $25,945.89

Scenario Cost/Unit: $8.37

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$449.19	3	$1,347.57
Dozer, 140 HP	927	Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included.	Hour	$146.00	48	$7,008.17
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$2.58	1.6	$4.13
Roller, vibratory, towed	1330	Towed vibratory smooth or tamping foot (sheepsfoot) roller compactor typically 25 ton. Equipment cost only. Does not include pulling equipment. Add Tractor or Dozer.	Hour	$65.25	48	$3,132.19
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	$103.78	48	$4,981.60
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$31.05	19.6	$608.59
Pipe, CMP, 18", 16 Gauge	1743	18" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$18.28	98	$1,791.61
Pipe, CMP, 30", 16 Gauge	1742	30" Corrugated Metal Pipe, Galvanized, Uncoated, 16 gage. Material cost only.	Foot	$29.25	8	$234.01
Trash Guard, metal	1608	Trash Guard, fabricated-steel, includes materials, equipment, and labor to transport and place Conical shaped trash guard for drop inlet spillway. Typically fabricated of CMP and steel. Includes materials, equipment, and labor to fabricate and transport.	Pound	$2.46	118	$289.99
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	96	$3,104.85

Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	48	$1,787.44
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	8	$347.17

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	3	$903.47
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	$202.55	2	$405.11

Practice: 521A - Pond Sealing or Lining, Flexible Membrane

Scenario: #1 - Flexible Liner with leak detection line

Scenario Description: A flexible, geosynthetic membrane liner is installed to prevent seepage from waste storage impoundment structures. A leak detection line, geotextile to cushion liner from subgrade damage, and a liner with vents anchored around the top of an earthen pond are installed. Associated practices include Pond (378), Waste Storage Facility(313), Heavy Use Area Protection (561), Critical Area Planting (342), Access Road (560) Waste Transfer (634) Underground Ground Outlet (620) and Fence (382)

Before Situation: Soils on-site exhibit seepage rates in excess of acceptable limits. If not lined, soils will allow the passage of nutrients and pathogens from the waste storage facility or pond negatively impacting water quality.

After Situation: A 60mil, HPDE flexible liner is installed after a leak detection line is placed. The entire area is covered with geotextile. The measurement is based on the neatline of square feet of material installed to inside top slope. Environmental protection is provided by avoiding seepage losses from waste storage impoundments.

Scenario Feature Measure: Surface area of Liner Material (To Inside top of slope)

Scenario Unit: Square Foot

Scenario Typical Size: 21700

Total Scenario Cost: $36,302.45

Scenario Cost/Unit: $1.67

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Front End Loader, 185 HP	1619	Wheeled front end loader with horsepower range of 160 to 210. Equipment and power unit costs. Labor not included.	Hour	$110.28	4	$441.11
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.66	2420	$6,445.84
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$73.86	8	$590.87
Roller, vibratory, towed	1330	Towed vibratory smooth or tamping foot (sheepsfoot) roller compactor typically 25 ton. Equipment cost only. Does not include pulling equipment. Add Tractor or Dozer.	Hour	$65.25	4	$261.02
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$52.50	32	$1,680.09
Materials						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$31.05	45	$1,397.28
Pipe, PVC, 4", SCH 40	978	Materials: - 4" - PVC - SCH 40 - ASTM D1785	Foot	$4.31	300	$1,292.85
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Yard	$6.12	2420	$14,803.30
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	12	$388.11
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.29	40	$931.76
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	8	$297.91
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	64	$6,174.49

Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	16	$694.34

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	3	$903.47

Practice: 521A - Pond Sealing or Lining, Flexible Membrane

Scenario: #2 - Flexible liner used for Agrichemical Mixing Facility

Scenario Description: A flexible, geosynthetic membrane liner is installed to prevent seepage from an agricultural chemical handling facility. Geotextile is installed on entire area to cushion liner from subgrade damage. The liner is anchored with vents. Associated practices include Pond (378),Heavy Use Area Protection (561), Critical Area Planting (342), Access Road (560), Underground Ground Outlet (620), and Fence (382)

Before Situation: Soils on-site exhibit seepage rates in excess of acceptable limits. If not lined, soils will allow the passage of nutrients and pathogens from the waste storage facility or pond negatively impacting water quality.

After Situation: A flexible liner suitable for chemicals or pesticides is installed over geotextile. The measurement is based on the neatline of square foot of material installed to inside top of slope. Environmental protection is provided by avoiding seepage losses from spillage within facility designed to contain spillage.

Scenario Feature Measure: SF of liner to inside top

Scenario Unit: Square Foot

Scenario Typical Size: 2500

Total Scenario Cost: $5,702.47

Scenario Cost/Unit: $2.28

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Geotextile, woven	42	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	$2.66	102	$271.68
Hydraulic Excavator, .5 CY	930	Track mounted hydraulic excavator with bucket capacity range of 0.3 to 0.8 CY. Equipment and power unit costs. Labor not included.	Hour	$73.86	4	$295.43
Roller, static, smooth, self propelled	1392	Self propelled smooth drum static roller compactor, typically 1.5 ton with 34" roller. Equipment cost only. Does not include labor.	Hour	$15.27	2	$30.53
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$52.50	16	$840.05
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	4	$129.37
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.29	18	$419.29
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	8	$297.91
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	16	$1,543.62
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	8	$347.17
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	3	$903.47
Materials						
Synthetic Liner, 40 mil	1387	Synthetic 40 mil HDPE, LLDPE, EPDM, etc membrane liner material. Includes materials and shipping only.	Square Yard	$6.12	102	$623.94

Practice: 521B - Pond Sealing or Lining, Soil Dispersant

Scenario: #1 - Uncovered

Scenario Description: A 12” compacted soil liner treated with soil dispersant is constructed to reduce seepage from ponds or waste storage impoundment structures. Implementation includes incorporation of the soil dispersant with the soil liner under proper moisture conditions and compaction to the designed liner thickness in three lifts. The typical area is 43,560 square feet. Practice implementation may require filter compatibility with the subgrade (graded filter or geotextile). Associated practices: Waste Storage Facility (313), Pond (378)

Before Situation: Soils on-site exhibit seepage rates in excess of acceptable limits and are suitable for treatment with dispersants. If not lined, soils will allow the passage of nutrients and pathogens from the waste storage facility or pond negatively impacting water quality.

After Situation: A compacted soil liner treated with soil dispersant is constructed to reduce seepage from ponds or waste storage impoundment structuresThe installed liner reduces or prevents seepage losses, which reduces the delivery of nutrients and pathogens to sub-surface or surface water. The liner is constructed 1 foot thick over a 1 acrea area.

Scenario Feature Measure: Volume of Liner Material

Scenario Unit: Cubic Yard

Scenario Typical Size: 1613

Total Scenario Cost: $74,174.17

Scenario Cost/Unit: $45.99

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.87	1613	$7,860.86
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$67.93	16	$1,086.82
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.29	16	$372.71
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	$21.64	32	$692.61
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	2	$192.95
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	8	$347.17
Mobilization						
Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been included in the component price.	Dollar	$1.00	1	$1.00
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	1	$301.16
Materials						
Soil Dispersant	1490	Soil Amendment (tetrasodium pyrophosphate (TSPP), sodium tripolyphosphate (STPP), or soda ash or approved equivalent)	Ton	$484.46	130.7	$63,318.89

Practice: 521B - Pond Sealing or Lining, Soil Dispersant

Scenario: #2 - Covered

Scenario Description: A 12” compacted soil liner treated with a soil dispersant is constructed to reduce seepage from ponds or waste storage impoundment structures. Practice implementation includes incorporation of the dispersant with the soil liner under proper moisture conditions, compaction to the designed liner thickness, and placement of soil cover over the treated liner. The typical area is 43560 square feet. The liner is constructed in three areas then the entire area is covered with 12” of soil to protect the liner. Practice implementation may require filter compatibility with the subgrade (graded filter or geotextile). Payment is based on volume of treated liner. The cost of the soil cover is included in the payment. Associated practices: Waste Storage Facility (313), Pond (378)

Before Situation: Soils on-site exhibit seepage rates in excess of acceptable limits and are suitable for treatment with dispersants. If not lined, soils will allow the passage of nutrients and pathogens from the waste storage facility or pond negatively impacting water quality.

After Situation: A compacted soil liner treated with soil dispersant and soil cover is constructed to reduce seepage from ponds or waste storage impoundment structuresThe installed liner reduces or prevents seepage losses, which reduces the delivery of nutrients and pathogens to sub-surface or surface water. The liner is constructed 1 foot thick over a 1 acrea area with 1 foot of soil cover over compacted liner.

Scenario Feature Measure: Volume of Liner Material including Soil Cover over Liner

Scenario Unit: Cubic Yard

Scenario Typical Size: 3226

Total Scenario Cost: $82,035.02

Scenario Cost/Unit: $25.43

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.87	3226	$15,721.72
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$67.93	16	$1,086.82
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.29	16	$372.71
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	$21.64	32	$692.61
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	2	$192.95
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	8	$347.17
Mobilization						
Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been included in the component price.	Dollar	$1.00	1	$1.00
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	1	$301.16
Materials						
Soil Dispersant	1490	Soil Amendment (tetrasodium pyrophosphate (TSPP), sodium tripolyphosphate (STPP), or soda ash or approved equivalent)	Ton	$484.46	130.7	$63,318.89

Practice: 521C - Pond Sealing or Lining, Bentonite Sealant

Scenario: #1 - Bentonite Treatment, Uncovered

Scenario Description: A compacted soil liner treated with bentonite is constructed to reduce seepage from ponds or waste storage impoundment structures. Bentonite is incorporated with the soil under proper moisture conditions and compacted to designed liner thickness. Bentonite treated soil liner may require additional filter compatibility requirements with the subgrade (graded filter or geotextile) as described in the NRCS, National Engineering Handbook. Associated practices: Waste Storage Facility (313), Pond (378)

Before Situation: Soils on-site exhibit seepage rates in excess of acceptable limits and are suitable for treatment with dispersants. If not lined, soils will allow the passage of nutrients and pathogens from the waste storage facility or pond negatively impacting water quality.

After Situation: A compacted soil liner treated with bentonite is constructed to reduce seepage from ponds or waste storage impoundment structures. The liner is constructed 1 foot thick over a 1 acre area. The liner reduces or prevents seepage losses, which reduces the delivery of nutrients and pathogens to surface water.

Scenario Feature Measure: Volume of Liner Material

Scenario Unit: Cubic Yard

Scenario Typical Size: 1613

Total Scenario Cost: $128,538.11

Scenario Cost/Unit: $79.69

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Bentonite	41	Bentonite, includes materials (50# bag)	Each	$22.87	5227	$119,548.02
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.87	1613	$7,860.86
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$67.93	6	$407.56
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.29	6	$139.76
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	2	$192.95
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	2	$86.79
Mobilization						
Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been included in the component price.	Dollar	$1.00	1	$1.00
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	1	$301.16

Practice: 521C - Pond Sealing or Lining, Bentonite Sealant

Scenario: #2 - Bentonite Treatment, Covered

Scenario Description: A compacted soil liner treated with bentonite is constructed to reduce seepage from ponds or waste storage impoundment structures. Bentonite is incorporated with the soil under proper moisture conditions and compacted to designed liner thickness. A soil cover is placed over the treated liner. Payment is based on the volume of liner material and the cost of soil cover is included in the payment. Bentonite treated soil liner may require additional filter compatibility requirements with the subgrade (graded filter or geotextile) as described in the NRCS, National Engineering Handbook. implementation may require filter compatibility with the subgrade (graded filter or geotextile). Associated practices: Waste Storage Facility (313), Pond (378)

Before Situation: Soils on-site exhibit seepage rates in excess of acceptable limits and are suitable for treatment with dispersants. If not lined, soils will allow the passage of nutrients and pathogens from the waste storage facility or pond negatively impacting water quality.

After Situation: A compacted soil liner treated with bentonite is constructed to reduce seepage from ponds or waste storage impoundment structures. The liner is constructed 1 foot thick over a 1 acre area. A 1 foot soil cover is placed over the treated liner. The cost of installing the 1 foot cover is included in the payment of the treated material. The liner reduces or prevents seepage losses, which reduces the delivery of nutrients and pathogens to surface water.

Scenario Feature Measure: Volume of Liner Material (includes 1 foot of soil cover over liner)

Scenario Unit: Cubic Yard

Scenario Typical Size: 1613

Total Scenario Cost: $136,403.84

Scenario Cost/Unit: $84.57

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Bentonite	41	Bentonite, includes materials (50# bag)	Each	$22.87	5227	$119,548.02
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.87	3227	$15,726.59
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$67.93	6	$407.56
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.29	6	$139.76
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	2	$192.95
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	2	$86.79
Mobilization						
Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been included in the component price.	Dollar	$1.00	1	$1.00
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	1	$301.16

Practice: 521D - Pond Sealing or Lining, Compacted Clay Treatment

Scenario: #1 - Material haul < 2000 ft

Scenario Description: A compacted soil liner treated with compacted clay is constructed to reduce seepage from ponds or waste storage impoundment structures. Material is hauled from less than 1 mile away from site. Practice implementation includes compaction of the soil liner under proper moisture conditions to the designed liner thickness, and soil cover to protect the finished liner. Associated practices: Pond (378), Waste Storage Facility (313), and other waste impoundments

Before Situation: Soils on-site exhibit seepage rates in excess of acceptable limits. An adequate supply of soil suitable for constructing a clay liner without amendments is available at an economical haul distance within 1 mile of the site.

After Situation: A 12” thick compacted clay liner with 6” thick of soil cover is installed over 1 acre. Water conservation and environmental protection are provided by limiting seepage losses from ponds or waste storage impoundments.

Scenario Feature Measure: Volume of Liner Material (including volume of soil cover, as needed)

Scenario Unit: Cubic Yard

Scenario Typical Size: 2420

Total Scenario Cost: $30,422.07

Scenario Cost/Unit: $12.57

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.87	2420	$11,793.72
Excavation, clay, large equipment, 50 ft	1218	Bulk excavation of clay with dozer >100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$3.15	1613	$5,078.05
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$4.44	2420	$10,752.35
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	8	$771.81
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$574.99	3	$1,724.98
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	1	$301.16

Practice: 521D - Pond Sealing or Lining, Compacted Clay Treatment

Scenario: #2 - Material haul > 2000 feet

Scenario Description: A compacted soil liner treated with compacted clay is constructed to reduce seepage from ponds or waste storage impoundment structures. Material is hauled from over 1 mile away from site. Practice implementation includes compaction of the soil liner under proper moisture conditions to the designed liner thickness, and soil cover to protect the finished liner. Associated practices: Pond (378), Waste Storage Facility (313), and other waste impoundments

Before Situation: Soils on-site exhibit seepage rates in excess of acceptable limits. An adequate supply of soil suitable for constructing a clay liner without amendments is available at an economical haul distance over 1 mile from the site.

After Situation: A 12” thick compacted clay liner with 6” thick of soil cover is installed over 1 acre. Water conservation and environmental protection are provided by limiting seepage losses from ponds or waste storage impoundments. The typical haul distance is 3.3 miles.

Scenario Feature Measure: Volume of Liner Material (including volume of soil cover, as needed)

Scenario Unit: Cubic Yard

Scenario Typical Size: 2420

Total Scenario Cost: $39,824.37

Scenario Cost/Unit: $16.46

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic Yard	$4.87	2420	$11,793.72
Excavation, clay, large equipment, 50 ft	1218	Bulk excavation of clay with dozer >100 HP with average push distance of 50 feet. Includes equipment and labor.	Cubic Yard	$3.15	1613	$5,078.05
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$4.44	2420	$10,752.35
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic Yard	$2.58	2420	$6,240.50
Hauling, bulk, highway truck	1615	Hauling of bulk earthfill, rockfill, waste or debris. One-way travel distance using fully loaded highway dump trucks (typically 16 CY or 20 TN capacity). Includes equipment and labor for truck only. Does not include cost for loading truck.	Cubic Yard Mile	$0.39	8065	$3,161.80
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	8	$771.81
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$574.99	3	$1,724.98
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	1	$301.16

Practice: 338 - Prescribed Burning

Scenario: #1 - Understory Burn

Scenario Description: Prescribed burning is accomplished in 20 acre increments to limit the off-site disruption of the burn. The burn is managed to keep the fire cool enough to not cause mortality to residulate stand, but also to burn hot enough to reduce the understory accomulation of residues. The prescribed burn is applied according to a designed burn plan and the NRCS prescribed burning (338) standard. The fire hazard is reduced by reducing the fuel load available in the understory. Associated Practice(s): Firebreak(394)

Before Situation: An over accumulation of undersirable vegetation in the understory has a substantial wildfire risk due to the fuel load available in the understory. Leaf litter and debris are present throughout the stand. Competing and/or invasive species are hindering growth of desirable species.

After Situation: A licensed entity implements a prescribed burn on 20 acres to enhance the native species stand and reduce wildlfire risks. The prescribed burn controls competing and/or invasive species. Growing conditions are altered to enhance health and productivity of the more desirable plants.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 20

Total Scenario Cost: $1,672.69

Scenario Cost/Unit: $83.63

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	16	$595.81
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	2	$192.95
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	4	$173.58
Equipment Installation						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$38.47	8	$307.76
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	8	$205.17
Water tank, portable	1602	Portable water tank transported in a pick up truck. Typically with 200 gallon capacity includes tank with pump, hose and sprayer. Does not include the pickup truck. Equipment only.	Hour	$2.85	8	$22.82
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$83.16	2	$166.32
Materials						
Fuel, ignition fuel mixture	1596	Mixture of gasoline and diesel for ignition of prescribed burns. Materials only.	Gallon	$4.13	2	$8.27

Practice: 338 - Prescribed Burning

Scenario: #2 - Site Preparation

Scenario Description: A prescribed burn is implemented on a 5 acre site to eliminate the existing competition and debris to prepare site for planting, seeding, or permit natural seeding. A small 5 acre opening is created to promote a forest savannah habit within a forest that maintains early successional habitat for wildlife. Multiple sites are typically created throughout a management area. Small sites require intense management to ensure desired objectives are met and to reduce risk within forest stand. Associated Practice(s): Firebreak(394), Early Successional Habitat/Management (647), Upland Wildlife Habitat Management (645)

Before Situation: A site that was recently managed to remove the overstory has remaining slash, brush and grasses that dominate the site providing inadequate cover/shelter and food for desired wildlife species.

After Situation: A prescribed burn is implemented on the 5 acre site to eliminate the existing competition and debris. The grass, competing brush, and downed slah leftover from forestry activities are managed through the burn. Some bare ground is exposed. The burn alters the site to create forest openings. The burn prepares the site for seeding of early successional habitat or planting of desired vegetation. The altered site conditions promote growth of desired species to create a diverse plant community with adequate food and cover for wildlife.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 5

Total Scenario Cost: $919.50

Scenario Cost/Unit: $183.90

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	8	$297.91
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	1	$96.48
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	2	$86.79
Equipment Installation						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$38.47	4	$153.88
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	4	$102.58
Water tank, portable	1602	Portable water tank transported in a pick up truck. Typically with 200 gallon capacity includes tank with pump, hose and sprayer. Does not include the pickup truck. Equipment only.	Hour	$2.85	4	$11.41
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$83.16	2	$166.32
Materials						
Fuel, ignition fuel mixture	1596	Mixture of gasoline and diesel for ignition of prescribed burns. Materials only.	Gallon	$4.13	1	$4.13

Practice: 338 - Prescribed Burning

Scenario: #3 - Herbaceous Fuel

Scenario Description: A prescribed burn is applied on 50 acres according to a design burn plan and the NRCS Prescribed Burning standard and specifications to control undersirable species, improve wildlife habitat, improve plant productivity and/or quality, and maintain ecological processes. A typical 50 acre parcel with herbaceous and/or low volatile woody fuel with no high volatile fuels is burned. Burned firbreaks used to achieve total firebreak width are part of these burns, but the construction of the firebreak is not included. Associated Practice(s): Firebreak (394) Upland Wildlife Management Habitat Management (645)

Before Situation: A parcel of land with herbaceous fuel and/ or low volatile woody fuel with no high volatile fuels has undesirable plant composition due to reduced plant vigor, competing and invasive species, or improper livestock distribution.

After Situation: The desirable plant composition is restored, plant vigor improved and invasive species reduced. Habitat component for wildlife is improved.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 50

Total Scenario Cost: $1,900.34

Scenario Cost/Unit: $38.01

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	16	$595.81
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	2	$192.95
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	8	$347.17
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$45.80	1	$45.80
Equipment Installation						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$38.47	8	$307.76
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	8	$205.17
Water tank, portable	1602	Portable water tank transported in a pick up truck. Typically with 200 gallon capacity includes tank with pump, hose and sprayer. Does not include the pickup truck. Equipment only.	Hour	$2.85	8	$22.82
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$83.16	2	$166.32
Materials						
Fuel, ignition fuel mixture	1596	Mixture of gasoline and diesel for ignition of prescribed burns. Materials only.	Gallon	$4.13	4	$16.53

Practice: 338 - Prescribed Burning

Scenario: #4 - Volatile fuels < 4 ft tall

Scenario Description: A prescribed burn is applied on 50 acres according to a design burn plan and the NRCS Prescribed Burning standard and specifications to control undersirable species, improve wildlife habitat, improve plant productivity and/or quality, and maintain ecological processes. A typical 50 acre parcel with herbaceous and/or low volatile woody fuel and high volatile woody fuels less than 4 feet tall are burned. Burned firbreaks used to achieve total firebreak width are part of these burns, but the construction of the firebreak is not included. Associated Practice(s): Firebreak (394) Upland Wildlife Habitat Management (645)

Before Situation: A parcel of land with herbaceous fuel and/ or low volatile woody fuel and high volatile woody fuels less than 4 feet tall has undesirable plant composition due to reduced plant vigor, competing and invasive species, or improper livestock distribution.

After Situation: The desirable plant composition is restored, plant vigor improved and invasive species reduced. Forage production and quality for livestock and /or wildlife is improved.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 50

Total Scenario Cost: $2,468.30

Scenario Cost/Unit: $49.37

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	24	$893.72
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	3	$289.43
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	12	$520.75
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$45.80	1	$45.80
Equipment Installation						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$38.47	8	$307.76
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	8	$205.17
Water tank, portable	1602	Portable water tank transported in a pick up truck. Typically with 200 gallon capacity includes tank with pump, hose and sprayer. Does not include the pickup truck. Equipment only.	Hour	$2.85	8	$22.82
Mobilization						
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$83.16	2	$166.32
Materials						
Fuel, ignition fuel mixture	1596	Mixture of gasoline and diesel for ignition of prescribed burns. Materials only.	Gallon	$4.13	4	$16.53

Practice: 338 - Prescribed Burning

Scenario: #5 - Volatile fuels > 4 ft tall

Scenario Description: A prescribed burn is applied on 50 acres according to a design burn plan and the NRCS Prescribed Burning standard and specifications to control undersirable species, improve wildlife habitat, improve plant productivity and/or quality, and maintain ecological processes. A typical 50 acre parcel with herbaceous and/or low volatile woody fuel and high volatile woody fuels greater than 4 feet tall are burned. Burned firbreaks used to achieve total firebreak width are part of these burns, but the construction of the firebreak is not included. Associated Practice(s): Firebreak (394), Upland Wildlife Habitat Management (645)

Before Situation: A parcel of land with herbaceous fuel and/ or low volatile woody fuel and high volatile woody fuels greater than 4 feet tall has undesirable plant composition due to reduced plant vigor, competing and invasive species, or improper livestock distribution.

After Situation: The desirable plant composition is restored, plant vigor improved and invasive species reduced. Forage production and quality for livestock and /or wildlife is improved.

Scenario Feature Measure: Acres planned

Scenario Unit: Acre

Scenario Typical Size: 50

Total Scenario Cost: $3,109.05

Scenario Cost/Unit: $62.18

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	24	$893.72
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$96.48	4	$385.91
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	12	$520.75
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$45.80	2	$91.60
Equipment Installation						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$38.47	8	$307.76
Trailer, water tank	1598	Mobile 5,000 gal water tank mounted on a trailer. Equipment only. Does not include towing equipment.	Hour	$23.24	8	$185.90
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	8	$205.17
Water tank, portable	1602	Portable water tank transported in a pick up truck. Typically with 200 gallon capacity includes tank with pump, hose and sprayer. Does not include the pickup truck. Equipment only.	Hour	$2.85	12	$34.23
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	1	$301.16
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$83.16	2	$166.32

Materials

Fuel, ignition fuel mixture	1596	Mixture of gasoline and diesel for ignition of prescribed burns. Materials only.	Gallon	$4.13	4	$16.53

Practice: 528 - Prescribed Grazing

Scenario: #1 - Pasture Standard, Paddock Residency 3 or more days

Scenario Description: Design and implementation of a grazing system that will enhance pasture condition and ecosystem function as well as optimize efficiency and economic return through monitoring (ex:photo points, stubble height after grazing, etc) &record keeping. Associated Practices: Brush Management (314), Herbaceous Weed Control (315), Pond (378), Fence (382), Acess Control (472), Forage and Biomass Planting (512), Pipeline (516), Spring Development (574), Animal Trails and Walkways (575), Stream Crossing (578), Nutrient Management (590), Feed Management (592), Watering Facility (614), Water Well (642).

Before Situation: Current grazing system exhibits undesirable and inefficient use of forage plants and such use may have a negative impact on pasture condition, as well as soil and water resources. Stocking rates are likely higher than the current level of production and efficiency of use can support without management changes. There is currently no monitoring plan in place to evaluate change on the landscape.

After Situation: Prescribed grazing system is designed to protect the health and vigor of the plant communities that are in place. Livestock are managed in a way that enhances pasture condition and function through protection of sensitive areas, and efficient harvest of forage resources. Grazing system success will be evaluated through short term monitoring.

Scenario Feature Measure: Area of grazed pasture

Scenario Unit: Acre

Scenario Typical Size: 40

Total Scenario Cost: $1,221.27

Scenario Cost/Unit: $30.53

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	28	$606.04
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	14	$521.34
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$45.80	1	$45.80
Equipment Installation						
Rangeland/grassland field monitoring kit	967	Miscellaneous tools needed to complete rangeland/grassland monitoring. Materials may include camera, clippers, plot frame, scale, tape measure, etc. Includes materials and shipping only.	Each	$48.10	1	$48.10

Practice: 528 - Prescribed Grazing

Scenario: #2 - Pasture Intensive - Paddock Residency less than 3 days

Scenario Description: Design and implementation of a grazing system that will enhance pasture condition and ecosystem function as well as optimize efficiency and economic return through monitoring (ex: trend, composition, production, etc), record keeping. Associated Practices: Brush Management (314), Herbaceous Weed Control (315) Pond (378), Fence (382), Acess Control (472), Forage and Biomass Planting (512), Pipeline (516), Spring Development (574), Animal Trails and Walkways (575), Stream Crossing (578), Nutrient Management (590), Feed Management (592), Watering Facility (614), Water Well (642).

Before Situation: Current grazing system exhibits undesirable and inefficient use of forage plants and such use may have a negative impact on pasture condition, as well as soil and water resources. Stocking rates are likely higher than the current level of production and efficiency of use can support without management changes. There is currently no monitoring plan in place to evaluate change on the landscape.

After Situation: Prescribed grazing system is designed to protect the health and vigor of the plant communities that are in place. Livestock are managed in a way that enhances pasture condition and function through proper rest and recovery periods, protection of sensitive areas, proper utilization, and efficient harvest of forage resources. Grazing system success will be evaluated through long term monitoring.

Scenario Feature Measure: Area of grazed pasture

Scenario Unit: Acre

Scenario Typical Size: 40

Total Scenario Cost: $2,686.50

Scenario Cost/Unit: $67.16

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	45	$973.99
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	16	$694.34
Acquisition of Technical Knowledge						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	$45.80	1	$45.80
Equipment Installation						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$38.47	18	$692.47
Rangeland/grassland field monitoring kit	967	Miscellaneous tools needed to complete rangeland/grassland monitoring. Materials may include camera, clippers, plot frame, scale, tape measure, etc. Includes materials and shipping only.	Each	$48.10	1	$48.10
Materials						
Nutritional Balance Analyzer, fecal sample analysis only	1127	NIRS fecal analysis, animal performance report. Includes materials and shipping only.	Each	$38.64	6	$231.81

Practice: 528 - Prescribed Grazing

Scenario: #3 - Pasture Deferment of Interrupted Harvest

Scenario Description: Defer the pasture for 90 days and up to a growing season to manage for invasive weeds when necessary, to improve the health of the plants and/or provide nesting habitat for wildlife species. Keep records of dates out and monitor to determine when desired objectives of deferment are met. Associated Practices: Brush Management (314), Herbaceous Weed Control (315) Fence (382), Acess Control (472), Forage and Biomass Planting (512), Nutrient Management (590), Feed Management (592), Upland Wildlife Habitat Management (645).

Before Situation: Over-grazed pasture, a pasture with a low condition score, or a newly established pasture converted from cropland with a need for proper grazing management.

After Situation: Improve the health and vigor of the sward, through deferment of grazing and improve the nesting habitat for wildlife.

Scenario Feature Measure: Area of pasture deferred

Scenario Unit: Acre

Scenario Typical Size: 20

Total Scenario Cost: $949.63

Scenario Cost/Unit: $47.48

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	1	$37.24
Equipment Installation						
Rangeland/grassland field monitoring kit	967	Miscellaneous tools needed to complete rangeland/grassland monitoring. Materials may include camera, clippers, plot frame, scale, tape measure, etc. Includes materials and shipping only.	Each	$48.10	1	$48.10
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	1	$25.65
Trucking, moving livestock to new paddock	961	Livestock transportation costs to implement a grazing rotation using a gooseneck trailer 6'8" x 24'. Includes equipment, power unit and labor costs.	Mile	$4.55	5	$22.75
Foregone Income						
FI, Grazing AUMs	2079	Grazing is the Primary Land Use	Animal Unit Month	$16.00	51	$815.89

Practice: 528 - Prescribed Grazing

Scenario: #4 - Targeted Grazing

Scenario Description: Management of woody non-herbaceous plant species through the use of livestock that are closely herded to concentrate grazing on targeted shrubs. Animals graze for up to 21 days. Grazing may be repeated in subsequent years as needed. Typical area is moderate rolling to gentle sloping, moderately deep to deep soils that have dense stands of woody non-herbaceous species that exceed the desirable ecological site condition. This scenario is an alternative for organic producers. Associated Practices: Early Successional Habitat Development and Management (647), Restoration of Rare and Declining Habitats (643), Shallow Water Development and Management (646), Wetland Wildlife Habitat Management (644)

Before Situation: Area consist of dense stands of woody non-herbaceous species that exceed the desirable ecological site condition degrading forage quality, promoting noxious and invasive species, increasing risk of soil erosion and degrading wildlife habitat.

After Situation: Woody species are grazed to limit the regrowth of shrubs and achieve a desirable plant community based on species composition, structure, density, and canopy cover or height. Ecological site condition is progressing in an upward trend, hydrology and plant health and vigor is returning to near normal levels.

Scenario Feature Measure: Area treated

Scenario Unit: Acre

Scenario Typical Size: 5

Total Scenario Cost: $1,845.41

Scenario Cost/Unit: $369.08

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	10	$216.44
Equipment Installation						
All terrain vehicles, ATV	965	Includes equipment, power unit and labor costs.	Hour	$38.47	3	$115.41
Materials						
Animals used for biological weed control	1130	Goats, Llamas, Sheep - Includes all support: fence, water, dog, mob, etc. Includes materials and shipping only.	Head per day	$12.61	120	$1,513.55

Practice: 533 - Pumping Plant

Scenario: #1 - Electric Powered Pump 3 Hp or less

Scenario Description: A 2 hp submersible electric-powered pump is installed in a well or structure; or a close-coupled 2 Hp electric-powered centrifugal pump is mounted on a platform. It is used for watering livestock as part of a prescribed grazing system; or for pressurizing a small irrigation system; or for transferring liquid waste in a waste transfer system. Resource Concerns: Livestock Production Limitation - Inadequate livestock water; Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water. Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management; 516 - Livestock Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; and 614 - Watering Facility.

Before Situation: Livestock: The present gravity flow system is inadequate to provide the proper flow rate for a prescribed grazing system. Irrigation: Available water is at an insufficient pressure to allow for even distribution of water. Waste Transfer: Contaminated water needs to be moved to a containment facility.

After Situation: Livestock: Water is transferred at a sufficient rate and pressure to meet the requirements of a prescribed grazing system. Irrigation: A properly designed pump is installed to improve irrigation efficiency and reduce energy usage. Waste Transfer: Liquid wastes that have been collected through a waste transfer system are now efficiently transferred to an appropriate treatment or storage facility. For all these scenarios a 2 hp electric pump is being used.

Scenario Feature Measure: Pump Size Matchs need

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $1,798.31

Scenario Cost/Unit: $1,798.31

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	6	$223.43
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	1	$43.40
Equipment Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	6	$153.88
Materials						
Pump, <= 5 HP, pump and motor, fixed cost portion	1009	Fixed cost portion of a pump less than or equal to 5 HP pump and motor. This portion is a base cost and is not dependant on horsepower. The total cost of any pump will include this fixed cost plus a variable cost portion. The completed pump and motor will	Each	$549.88	1	$549.88
Pump, <= 5 HP, pump and motor, variable cost portion	1010	Variable cost portion of a pump less than or equal to 5 HP pump and motor. This portion IS dependent on the total horsepower for the pump. The total cost of any pump will include this variable cost plus the fixed cost portion. The completed pump and moto	Horsepower	$413.86	2	$827.72

Practice: 533 - Pumping Plant

Scenario: #2 - Electric Powered Pump 3 HP or less with Pressure Tank

Scenario Description: A 2 Hp submersible electric-powered pump is installed in a well or structure; or a close-coupled 1 Hp electric-powered centrifugal pump is mounted on a platform. It is used for watering livestock as part of a prescribed grazing system; or for pressurizing a small irrigation system. Resource Concerns: Livestock Production Limitation - Inadequate livestock water; Insufficient water - Inefficient use of irrigation water. Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management; 516 - Livestock Pipeline.

Before Situation: Livestock: The present gravity flow system is inadequate to provide the proper flow rate for a prescribed grazing system. Irrigation: Available water is at an insufficient pressure to allow for even distribution of water.

After Situation: Livestock: Water is transferred at a sufficient rate and pressure to meet the requirements of a prescribed grazing system. Irrigation: A properly designed pump is installed to improve irrigation efficiency and reduce energy usage.

Scenario Feature Measure: Pump Size Matchs need

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $2,613.35

Scenario Cost/Unit: $2,613.35

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$288.82	0.25	$72.20
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	2	$51.29
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$31.47	0.25	$7.87
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$0.85	10	$8.50
Pressure Tank, 40 gallon	1038	Pressure Tank, 40 gallon. Includes materials and shipping only.	Each	$463.67	1	$463.67
Pump, <= 5 HP, pump and motor, fixed cost portion	1009	Fixed cost portion of a pump less than or equal to 5 HP pump and motor. This portion is a base cost and is not dependant on horsepower. The total cost of any pump will include this fixed cost plus a variable cost portion. The completed pump and motor will	Each	$549.88	1	$549.88
Pump, <= 5 HP, pump and motor, variable cost portion	1010	Variable cost portion of a pump less than or equal to 5 HP pump and motor. This portion IS dependent on the total horsepower for the pump. The total cost of any pump will include this variable cost plus the fixed cost portion. The completed pump and moto	Horsepower	$413.86	2	$827.72
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	10	$216.44
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	10	$372.38
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	1	$43.40

Practice: 533 - Pumping Plant

Scenario: #3 - Electric Powered Pump 3 to 10 HP

Scenario Description: This is a close-coupled 7.5 Hp electric-powered centrifugal pump, mounted on a platform. It is for a large, high-pressure (200 psi) livestock pipeline, used for watering livestock as part of a prescribed grazing system; or for pressurizing a medium-sized (200 gpm and 40 psi) irrigation system; or a medium-sized (400 gpm and 20 psi) waste transfer system. Resource Concerns: Livestock Production Limitation - Inadequate livestock water; Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water. Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management; 516 - Livestock Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; and 614 - Watering Facility.

Before Situation: Livestock: Current system consists of a series of medium pressure and inefficient pump stations to transport water to a distant and higher-elevation watering facility. Irrigation: An existing irrigation system employs an inefficient, improperly sized pump, that prevents efficient water application resulting in water loss and high energy use. Waste Transfer: Various types of semi-solid or liquid waste are uncollected causing surface and ground water issues. Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

After Situation: Livestock: A single, efficient, high-pressure pumping plant is installed, eliminating intermediate pump stations, reducing energy use and enabling better system management. Irrigation: A properly designed and efficient pumping plant is installed, reducing energy use and improving irrigation efficiency. Waste Transfer: Collected wastes are now efficiently transferred to an appropriate treatment or storage facility.

Scenario Feature Measure: Pump Size Matchs need

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $3,778.82

Scenario Cost/Unit: $3,778.82

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$288.82	0.5	$144.41
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	8	$205.17
Materials						
Pump, > 5 HP to 30 HP, pump and motor, fixed cost portion	1011	Fixed cost portion of a pump between 5 and 30 HP, including the pump and motor. This portion is a base cost for the pump and is not dependant on horsepower. The total cost will include this fixed cost plus a variable cost portion. Includes material and shipping only.	Each	$1,968.95	1	$1,968.95
Pump, > 5 HP to 30 HP, pump and motor, variable cost portion	1012	Variable cost portion of a pump between 5 and 30 HP, including the pump and motor. This portion is dependent on the total horsepower for the pump. The total cost will include this variable cost plus a fixed cost portion. Includes material and shipping only.	Horsepower	$125.33	7.5	$939.97
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	8	$173.15
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	8	$347.17

Practice: 533 - Pumping Plant

Scenario: #4 - Electric Powered Pump 10 to 40 HP

Scenario Description: This is a close-coupled, 3-phase, 25 Hp electric-powered centrifugal pump mounted on a platform for pressurizing a medium-sized (600 gpm and 50 psi) sprinkler or large microirrigation (850 gpm and 35 psi) system or a large-sized surface irrigaiton system (1,200 gpm) or a large-sized (1,200 gpm and 25 psi) waste transfer system. Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water. Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management; 313 - Waste Storage Facility; 634 - Waste Transfer; and 614 - Watering Facility.

Before Situation: Irrigation: An existing irrigation system employs an inefficient, improperly sized pump that prevents efficient water application resulting in water loss and high energy use. Waste Transfer: Various types of semi-solid or liquid waste are uncollected causing surface and ground water issues. Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

After Situation: Irrigation: A properly designed and efficient pumping plant is installed, reducing energy use and improving irrigation efficiency. Waste Transfer: Collected wastes are now efficiently transferred to an appropriate treatment or storage facility or to a distribution system.

Scenario Feature Measure: Pump Size Matchs need

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $8,604.64

Scenario Cost/Unit: $8,604.64

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$65.99	8	$527.88
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$288.82	2	$577.64
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	8	$258.74
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	$21.64	32	$692.61
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	4	$148.95
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	16	$694.34
Materials						
Pump, > 5 HP to 30 HP, pump and motor, fixed cost portion	1011	Fixed cost portion of a pump between 5 and 30 HP, including the pump and motor. This portion is a base cost for the pump and is not dependant on horsepower. The total cost will include this fixed cost plus a variable cost portion. Includes material and shipping only.	Each	$1,968.95	1	$1,968.95
Pump, > 5 HP to 30 HP, pump and motor, variable cost portion	1012	Variable cost portion of a pump between 5 and 30 HP, including the pump and motor. This portion is dependent on the total horsepower for the pump. The total cost will include this variable cost plus a fixed cost portion. Includes material and shipping only.	Horsepower	$125.33	25	$3,133.22
Mobilization						

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32

Practice: 533 - Pumping Plant

Scenario: #5 - Electric Powered Pump over 60 HP

Scenario Description: This is a close-coupled, 3-phase, 70 HP electric-powered centrifugal pump mounted on a platform for pressurizing a large-sized (1,200 gpm and 50 psi) sprinkler or very large microirrigation (1,700 gpm and 35 psi) system or a very large-sized surface irrigation system (2,800 gpm) or a very large-sized (2,400 gpm and 25 psi) waste transfer system. Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water. Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 449 - Irrigation Water Management; 313 - Waste Storage Facility; and 634 - Waste Transfer.

Before Situation: Irrigation: An existing irrigation system employs an inefficient, improperly sized pump that prevents efficient water application resulting in water loss and high energy use.

After Situation: Irrigation: A properly designed and efficient pumping plant is installed, reducing energy use and improving irrigation efficiency.

Scenario Feature Measure: Pump Size Matchs need

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $18,693.89

Scenario Cost/Unit: $18,693.89

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$65.99	8	$527.88
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$288.82	2	$577.64
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	56	$1,436.19
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	8	$258.74
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	$21.64	56	$1,212.07
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	8	$297.91
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	56	$2,430.18
Materials						
Pump, > 30 HP, pump and motor, fixed cost portion	1013	Fixed cost portion of a pump greater than 30 HP, including the pump and motor. This portion is a base cost for the pump and is not dependant on horsepower. The total cost will include this fixed cost plus a variable cost portion. Includes material and shipping only.	Each	$4,657.54	1	$4,657.54
Pump, >30 HP, Pump and motor, variable cost portion	1014	Variable cost portion of a pump greater than 30 HP, including the pump and motor. This portion is dependent on the total horsepower for the pump. The total cost will include this variable cost plus a fixed cost portion. IIncludes material and shipping only.	Horsepower	$95.62	70	$6,693.43
Mobilization						

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32

Practice: 533 - Pumping Plant

Scenario: #6 - Variable Frequency Drive

Scenario Description: This is an installation of electrical and electronic components designed to vary the frequency of the voltage to an electric motor and thus the ability to vary the speed of the motor. This directly affects pressure and flowrate. This also could give the operator the flexibility to operate several systems separately or at the same time. In many cases, electric pumps at or under 10 Hp are single phase and need to be replaced by a 3-phase motor that is not covered in this scenario. Resource concerns: Insufficient water - Inefficient use of irrigation water; Inefficient energy use - Equipment and facilities and Farming/ranching practices and field operations. Associated Practices: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management; 516 - Livestock Pipeline; and 614 - Watering Facility.

Before Situation: Standard electrical connection from electrical utility to pump motor. No capability to match pump output pressure and/or flowrate to field(s) need(s). Result is over/under pressure(s) and/or flow rate(s), possible hydraulic anomalies, energy loss, and or inefficient water application in the irrigation system.

After Situation: VFD Modifications are implemented at the pump site to allow for varying the speed of a 40 Hp electric motor to match the pressure and flow requirements for a center pivot irrigation system.

Scenario Feature Measure: Pump Power Requirement

Scenario Unit: Horsepower

Scenario Typical Size: 50

Total Scenario Cost: $11,663.39

Scenario Cost/Unit: $233.27

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total

Materials

Variable Speed Drive, 50 HP	1288	Variable speed drive for 50 Horsepower electric motor. Does not include motor. Materials only.	Horsepower	$233.27	50	$11,663.39

Practice: 533 - Pumping Plant

Scenario: #7 - Internal Combustion Powered Pump 7.5HP or less

Scenario Description: The typical scenario supports replacement of a pump in an existing irrigation system on cropland with a 5 HP pump. Size of pump is determined by required GPM and pressure derived from a design for specific irrigation system on cropland. Scenario could also be used for a 5 HP pump for silage leachate, barnyard runoff, and milk house waste (as part of a waste transfer system) at farm headquarters. The combination of higher solids content and volume require a larger horse power pump. This liquid manure pump is used to transfer semi-solid manure from a small reception pit located either below a barnyard or at the end of a free-stall barn or scrape alley. Resource Concerns: Livestock Production Limitation - Inadequate livestock water; Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water. Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 449 - Irrigation Water Management; 516 - Livestock Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; and 614 - Watering Facility.

Before Situation: Irrigation: Either an existing irrigation system employs an inefficient, improperly-sized pump that leads to inefficient water delivery resulting in high energy costs, or Waste Transfer: various types of semi-solid or liquid waste at the headquarters is uncollected causing surface and ground water issues.

After Situation: Irrigation Setting: For irrigation system, a properly designed pump is installed, reducing water and energy usage. Waste Transfer Setting: For semi-solid or liquid waste, wastes that have been collected through a waste transfer system are now efficiently transferred to appropriate treatment or storage facilities or crop application. Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

Scenario Feature Measure: Pump Size Matchs need

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $3,460.97

Scenario Cost/Unit: $3,460.97

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$288.82	0.25	$72.20
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	2	$51.29
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	4	$86.58
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	4	$173.58
Materials						
Pump, < 50 HP, Pump &ICE power unit	1027	Materials, labor, controls: < 50 HP Pump &ICE power unit	Horsepower	$615.46	5	$3,077.31

Practice: 533 - Pumping Plant

Scenario: #8 - Internal Combustion Powered Pump 7.5 to 39 HP

Scenario Description: The typical scenario supports installation of a pump in an existing irrigation system or installation of a new pump on cropland with a 10 BHP pump. Size of pump is determined by required GPM and pressure derived from a design for specific irrigation system on cropland. The combination of higher solids content and volume require a larger horse power pump. This liquid manure pump is used to transfer semi-solid manure from a small reception pit located either below a barnyard or at the end of a free-stall barn or scrape alley. Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water. Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management; 313 - Waste Storage Facility; 634 - Waste Transfer; 436 - Irrigation Reservoir; and 447 - Irrigation System, Tailwater Recovery; and 614 - Watering Facility.

Before Situation: Irrigation: Either an existing irrigation system employs an inefficient, improperly-sized pump that leads to inefficient water delivery resulting in high energy costs, or Waste Transfer: various types of semi-solid or liquid waste at the headquarters is uncollected causing surface and ground water issues.

After Situation: Irrigation Setting: For irrigation system, a properly designed pump is installed, reducing water and energy usage. Waste Transfer Setting: For semi-solid or liquid waste, wastes that have been collected through a waste transfer system are now efficiently transferred to appropriate treatment or storage facilities or crop application. Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

Scenario Feature Measure: Pump Size Matchs need

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $9,619.82

Scenario Cost/Unit: $9,619.82

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$65.99	8	$527.88
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$288.82	1	$288.82
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	4	$102.58
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	8	$258.74
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	$21.64	32	$692.61
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	8	$297.91
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	16	$694.34
Materials						
Pump, < 50 HP, Pump &ICE power unit	1027	Materials, labor, controls: < 50 HP Pump &ICE power unit	Horsepower	$615.46	10	$6,154.63
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32

Practice: 533 - Pumping Plant

Scenario: #9 - Internal Combustion Powered Pump 40 to 75 HP

Scenario Description: The typical scenario supports installation of a pump in an existing irrigation system or installation of a new pump on cropland with a 71 BHP pump. Size of pump is determined by required GPM and pressure derived from a design for specific irrigation system on cropland. The combination of higher solids content and volume require a larger horse power pump. This liquid manure pump is used to transfer semi-solid manure from a small reception pit located either below a barnyard or at the end of a free-stall barn or scrape alley. Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water. Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management; 313 - Waste Storage Facility; 634 - Waste Transfer; 436 - Irrigation Reservoir; and 447 - Irrigation System, Tailwater Recovery; and 614 - Watering Facility.

Before Situation: Irrigation: Either an existing irrigation system employs an inefficient, improperly-sized pump that leads to inefficient water delivery resulting in high energy costs, or Waste Transfer: various types of semi-solid or liquid waste at the headquarters is uncollected causing surface and ground water issues.

After Situation: Irrigation Setting: For irrigation system, a properly designed pump is installed, reducing water and energy usage. Waste Transfer Setting: For semi-solid or liquid waste, wastes that have been collected through a waste transfer system are now efficiently transferred to appropriate treatment or storage facilities or crop application. Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

Scenario Feature Measure: Pump Size Matchs need

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $30,054.36

Scenario Cost/Unit: $30,054.36

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$65.99	8	$527.88
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$288.82	1	$288.82
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	4	$102.58
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	8	$258.74
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	$21.64	32	$692.61
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	8	$297.91
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	16	$694.34
Materials						
Pump, > 70 HP, Pump &ICE power unit	1029	Materials, labor, controls: > 70 HP Pump &ICE power unit	Horsepower	$374.50	71	$26,589.17
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32

Practice: 533 - Pumping Plant

Scenario: #10 - Internal Combustion Powered Pump over 75 HP

Scenario Description: The typical scenario supports replacement of a pump in an existing irrigation system or installation of a new pump on cropland that is 75 break HP pump or larger. Size of pump is determined by required GPM and pressure derived from a design for specific irrigation system on cropland. Scenario could also be used for a pump for silage leachate, barnyard runoff, and milk house waste (as part of a waste transfer system) at farm headquarters. Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water. Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management; 313 - Waste Storage Facility; 634 - Waste Transfer; and 614 - Watering Facility.

Before Situation: Irrigation: Either an existing irrigation system employs an inefficient, improperly-sized pump that leads to inefficient water delivery resulting in high energy costs, or Waste Transfer: various types of semi-solid or liquid waste at the headquarters is uncollected causing surface and ground water issues.

After Situation: Irrigation Setting: For irrigation system, a properly designed pump is installed, reducing water and energy usage. Waste Transfer Setting: For semi-solid or liquid waste, wastes that have been collected through a waste transfer system are now efficiently transferred to appropriate treatment or storage facilities or crop application. Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

Scenario Feature Measure: Pump Size Matchs need

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $41,948.32

Scenario Cost/Unit: $41,948.32

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$65.99	8	$527.88
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$288.82	2	$577.64
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	6	$153.88
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	8	$258.74
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	$21.64	48	$1,038.92
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	8	$297.91
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	24	$1,041.51
Materials						
Pump, > 70 HP, Pump &ICE power unit	1029	Materials, labor, controls: > 70 HP Pump &ICE power unit	Horsepower	$374.50	100	$37,449.54
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32

Practice: 533 - Pumping Plant

Scenario: #11 - Windmill Powered Pump

Scenario Description: A windmill is installed in order to supply a reliable water source for livestock and/or wildlife. The windmill includes the tower, concrete footings, wheel blade unit, sucker rod, down pipe, gear box, pump, plumbing, and well head protection concrete pad. The typical scenario will be a windmill system with a 10 ft diameter mill and 27-foot tower which is pumping from a 150-foot well. As a result of installing this windmill, resource concerns of inadequate stock water, plant establishment, growth, productivity, health, and vigor, and water quantity can be addressed. Resource Concerns: Insufficient stockwater.

Before Situation: In a rangeland or pasture setting, a reliable source of water for livestock is not available, or the spacing between water sources is such that grazing distribution and plant health are adversely impacted.

After Situation: A windmill, with a wheel ranging from 6' to 16' in diameter, will be installed over a well that is located to provide a reliable source of livestock water at the rate of at least 2 gpm, to facilitate proper grazing distribution and improved plant health. To increase reliability, water is pumped into a storage tank to provide a given number of days of supply. Installation includes the footings, wellhead protection concrete pad, tower, gear box, sail, sucker rod, down hole accessories, and a short outlet pipe to a storage tank.

Scenario Feature Measure: Each Mill Wheel

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $10,660.69

Scenario Cost/Unit: $10,660.69

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Aerial lift, telescoping bucket	1893	Aerial lift, bucket truck or cherry picker, typical 40' boom. Equipment only.	Hour	$49.66	8	$397.30
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$288.82	2	$577.64
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	4	$102.58
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	32	$692.61
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	16	$694.34
Materials						
Windmill, 10', fan diameter	1036	Includes materials costs for windmill head and 27’ tower	Each	$7,593.90	1	$7,593.90
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32

Practice: 533 - Pumping Plant

Scenario: #12 - Photovoltaic Powered Pump

Scenario Description: The typical scenario assumes installation of a submersible solar-powered pump in a well or a live stream. The installation includes the pump, wiring, drop pipe, solar panels, mounts, inverter, and all appurtenances. Note: It is generally not advisable to use a storage battery for a number of reasons. A storage tank is generally the most efficient method to store energy. Grazing - Livestock exclusion from surface water will result in improved surface water quality and reduced erosion. Irrigation - energy consumption will be reduced and the increased pressure and flow rates will improve irrigation efficiency. Resource Concerns: Insufficient stockwater. Associated Practices include: 374 - Farmstead Energy Improvement; 382 - Fence; 430 - Irrigation Pipeline; 436 - Irrigation Reservoir; 516 - Livestock Pipeline; 561 - Heavy Use Area Protection; and, 614 - Watering Facility.

Before Situation: Livestock: Inadequate supply or location of water for a prescribed grazing system. Eroded stream banks and degraded water quality due to livestock access to stream. Cattle are not well-distributed because of remote water location. Irrigation: Pressure and flow rate is insufficient for uniform irrigation.

After Situation: The typical scenario assumes installation of a 600-watt photovoltaic (PV) panel, capable of operating a 1/4 Hp (0.25 Hp) solar-powered submersible pump in a well or other water source (Notes: 1) A PV panel is rated under standard and ideal conditions which will most likely not be replicated in the field; 2) 1 Hp is defined as 746 watts; 3) It is reasonable to expect a 1/4 Hp solar-powered submersible pump to deliver about 1.5 gpm and develop a pressure at the pump outlet of about 60 psi.). The installation includes the pump, wiring, pipeline in the well, solar panels, frame mounts, inverter, and all appurtenances. Water will be pumped to an existing storage tank at a higher elevation from which it will be used to pressurize the Livestock Pipeline (516) or Irrigation Pipeline (430). Grazing - Livestock exclusion from surface water will result in improved surface water quality and reduced erosion. Grazing has potential to be well distributed. Irrigation: Improved pressure and flow rate will improve irrigation efficiency.

Scenario Feature Measure: Solar Pump

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $7,199.24

Scenario Cost/Unit: $7,199.24

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	16	$346.31
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	2	$86.79
Equipment Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	8	$205.17
Materials						
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$0.85	250	$212.50
Solar Pumping System, Fixed Cost Portion	2495	Fixed cost portion of a solar powered pumping system. This portion is a base cost for a complete system including the photovoltaic panels, pumping plant, support braces, electric controllers, service drop, etc., and is not dependant on KiloWatt. The total cost will include this fixed cost plus a variable cost portion. Includes the cost of materials only.	Each	$2,896.94	1	$2,896.94
Solar Pumping System, Variable Cost Portion	2496	Variable cost portion of a solar powered pumping system. This portion IS dependent upon the total kilowatts of the photovoltaic panels, but also includes the pumping plant, support braces, electric controllers, service drop, etc. The total cost will include this variable cost plus a fixed cost portion. Includes the cost of materials only.	Kilowatt	$5,752.56	0.6	$3,451.53

Practice: 533 - Pumping Plant

Scenario: #13 - Water Ram Pump

Scenario Description: A water ram is used to transfer water from a live stream to a Watering Facility (614) or small Irrigation Reservoir (436) utilizing the energy of moving water to transfer a portion of that water to a higher elevation. It is anchored to a small concrete pad. Bypass water (which could easily be 90% of the water diverted from the stream) is returned to the stream or transferred in a pipe, to a lower elevation tank (614 or 436), without erosion or impairment to water quality. In the livestock scenario, the objective is to provide water to the cattle outside of a live stream or other natural water source thereby eliminating a significant erosion situation while also improving water quality. The cattle thus have access to drinking water without having to enter the stream. The water ram may need to be fenced for protection from curious bovines. While it is generally not considered practical for irrigation, in the irrigation scenario, water can be retrieved from a stream and stored in a small 436 to provide water for a very small (0.1 acre) irrigation system. Resource Concerns: Insufficient stockwater. Associated Practices: 374 - Farmstead Energy Improvement; 382 - Fence; 430 - Irrigation Pipeline; 436 - Irrigation Reservoir; 516 - Livestock Pipeline; 561 - Heavy Use Area Protection; and, 614 - Watering Facility.

Before Situation: Water in a nearby stream is not available at the desired location, pressure and/or flow rate.

After Situation: A 2" diameter inlet pipe is installed and connected to a water ram pump with all appurtenances and anchored to a concrete pad (9 ft x 4 ft x 5 in) or other appropriate secure base. Depending upon the application, either a 1-inch diameter Livestock Pipeline (516) or an Irrigation Pipeline (430) is installed from the water ram to a 5,000 gallon storage facility. Improved water quantity or quality, grazing management, plant diversity, animal health, and/or irrigation purposes as outlined in the appropriate NRCS irrigation system standard. A 2" water ram, with 10 gpm of inlet flow and 10 feet of drop, can supply about 1.0 gpm to a location about 50 feet higher than the water ram.

Scenario Feature Measure: Number of Ram Pumps

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $1,483.46

Scenario Cost/Unit: $1,483.46

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$288.82	0.5	$144.41
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	8	$205.17
Labor						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$21.64	8	$173.15
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	8	$347.17
Materials						
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$0.85	50	$42.50
Pump, Ram	1114	Ram pump kit, 2 inch. Includes materials and shipping only.	Each	$571.06	1	$571.06

Practice: 533 - Pumping Plant

Scenario: #14 - Livestock Nose Pump

Scenario Description: A Nose Pump is a diaphragm pump located in a pasture for the purpose of providing water to cattle. For a permanent installation, it is typical to also install Heavy Use Area Protection (561) (separate contract item) where the cattle congregate around the pump. It is powered and operated by cattle to transfer water from a stream to a drinking bowl. The objective is to provide water to the cattle outside of a live stream or other natural water source thereby eliminating a significant erosion situation and while also improving water quality. The cattle thus have access to drinking water without having to enter the stream. Generally one nose pump is adequate for 20 cattle. Resource Concerns: Insufficient stockwater; Inefficient energy use - Equipment and facilities. Associated Practices include: 374 - Farmstead Energy Improvement; 382 - Fence; 516 - Livestock Pipeline; 561 - Heavy Use Area Protection; and, 614 - Watering Facility.

Before Situation: Livestock have open access to a live stream or other existing natural water supply. Water supply is contaminated due to animal activity and stream banks are eroded on a daily basis. Improper cattle distribution results in poor water quality, poor grazing distribution, over grazing, and soil erosion.

After Situation: One nose pump is installed with all appurtenances anchored to concrete pad with 6"x6"x10 Gauge reinforcement wire (9 ft x 4 ft x 5 in) or other appropriate secure base to supply water to cattle for improved livestock herd management. Additional Heavy Use Area Protection (561) in the form of crushed rock and at least 5 feet wide, may be installed (separate contract item) surrounding the concrete pad. Improved: water quality, soil quality, grazing management, plant diversity, and animal health.

Scenario Feature Measure: Number of Pumps

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $513.79

Scenario Cost/Unit: $513.79

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total

Materials

Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$31.47	1.2	$37.77
Nose Pump	1052	Materials and delivery.	Each	$374.14	1	$374.14
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$0.85	25	$21.25

Labor

Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	1	$37.24
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	1	$43.40

Practice: 533 - Pumping Plant

Scenario: #15 - Electric or Ram Manure Pump

Scenario Description: This scenario involves a eletric driven pump to transfer semi-solid/ liquid manure (as part of a waste transfer system) at the farm headquarters to a Waste Storage Facility - 313. Electricity is readily available and is a practical alternative. Another variation would be a electric motor driven horizontal ram pump set in a concrete base for small operations to transfer semi-solid/ liquid manure. Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters Associated Practices include: 590 - Nutrient Management; 378 - Pond; 313 - Waste Storage Facility; 367 - Roofs and Covers; and 634 - Waste Transfer.

Before Situation: Waste Transfer Setting: various types of semi-solid or liquid waste at the headquarters are uncollected causing surface and ground water issues. A transfer method for waste is needed. Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

After Situation: Wastes that have been collected through a waste transfer system are now efficiently transferred from a Waste Storage Facility (313) to an appropriate treatment facility. Typcial farm does not have 3 phase power. Maximum motor size is 10 hp but with delayed start can use 2 motors, thus use (2) 10 hp electric motors to run vertical shaft pump that will typically will move 300-600 gallons per minute and is kept mounted at that location. A similar substitution would be a Hydralic ram pump driven by an electric motor.Awaiting new cost component to use for a Vertical shaft pump, 10' deep powered by Twin 10 HP motors to allow use on single phase power

Scenario Feature Measure: Each pump

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $11,795.88

Scenario Cost/Unit: $11,795.88

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	3	$111.71
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	1	$43.40
Materials						
Effluent pump appertenances	2162	Controller for pump system with timer, event counter and run time meter, 3 float switch assembly and alarm system with electrical connections.	Each	$2,689.72	1	$2,689.72
Pump, > 5 HP to 30 HP, pump and motor, fixed cost portion	1011	Fixed cost portion of a pump between 5 and 30 HP, including the pump and motor. This portion is a base cost for the pump and is not dependant on horsepower. The total cost will include this fixed cost plus a variable cost portion. Includes material and shipping only.	Each	$1,968.95	2	$3,937.90
Pump, > 5 HP to 30 HP, pump and motor, variable cost portion	1012	Variable cost portion of a pump between 5 and 30 HP, including the pump and motor. This portion is dependent on the total horsepower for the pump. The total cost will include this variable cost plus a fixed cost portion. Includes material and shipping only.	Horsepower	$125.33	20	$2,506.57
Pump, > 5 HP to 30 HP, pump and motor, variable cost portion	1012	Variable cost portion of a pump between 5 and 30 HP, including the pump and motor. This portion is dependent on the total horsepower for the pump. The total cost will include this variable cost plus a fixed cost portion. Includes material and shipping only.	Horsepower	$125.33	20	$2,506.57

Practice: 533 - Pumping Plant

Scenario: #16 - Large piston Manure Pump

Scenario Description: This scenario involves a large piston pump with hopper used to transfer heavily bedded manure or sand laden manure (as part of a waste transfer system) at the farm headquarters to a Waste Storage Facility - 313. Pump is set in concrete pit. Additional safety value is requried. Site topography or limited space requires transfer of wastes to other location. Gravity not an option. Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters; Associated Practices include: 590 - Nutrient Management; 378 - Pond; 313 - Waste Storage Facility; 367 - Roofs and Covers; and 634 - Waste Transfer and Roofs and Cover(367)

Before Situation: Waste Transfer Setting: various types of semi-solid or liquid waste at the headquarters are uncollected causing surface and ground water issues. A transfer method for waste is needed. Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

After Situation: A large piston pump with hopper set in a concrete pit used to transfer semi-solid manure with sand (as part of a waste transfer system) at the farm headquarters from a Waste Storage Facility - 313. An additional value is installed to allow access to pump for repairs. Wastes that have been collected through a waste transfer system are now efficiently transferred from a Waste Storage Facility (313) to an appropriate treatment facility.

Scenario Feature Measure: Each pump

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $36,529.39

Scenario Cost/Unit: $36,529.39

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$449.19	4	$1,796.76
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$288.82	1.5	$433.23
Hydraulic Excavator, 1 CY	931	Track mounted hydraulic excavator with bucket capacity range of 0.8 to 1.5 CY. Equipment and power unit costs. Labor not included.	Hour	$133.90	8	$1,071.20
Truck, Concrete Pump	1211	Concrete pump, normally truck mounted. Use this item in association with other concrete components when job requires placement by other than normal chutes. Include drive and setup time in quantity; therefore, do not include mobilization. Includes equipment and operator.	Hour	$149.05	2	$298.11
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$31.47	1.5	$47.21
Pump, Manure, Solid Piston	2157	Pump, Manure, Solid Piston, Hydraulically Actuated, 12" or greater discharge, 7.5 HP w/ accessories. Includes delivery.	Each	$27,503.10	1	$27,503.10
Swing Check Valve, metal, 12"	2082	12" swing check valve for back flow prevention, ductile iron metal body with flange mount and lever shaft. Materials only.	Each	$4,130.78	1	$4,130.78
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	8	$258.74
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	2	$86.79
Mobilization						

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	3	$903.47

Practice: 533 - Pumping Plant

Scenario: #17 - <50gpm Irrg PTO pump

Scenario Description: This scenario involves a smaller capacity PTO driven pump to transfer water for an irrigation system from a Pond - 378 (includes backflow prevention as appropriate) or other suitable water source to cropland. PTO driven pump is selected because the landowner has equipment available to supply power to the pump. Electricity is not readily available and/or a stationary engine is not a practical alternative. Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water. Associated Practices include: 430 - Irrigation Pipeline; 442 - Irrigation System, Sprinkler; 449 - Irrigation Water Management

Before Situation: Irrigation Setting: An existing surface irrigation system employs an inefficient, improperly sized pump that leads to inefficient water delivery resulting in high energy costs; Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

After Situation: Irrigation Setting: A properly designed PTO-driven pump is installed, to transfer water to an Irrigation Pipeline (430) or Irrigation Canal or Lateral (320). The pump typically will move 30 gallons per minute(irrigation)

Scenario Feature Measure: Each pump

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $778.38

Scenario Cost/Unit: $778.38

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	1	$43.40
Materials						
Aggregate, gravel, washed, pea gravel	1331	Washed and graded pea gravel river stone. Includes materials and local delivery within 20 miles of quarry.	Cubic Yard	$34.69	3	$104.08
Pump, Ag Water PTO, 22 GPM	1115	Ag Water PTO Pump, 22 GPM, 1" diameter. Includes materials, labor, controls and shipping.	Each	$630.90	1	$630.90

Practice: 533 - Pumping Plant

Scenario: #18 - 50 to 500 gpm PTO Pump

Scenario Description: This scenario involves a PTO driven pump to transfer water for an irrigation system from a Pond - 378 (includes backflow prevention as appropriate) or other suitable water source to cropland. PTO driven pump is selected because the landowner has equipment available to supply power to the pump. Electricity is not readily available and/or a stationary engine is not a practical alternative. Waste Transfer: PTO pump can also be used to transfer low solids manure from existing waste storage facility to remote storage or in pipeline for final application on land. Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water. Associated Practices include: 430 - Irrigation Pipeline; 442 - Irrigation System, Sprinkler; 449 - Irrigation Water Management

Before Situation: Irrigation Setting: An existing surface irrigation system employs an inefficient, improperly sized pump that leads to inefficient water delivery resulting in high energy costs; Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

After Situation: Irrigation Setting: A properly designed PTO-driven pump is installed, to transfer water to an Irrigation Pipeline (430) or Irrigation Canal or Lateral (320). Waste Transfer Setting: Wastes that have been collected through a waste transfer system are now efficiently transferred from a Waste Storage Facility (313) to an appropriate treatment facility or to an irrigation system. The pump typically will move 300 gallons per minute(irrigation) or 200 gpm (waste)and is portable so that it can be used at several locations.

Scenario Feature Measure: Each pump

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $4,064.58

Scenario Cost/Unit: $4,064.58

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$31.47	3	$94.42
Pump, Ag Water PTO, 300 GPM	1116	Ag water PTO Pump, 300 GPM, 3" diameter. Includes materials, labor, controls and shipping.	Each	$3,926.77	1	$3,926.77
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	1	$43.40

Practice: 533 - Pumping Plant

Scenario: #19 - >500 gpm PTO Pump

Scenario Description: This scenario involves a PTO driven pump to transfer water for an irrigation system from a Pond - 378 (includes backflow prevention as appropriate) or other suitable water source to cropland. PTO driven pump is selected because the landowner has equipment available to supply power to the pump. Electricity is not readily available and/or a stationary engine is not a practical alternative. Waste Transfer: PTO pump can also be used to transfer low solids manure from existing waste storage facility to remote storage or in pipeline for final application on land. Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water. Associated Practices include: 430 - Irrigation Pipeline; 442 - Irrigation System, Sprinkler; 449 - Irrigation Water Management, Waste Transfer 634

Before Situation: Irrigation Setting: An existing surface irrigation system employs an inefficient, improperly sized pump that leads to inefficient water delivery resulting in high energy costs; Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

After Situation: Irrigation Setting: A properly designed PTO-driven pump is installed, to transfer water to an Irrigation Pipeline (430) or Irrigation Canal or Lateral (320). Waste Transfer Setting: Wastes that have been collected through a waste transfer system are now efficiently transferred from a Waste Storage Facility (313) to an appropriate treatment facility or to an irrigation system. The pump typically will move 300 gallons per minute(irrigation) or 200 gpm (waste)and is portable so that it can be used at several locations.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $9,698.01

Scenario Cost/Unit: $9,698.01

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	1	$43.40
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic Yard	$21.70	2.5	$54.24
Pump, Ag Water PTO, 1,000 GPM	1923	Materials, labor, controls: Ag Water PTO Pump 1,000 GPM - 8"	Each	$9,600.37	1	$9,600.37

Practice: 533 - Pumping Plant

Scenario: #20 - 1 hp pump or Siphon or Flout

Scenario Description: A 1 hp submersible electric-powered pump is installed in a well or structure; or a close-coupled 1 Hp electric-powered centrifugal pump is mounted on a platform. It is used for watering livestock as part of a prescribed grazing system; or for pressurizing a small irrigation system; or for transferring liquid waste in a waste transfer system it can be a 1 hp pump or for gravity situations an equal alternative is a siphon or flout to dose or transfer wastes. Resource Concerns: Livestock Production Limitation - Inadequate livestock water; Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water. Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management; 516 - Livestock Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; and 614 - Watering Facility.

Before Situation: Livestock: The present gravity flow system is inadequate to provide the proper flow rate for a prescribed grazing system. Irrigation: Available water is at an insufficient pressure to allow for even distribution of water. Waste Transfer: Contaminated water needs to be moved to a containment facility.

After Situation: Livestock: Water is transferred at a sufficient rate and pressure to meet the requirements of a prescribed grazing system. Irrigation: A properly designed pump is installed to improve irrigation efficiency and reduce energy usage. Waste Transfer: Liquid wastes that have been collected through a waste transfer system are now efficiently transferred to an appropriate treatment or storage facility. Sites that support gravity flow but need dosing can also use a siphon or flout to accomplish the transfer.

Scenario Feature Measure: Each

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $1,144.50

Scenario Cost/Unit: $1,144.50

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	3	$111.71
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	1	$43.40
Equipment Installation						
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	1	$25.65
Materials						
Pump, <= 5 HP, pump and motor, fixed cost portion	1009	Fixed cost portion of a pump less than or equal to 5 HP pump and motor. This portion is a base cost and is not dependant on horsepower. The total cost of any pump will include this fixed cost plus a variable cost portion. The completed pump and motor will	Each	$549.88	1	$549.88
Pump, <= 5 HP, pump and motor, variable cost portion	1010	Variable cost portion of a pump less than or equal to 5 HP pump and motor. This portion IS dependent on the total horsepower for the pump. The total cost of any pump will include this variable cost plus the fixed cost portion. The completed pump and moto	Horsepower	$413.86	1	$413.86

Practice: 533 - Pumping Plant

Scenario: #21 - Turbine Pump

Scenario Description: The typical scenario is for a 700 GPM pump and supports replacement of a pump in an existing irrigation system or installation of a new pump on cropland. Size of pump is determined by required GPM and pressure derived from a design for specific irrigation system on cropland. Resource Concerns: Insufficient water - Inefficient use of irrigation water. Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management;

Before Situation: Irrigation: Either an existing irrigation system employs an inefficient, improperly-sized pump that leads to inefficient water delivery resulting in high energy costs.

After Situation: Irrigation Setting: For irrigation system, a properly designed pump is installed, reducing water and energy usage.

Scenario Feature Measure: 1 Pump

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $12,280.53

Scenario Cost/Unit: $12,280.53

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total

Equipment Installation

Pump, Turbine, Cast Iron, fixed cost portion	2148	Fixed cost portion of cast iron turbine pump with appurtenances. Includes pump, appurtenances, and labor to install.	Each	$9,160.52	1	$9,160.52
Pump, Turbine, Cast Iron, variable cost portion	2149	Variable cost portion of cast iron turbine pump with appurtenances. Includes pump, appurtenances, and labor to install.	Gallon per Minute	$4.46	700	$3,120.01

Practice: 533 - Pumping Plant

Scenario: #52 - Electric Powered Pump 3 Hp or less with pressure tank and pump housing

Scenario Description: A 2 hp submersible electric-powered pump is installed in a well or structure; or a close-coupled 2 Hp electric-powered centrifugal pump is mounted on a platform. It is used for watering livestock as part of a prescribed grazing system; or for pressurizing a small irrigation system; or for transferring liquid waste in a waste transfer system. Resource Concerns: Livestock Production Limitation - Inadequate livestock water; Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water. Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 449 - Irrigation Water Management; 516 - Livestock Pipeline; 313 - Waste Storage Facility; 634 - Waste Transfer; and 614 - Watering Facility.

Before Situation: Livestock: The present gravity flow system is inadequate to provide the proper flow rate for a prescribed grazing system. Irrigation: Available water is at an insufficient pressure to allow for even distribution of water. Waste Transfer: Contaminated water needs to be moved to a containment facility.

After Situation: Livestock: Water is transferred at a sufficient rate and pressure to meet the requirements of a prescribed grazing system. Irrigation: A properly designed pump is installed to improve irrigation efficiency and reduce energy usage. Waste Transfer: Liquid wastes that have been collected through a waste transfer system are now efficiently transferred to an appropriate treatment or storage facility. For all these scenarios a 2 hp electric pump is being used.

Scenario Feature Measure: Pump Size Matchs need

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $6,822.45

Scenario Cost/Unit: $6,822.45

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$31.47	1	$31.47
Pipe, PE, 1 ¼", DR 9	998	Materials: - 1 1/4" - PE - 160 psi - ASTM D3035 DR 9	Foot	$0.85	20	$17.00
Pressure Tank, 40 gallon	1038	Pressure Tank, 40 gallon. Includes materials and shipping only.	Each	$463.67	1	$463.67
Pump, <= 5 HP, pump and motor, fixed cost portion	1009	Fixed cost portion of a pump less than or equal to 5 HP pump and motor. This portion is a base cost and is not dependant on horsepower. The total cost of any pump will include this fixed cost plus a variable cost portion. The completed pump and motor will	Each	$549.88	1	$549.88
Pump, <= 5 HP, pump and motor, variable cost portion	1010	Variable cost portion of a pump less than or equal to 5 HP pump and motor. This portion IS dependent on the total horsepower for the pump. The total cost of any pump will include this variable cost plus the fixed cost portion. The completed pump and moto	Horsepower	$413.86	2	$827.72
Pumping Plant Pit, Concrete, 1200 Gallon	1922	Precast concrete septic tank structure, 1200 gal capacity, with access port and ladder. Materials only.	Each	$1,286.45	1	$1,286.45
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$23.29	4	$93.18
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	$21.64	12	$259.73
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	10	$372.38
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	8	$347.17
Equipment Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$65.99	8	$527.88

Crane, truck mounted, hydraulic, 12 ton	1734	12 ton capacity truck mounted hydraulic crane. Equipment cost only.	Hour	$107.74	4	$430.95
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	16	$410.34

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	4	$1,204.63

Practice: 533 - Pumping Plant

Scenario: #61 - Electric Powered Pump 40 to 60 HP

Scenario Description: This is a close-coupled, 3-phase, 50 Hp electric-powered centrifugal pump mounted on a platform for pressurizing a large-sized (1,200 gpm and 50 psi) sprinkler or very large microirrigation (1,700 gpm and 35 psi) system or a large-sized surface irrigation system (2,800 gpm) or a large-sized (2,400 gpm and 25 psi) waste transfer system. Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters; Insufficient water - Inefficient use of irrigation water. Associated Practices include: 374 - Farmstead Energy Improvement; 430 - Irrigation Pipeline; 441 - Irrigation System, Microirrigation; 442 - Irrigation System, Sprinkler; 449 - Irrigation Water Management; 313 - Waste Storage Facility; and 634 - Waste Transfer.

Before Situation: Irrigation: An existing irrigation system employs an inefficient, improperly sized pump that prevents efficient water application resulting in water loss and high energy use.

After Situation: Irrigation: A properly designed and efficient pumping plant is installed, reducing energy use and improving irrigation efficiency.

Scenario Feature Measure: Each Pump

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $13,351.38

Scenario Cost/Unit: $13,351.38

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Materials						
Pump, > 30 HP, pump and motor, fixed cost portion	1013	Fixed cost portion of a pump greater than 30 HP, including the pump and motor. This portion is a base cost for the pump and is not dependant on horsepower. The total cost will include this fixed cost plus a variable cost portion. Includes material and shipping only.	Each	$4,657.54	1	$4,657.54
Pump, >30 HP, Pump and motor, variable cost portion	1014	Variable cost portion of a pump greater than 30 HP, including the pump and motor. This portion is dependent on the total horsepower for the pump. The total cost will include this variable cost plus a fixed cost portion. IIncludes material and shipping only.	Horsepower	$95.62	50	$4,781.02
Equipment Installation						
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$65.99	8	$527.88
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$288.82	2	$577.64
Truck, Pickup	939	Equipment and power unit costs. Labor not included.	Hour	$25.65	16	$410.34
Labor						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12”, Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	$32.34	8	$258.74
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	$21.64	32	$692.61
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$37.24	4	$148.95
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	$43.40	16	$694.34

Mobilization

Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$301.16	2	$602.32

Practice: 533 - Pumping Plant

Scenario: #64 - Booster Pump for Waste Transfer

Scenario Description: Installation of Booster Pump along Waste Transfer System to move to distant fields for application.

Before Situation: Waste is currently applied by tanker or if pumped to field, cannot be pumped efficiently from storage to required distance for proper field application. Application by tanker is energy inefficient, causes excessive soil compaction, and limits application timing and methods for environmentally safe application of waste.

After Situation: Booster pump allows transfer of waste to more distant fields eliminating the need for tanker application. Reduces soil compaction, increases energy efficiency, and increases nutrient use efficiency reducing the potential for nutrient runoff and leaching.

Scenario Feature Measure: Booster Pump

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $11,207.18

Scenario Cost/Unit: $11,207.18

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total

Materials

Booster Pump for Hard Hose Reel Traveler, 4" dia. Hose	2443	Booster pump for a hard hose reel traveler, 4 inch diameter hose approximately 1/4 mile long. Includes booster pump only.	Each	$11,207.18	1	$11,207.18