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

Scenario # 1 **Flexible Membrane - Covered with liner drainage or venting**

Scenario Description: **Louisiana**

Installation of a flexible geosynthetic membrane liner to reduce seepage from ponds or waste storage impoundment structures. Practice implementation includes 1 foot of soil cover for liner protection, a geotextile or soil cushion to protect liner from subgrade damage, and liner drainage or venting. Associated practices include PS378 Pond, PS313 Waste Storage Facility.

Before Practice Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits.

After Practice Situation:

Water conservation and enviromental protection provided by limiting seepage losses from ponds or waste storage impoundments.

Scenario Feature Measure:

Surface area of Liner Material (including anchorage)

Scenario Typical Size:	2420	Square Yard	Unit Cost	$8.39

Cost Category	Component Name	Quantity	Unit	Unit Cost	Cost
Materials	Synthetic Liner, 40 mil	2420	Square Foot	$0.72	$1,742.40
Materials	Geonet	2420	Square Yard	$2.94	$7,114.80
Equip./Install.	Earthfill, Roller Compacted	807	Cubic yard	$3.32	$2,679.24
Equip./Install.	Geotextile, woven	2420	Square Yard	$2.13	$5,154.60
Labor	Specialist Labor	32	Hour	$75.80	$2,425.60
Labor	Skilled Labor	40	Hour	$26.82	$1,072.80
Mobilization	Mobilization, Skilled labor	1	Hour	$25.75	$25.75
Mobilization	Mobilization, Specialist Labor	1	Hour	$78.06	$78.06
Mobilization	Mobilization, Material, distance > 50 miles	1	Dollar	$1.00	$1.00
				Total Cost:	$20,294.25

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

Scenario # 1 **Soil Dispersant - Covered**

Scenario Description: **Louisiana**

Construction of a compacted soil liner, treated with a soil dispersant, 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. Practice implementation may require filter compatibility with the subgrade (graded filter or geotextile). Associated practice PS378, PS313.

Before Practice Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits. Soils are suitable for treatment with dispersants.

After Practice Situation:

Water conservation and environmental protection provided by limiting seepage losses from ponds or waste storage impoundments.

Scenario Feature Measure:

Volume of Liner Material including Soil Cover over Liner

Scenario Typical Size:	3226	Cubic Yard	Unit Cost	$4.60

Cost Category	Component Name	Quantity	Unit	Unit Cost	Cost
Materials	Soil Dispersant	6.53	Ton	$469.05	$3,062.90
Equip./Install.	Earthfill, Roller Compacted	3226	Cubic yard	$3.32	$10,710.32
Equip./Install.	Tractor, agricultural, 120 HP	6	Hour	$47.06	$282.36
Labor	Specialist Labor	2	Hour	$75.80	$151.60
Labor	Supervisor or Manager	8	Hour	$36.21	$289.68
Labor	Equipment Operators, Light	6	Hour	$19.22	$115.32
Mobilization	Mobilization, Light Equipment Operator	1	Hour	$19.04	$19.04
Mobilization	Mobilization, medium equipment	1	Each	$133.51	$133.51
Mobilization	Mobilization, Material, distance > 50 miles	1	Dollar	$1.00	$1.00
Mobilization	Mobilization, Specialist Labor	1	Hour	$78.06	$78.06
				Total Cost:	$14,843.79

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

Scenario # 1 **Bentonite Treatment - Uncovered**

Scenario Description: **Louisiana**

Construction of a compacted soil liner, treated with bentonite, to reduce seepage from ponds or waste storage impoundment structures. Practice implementation includes incorporation of the bentonite with the soil under proper moisture conditions, compaction to the designed liner thickness. Practice implementation may require filter compatibility with the subgrade (graded filter or geotextile). Associated practice PS378, PS313.

Before Practice Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits. Soils are suitable for treatment with dispersants.

After Practice Situation:

Water conservation and environmental protection provided by limiting seepage losses from ponds or waste storage impoundments.

Scenario Feature Measure:

Volume of Liner Material

Scenario Typical Size:	1613	Cubic Yard	Unit Cost	$40.27

Cost Category	Component Name	Quantity	Unit	Unit Cost	Cost
Materials	Bentonite	5227	Each	$11.24	$58,751.48
Equip./Install.	Earthfill, Roller Compacted	1613	Cubic yard	$3.32	$5,355.16
Equip./Install.	Tractor, agricultural, 120 HP	6	Hour	$47.06	$282.36
Labor	Equipment Operators, Light	6	Hour	$19.22	$115.32
Labor	Supervisor or Manager	2	Hour	$36.21	$72.42
Labor	Specialist Labor	2	Hour	$75.80	$151.60
Mobilization	Mobilization, medium equipment	1	Each	$133.51	$133.51
Mobilization	Mobilization, Material, distance > 50 miles	1	Dollar	$1.00	$1.00
Mobilization	Mobilization, Light Equipment Operator	1	Hour	$19.04	$19.04
Mobilization	Mobilization, Specialist Labor	1	Hour	$78.06	$78.06
				Total Cost:	$64,959.95

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

Scenario # 2 **Bentonite Treatment - Covered**

Scenario Description: **Louisiana**

Construction of a compacted soil liner, treated with bentonite, to reduce seepage from ponds or waste storage impoundment structures. Practice implementation includes incorporation of the bentonite with the soil under proper moisture conditions, compaction to the designed liner thickness, and placement of soil cover over the treated liner. Practice implementation may require filter compatibility with the subgrade (graded filter or geotextile). Associated practice PS378, PS313.

Before Practice Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits. Soils are suitable for treatment with bentonite.

After Practice Situation:

Water conservation and environmental protection provided by limiting seepage losses from ponds or waste storage impoundments.

Scenario Feature Measure:

Volume of Liner Material (includes 1 foot of soil cover over liner)

Scenario Typical Size:	1613	Cubic Yard	Unit Cost	$43.59

Cost Category	Component Name	Quantity	Unit	Unit Cost	Cost
Materials	Bentonite	5227	Each	$11.24	$58,751.48
Equip./Install.	Earthfill, Roller Compacted	3227	Cubic yard	$3.32	$10,713.64
Equip./Install.	Tractor, agricultural, 120 HP	6	Hour	$47.06	$282.36
Labor	Equipment Operators, Light	6	Hour	$19.22	$115.32
Labor	Supervisor or Manager	2	Hour	$36.21	$72.42
Labor	Specialist Labor	2	Hour	$75.80	$151.60
Mobilization	Mobilization, medium equipment	1	Each	$133.51	$133.51
Mobilization	Mobilization, Material, distance > 50 miles	1	Dollar	$1.00	$1.00
Mobilization	Mobilization, Light Equipment Operator	1	Hour	$19.04	$19.04
Mobilization	Mobilization, Specialist Labor	1	Hour	$78.06	$78.06
				Total Cost:	$70,318.43

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

Scenario # 1 Material haul < = 5 mile

Scenario Description: **Louisiana**

Construction of a compacted soil liner, treated with compacted clay, to reduce seepage from ponds or waste storage impoundment structures. 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. Estimate based on a 5 mile haul. Associated practices include PS378, PS313, & other waste water impoundments.

Before Practice Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits. An adequate quantity of soil suitable for constructing a clay liner without amendments is available at an econical haul distance. Suitable material is not found on site and it will be necessary to haul over public roads.

After Practice Situation:

Water conservation and environmental protection 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 Typical Size:	2420	Cubic Yard	Unit Cost	$8.38

Cost Category	Component Name	Quantity	Unit	Unit Cost	Cost
Equip./Install.	Earthfill, Roller Compacted	2420	Cubic yard	$3.32	$8,034.40
Equip./Install.	Hauling, bulk, highway truck	12100	Cubic Yard Mile	$0.25	$3,025.00
Equip./Install.	Excavation, common earth, large equipment, 150 ft	2420	Cubic Yard	$3.00	$7,260.00
Labor	Specialist Labor	8	Hour	$75.80	$606.40
Mobilization	Mobilization, medium equipment	1	Each	$133.51	$133.51
Mobilization	Mobilization, large equipment	3	Each	$249.71	$749.13
Mobilization	Mobilization, Specialist Labor	6	Hour	$78.06	$468.36
				Total Cost:	$20,276.80

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

Scenario # 2 Material haul > 5 mile

Scenario Description: **Louisiana**

Construction of a compacted soil liner, treated with compacted clay, to reduce seepage from ponds or waste storage impoundment structures. 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. Estimate based on a 10 mile haul. Associated practices include PS378, PS313, & other waste water impoundments.

Before Practice Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits. An adequate quantity of soil suitable for constructing a clay liner without amendments is available at an econical haul distance. It will be necessary to haul over public roads.

After Practice Situation:

Water conservation and environmental protection 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 Typical Size:	2420	Cubic Yard	Unit Cost	$11.79

Cost Category	Component Name	Quantity	Unit	Unit Cost	Cost
Equip./Install.	Earthfill, Roller Compacted	2420	Cubic yard	$3.32	$8,034.40
Equip./Install.	Hauling, bulk, highway truck	24200	Cubic Yard Mile	$0.25	$6,050.00
Equip./Install.	Excavation, common earth, large equipment, 150 ft	2420	Cubic Yard	$3.00	$7,260.00
Equip./Install.	Excavation, Common Earth, side cast, small equipment	2420	Cubic yard	$1.80	$4,356.00
Labor	Specialist Labor	8	Hour	$75.80	$606.40
Mobilization	Mobilization, medium equipment	2	Each	$133.51	$267.02
Mobilization	Mobilization, large equipment	6	Each	$249.71	$1,498.26
Mobilization	Mobilization, Specialist Labor	6	Hour	$78.06	$468.36
				Total Cost:	$28,540.44

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

Scenario # 3 On Farm

Scenario Description: **Louisiana**

Construction of a compacted soil liner, treated with compacted clay, to reduce seepage from ponds or waste storage impoundment structures. 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. Material borrow is on the landowner's property with no highway travel needed. Associated practices include PS378, PS313, & other waste water impoundments.

Before Practice Situation:

In-place soils at site exhibit seepage rates in excess of acceptable limits. An adequate quantity of soil suitable for constructing a clay liner without amendments is available on the farm if not ajacent to the site. Transportation on public roads and highways is not necessary.

After Practice Situation:

Water conservation and environmental protection 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 Typical Size:	2420	Cubic Yard	Unit Cost	$6.53

Cost Category	Component Name	Quantity	Unit	Unit Cost	Cost
Equip./Install.	Earthfill, Roller Compacted	2420	Cubic yard	$3.32	$8,034.40
Equip./Install.	Excavation, common earth, large equipment, 150 ft	2420	Cubic Yard	$3.00	$7,260.00
Mobilization	Mobilization, large equipment	2	Each	$249.71	$499.42
				Total Cost:	$15,793.82