

**Practice: 367 - Roofs and Covers**

**Scenario # 1 Flexible Roof**

**Scenario Description:** Actual Scenario # 1

**New York**

A flexible membrane or fabric-like roof placed on a steel truss hoop-like supports attached to an existing wall or with its own simple support system. Manure is stored as a liquid in basins, tanks, and as a solid on concrete and earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

Associated Practices: Animal Mortality Facility (316), Composting Facility (317), Heavy Use Area Protection (561), Roof Runoff Structure (558), Waste Storage Facility (313), and Waste Treatment (629).

**Before Practice Situation:**

Applicable where the exclusion of precipitation from an animal waste storage and/or treatment facility will improve of an existing or planned system. Manure is stored as a liquid in basins, tanks, and as a solid on concrete and earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

**After Practice Situation:**

A flexible membrane or fabric-like roof placed on a steel truss hoop-like supports and supporting foundation. Roof or cover will be engineered and installed in accordance with appropriate building codes and permits. Typical size is 40'x40 'square feet and is over an approved animal waste management facility as a component of a CNMP. It is designed to prevent precipitation to allow proper management of animal waste streams (manure or compost streams), thus mitigating the negative factors from the "before practice implementation".

**Scenario Feature Measure:**

Footprint of the building

<b>Scenario Typical Size:</b>	1600	Square Foot	Tot Unit Cost	\$7.01
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Cost Category	Component Name	Quantity	Unit	Unit Cost	Cost
Materials	Roof, Hoop Truss Arch Structure, 30-	1600	Square Foot	\$6.96	\$11,136.00
Mobilization	Mobilization, very small equipment	1	Each	\$78.08	\$78.08

Total Cost: \$11,214.08

**Payment types:**

PayType	Unit Payment	PayType	Unit Payment
EQIP	\$5.26	EQIP-HU	\$6.31
WHIP	\$0.00	WHIP-HU	\$0.00

**Practice: 367 - Roofs and Covers**

**Scenario # 2 Flexible Roof, complex foundation**

**New York**

**Scenario Description: Actual Scenario # 2**

A flexible membrane or fabric-like roof placed on a steel truss hoop-like supports and complex support system. Requires construction of anchor holes with concrete. Manure is stored as a liquid in basins, tanks, and as a solid on concrete and earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

Associated Practices: Animal Mortality Facility (316), Composting Facility (317), Heavy Use Area Protection (561), Roof Runoff Structure (558), Waste Storage Facility (313), and Waste Treatment (629).

**Before Practice Situation:**

Applicable where the exclusion of precipitation from an animal waste storage and/or treatment facility will improve of an existing or planned system. Manure is stored as a liquid in basins, tanks, and as a solid on concrete and earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

**After Practice Situation:**

A flexible membrane or fabric-like roof placed on a steel truss hoop-like supports and supporting foundation. Roof or cover will be engineered and installed in accordance with appropriate building codes and permits. Typical size is 40'x40 'square feet and support by 2 rows of treated posts. It is designed to prevent precipitation to allow proper management of animal waste streams (manure or compost streams), thus mitigating the negative factors from the "before practice implementation".

**Scenario Feature Measure:**

Footprint of the building

<b>Scenario Typical Size:</b>	1600	Square Foot	Tot Unit Cost	\$8.71
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Cost Category	Component Name	Quantity	Unit	Unit Cost	Cost
Materials	Roof, Hoop Truss Arch Structure, 30-	1600	Square Foot	\$6.96	\$11,136.00
Equip./Install.	Skidsteer, 80 HP	8	Hour	\$47.33	\$378.64
Equip./Install.	Concrete, CIP, formless, non	3	Cubic yard	\$151.01	\$453.03
Equip./Install.	Earthfill, Manually Compacted	12	Cubic yard	\$6.05	\$72.60
Equip./Install.	Auger, Truck Mounted	4	Hour	\$378.70	\$1,514.80
Labor	Equipment Operators, Light	8	Hour	\$24.05	\$192.40
Mobilization	Mobilization, small equipment	1	Each	\$190.19	\$190.19

Total Cost: \$13,937.66

**Payment types:**

PayType	Unit Payment	PayType	Unit Payment
EQIP	\$6.53	EQIP-HU	\$7.84
WHIP	\$0.00	WHIP-HU	\$0.00

**Practice: 367 - Roofs and Covers**

**Scenario # 3 Timber Frame Roof**

**Scenario Description:** Actual Scenario # 4

**New York**

A timber framed building with a timber or steel "sheet" roof. Anchor to existing facility located under roof or simple supports in ground. Manure is stored as a liquid in basins, tanks, and as a solid on concrete and earthen surfaces. Excess precipitation can cause premature filling of storage es or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

Associated Practices: Animal Mortality Facility (316), Composting Facility (317), Heavy Use Area Protection (561), Roof Runoff Structure (558), Waste Storage Facility (313), and Waste Treatment (629).

**Before Practice Situation:**

Applicable where the exclusion of precipitation from an animal waste storage and/or treatment facility will improve an existing or planned system. Manure is stored as a liquid in basins, tanks, and as a solid on concrete and earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

**After Practice Situation:**

A timber framed building with a timber or steel "sheet" roof and supporting foundation by associated practice. Engineered and installed in accordance with appropriate building codes and permits. Typical size is 5,000 square feet and is over an approved animal waste management facility as a component of a CNMP. It is designed to prevent precipitation to allow proper management of animal waste streams (manure or compost streams), thus mitigating the negative factors from the "before practice implementation".

**Scenario Feature Measure:**

Footprint of building

<b>Scenario Typical Size:</b>	5000	Square Foot	Tot Unit Cost	\$7.05
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Cost Category	Component Name	Quantity	Unit	Unit Cost	Cost
Materials	Roof, Post Frame Building, 30' to 60'	5000	Square Foot	\$6.96	\$34,800.00
Mobilization	Mobilization, very small equipment	2	Each	\$78.08	\$156.16
Mobilization	Mobilization, medium equipment	1	Each	\$282.78	\$282.78

Total Cost: \$35,238.94

**Payment types:**

PayType	Unit Payment	PayType	Unit Payment
EQIP	\$5.29	EQIP-HU	\$6.34
WHIP	\$0.00	WHIP-HU	\$0.00

**Practice: 367 - Roofs and Covers**

**Scenario # 4 Timber Frame Roof, complex foundation**

**New York**

**Scenario Description: Actual Scenario # 5**

A timber framed building with a timber or steel "sheet" roof and complex supporting foundation. Requires construction of anchor holes with concrete. Manure is stored as a liquid in basins, tanks, and as a solid on concrete and earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

Associated Practices: Animal Mortality Facility (316), Composting Facility (317), Heavy Use Area Protection (561), Roof Runoff Structure (558), Waste Storage Facility (313), and Waste Treatment (629).

**Before Practice Situation:**

Applicable where the exclusion of precipitation from an animal waste storage and/or treatment facility will improve of an existing or planned system. Manure is stored as a liquid in basins, tanks, and as a solid on concrete and earthen surfaces. Excess precipitation can cause premature filling of storages or cause nutrients to leach from solid manure piles leading to uncontrolled runoff as well as odor issues.

**After Practice Situation:**

A timber framed building with a timber or steel "sheet" roof and supporting foundation. Engineered and installed in accordance with appropriate building codes and permits. Typical size is 5,000 square feet and is over an approved animal waste management facility as a component of a CNMP. It is designed to prevent precipitation to allow proper management of animal waste streams (manure or compost streams), thus mitigating the negative factors from the "before practice implementation".

**Scenario Feature Measure:**

Footprint of building

<b>Scenario Typical Size:</b>	5000	Square Foot	Tot Unit Cost	\$7.97
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Cost Category	Component Name	Quantity	Unit	Unit Cost	Cost
Materials	Roof, Post Frame Building, 30' to 60'	5000	Square Foot	\$6.96	\$34,800.00
Equip./Install.	Skidsteer, 80 HP	16	Hour	\$47.33	\$757.28
Equip./Install.	Concrete, CIP, formless, non	3	Cubic yard	\$151.01	\$453.03
Equip./Install.	Earthfill, Manually Compacted	9	Cubic yard	\$6.05	\$54.45
Equip./Install.	Auger, Truck Mounted	8	Hour	\$378.70	\$3,029.60
Labor	Equipment Operators, Light	16	Hour	\$24.05	\$384.80
Mobilization	Mobilization, small equipment	2	Each	\$190.19	\$380.38

Total Cost: \$39,859.54

**Payment types:**

PayType	Unit Payment	PayType	Unit Payment
EQIP	\$5.98	EQIP-HU	\$7.17
WHIP	\$0.00	WHIP-HU	\$0.00

**Practice: 367 - Roofs and Covers**

**Scenario # 5 Flexible Membrane Cover, 20000 or less SF pond surface area**

**Scenario Description:** Actual Scenario # 8

**New York**

A fabricated rigid, semi-rigid, or flexible membrane over a waste storage or treatment facility. The membrane will cover the entire surface of a waste storage or treatment facility (e.g. waste treatment lagoon or anaerobic digester). Cover will exclude precipitation and/or capture biogas for controlled release for flaring or anaerobic digestion. Includes gas collection and flaring system.

Associated Practices: Animal Mortality Facility (316), Composting Facility (317), Heavy Use Area Protection (561), Roof Runoff Structure (558), Waste Storage Facility (313), Pumping Plant (533), and Waste Treatment (629).

**Before Practice Situation:**

Applicable where the exclusion of precipitation from an animal waste storage or treatment lagoon will improve the management of an existing or planned system, capture and controlled release or flaring of emissions from an existing or planned agricultural waste storage to improve air quality, and/or biogas production and capture for energy use are part of the existing or planned animal waste management system.

**After Practice Situation:**

A 15,000 SF fabricated rigid, semi-rigid, or flexible membrane over a waste storage or treatment facility. The membrane will cover the entire surface of a waste storage or treatment facility (e.g. waste treatment lagoon or anaerobic digester). Included will be a collection pipe for methane, a system of weighted tubes to create channels for rainwater collection and also keep membrane tight to surface. Methane collection pipe connected to flare with gas meter, flame arrestor and moisture control. Rainwater removal will be made under Pumping Plant (533). Payment based on surface area at top inside slope.

**Scenario Feature Measure:**

Surface of Area of Storage Facility

<b>Scenario Typical Size:</b>	15000	Square Foot	Tot Unit Cost	\$3.73
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Cost Category	Component Name	Quantity	Unit	Unit Cost	Cost
Materials	Synthetic Liner, 40 mil	2167	Square Yard	\$5.65	\$12,243.55
Materials	Covered Lagoon Flare	1	Each	\$12,452.92	\$12,452.92
Materials	Covered Lagoon Gas Collection	0.6	Each	\$38,655.33	\$23,193.20
Equip./Install.	Trencher, 8"	8	Hour	\$98.60	\$788.80
Equip./Install.	Track Loader, 95HP	24	Hour	\$97.13	\$2,331.12
Equip./Install.	Skidsteer, 80 HP	32	Hour	\$47.33	\$1,514.56
Equip./Install.	Earthfill, Manually Compacted	48	Cubic yard	\$6.05	\$290.40
Labor	Skilled Labor	24	Hour	\$39.82	\$955.68
Labor	General Labor	48	Hour	\$23.16	\$1,111.68
Labor	Equipment Operators, Light	24	Hour	\$24.05	\$577.20
Mobilization	Mobilization, very small equipment	2	Each	\$78.08	\$156.16
Mobilization	Mobilization, medium equipment	1	Each	\$282.78	\$282.78

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**Payment types:**

Total Cost: \$55,898.05

<u>PayType</u>	<u>Unit Payment</u>	<u>PayType</u>	<u>Unit Payment</u>
EQIP	\$2.79	EQIP-HU	\$3.35
WHIP	\$0.00	WHIP-HU	\$0.00

**Practice: 367 - Roofs and Covers**

**Scenario # 6 Flexible Membrane Cover, 20,001 to 80,000 SF pond surface area**

**Scenario Description:** Actual Scenario # 9

**New York**

A fabricated rigid, semi-rigid, or flexible membrane over a waste storage or treatment facility. The membrane will cover the entire surface of a waste storage or treatment facility (e.g. waste treatment lagoon or anaerobic digester). Cover will exclude precipitation and/or capture biogas for controlled release for flaring or anaerobic digestion. Includes gas collection and flaring system.

Associated Practices: Animal Mortality Facility (316), Composting Facility (317), Heavy Use Area Protection (561), Roof Runoff Structure (558), Waste Storage Facility (313), and Waste Treatment (629).

**Before Practice Situation:**

Applicable where the exclusion of precipitation from an animal waste storage or treatment lagoon will improve the management of an existing or planned system, capture and controlled release or flaring of emissions from an existing or planned agricultural waste storage to improve air quality, and/or biogas production and capture for energy use are part of the existing or planned animal waste management system.

**After Practice Situation:**

A 50,000 SF fabricated rigid, semi-rigid, or flexible membrane over a waste storage or treatment facility. The membrane will cover the entire surface of a waste storage or treatment facility (e.g. waste treatment lagoon or anaerobic digester). Included will be a collection pipe for methane, a system of weighted tubes to create channels for rainwater collection and also keep membrane tight to surface. Methane collection pipe connected to flare with gas meter, flame arrestor and moisture control. Rainwater removal will be made under Pumping Plant (533).

Payment based on surface area at top inside slope.

**Scenario Feature Measure:**

Surface of Area of Storage Facility

<b>Scenario Typical Size:</b>	50000	Square Foot	Tot Unit Cost	\$2.37
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Cost Category	Component Name	Quantity	Unit	Unit Cost	Cost
Materials	Synthetic Liner, 40 mil	7222	Square Yard	\$5.65	\$40,804.30
Materials	Covered Lagoon Flare	1	Each	\$12,452.92	\$12,452.92
Materials	Covered Lagoon Gas Collection	1.3	Each	\$38,655.33	\$50,251.93
Equip./Install.	Trencher, 8"	16	Hour	\$98.60	\$1,577.60
Equip./Install.	Track Loader, 95HP	40	Hour	\$97.13	\$3,885.20
Equip./Install.	Skidsteer, 80 HP	56	Hour	\$47.33	\$2,650.48
Equip./Install.	Earthfill, Manually Compacted	90	Cubic yard	\$6.05	\$544.50
Labor	Skilled Labor	40	Hour	\$39.82	\$1,592.80
Labor	General Labor	80	Hour	\$23.16	\$1,852.80
Labor	Equipment Operators, Light	96	Hour	\$24.05	\$2,308.80
Mobilization	Mobilization, very small equipment	2	Each	\$78.08	\$156.16
Mobilization	Mobilization, medium equipment	1	Each	\$282.78	\$282.78

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**Payment types:**

Total Cost: \$118,360.27

<u>PayType</u>	<u>Unit Payment</u>	<u>PayType</u>	<u>Unit Payment</u>
EQIP	\$1.78	EQIP-HU	\$2.13
WHIP	\$0.00	WHIP-HU	\$0.00

**Practice: 367 - Roofs and Covers****Scenario # 7 Flexible Membrane Cover, 80001 or greater pond surface area**Scenario Description: **Actual Scenario # 10****New York**

A fabricated rigid, semi-rigid, or flexible membrane over a waste storage or treatment facility. The membrane will cover the entire surface of a waste storage or treatment facility (e.g. waste treatment lagoon or anaerobic digester). Cover will exclude precipitation and/or capture biogas for controlled release for flaring or anaerobic digestion. Includes gas collection and flaring system.

Associated Practices: Animal Mortality Facility (316), Composting Facility (317), Heavy Use Area Protection (561), Roof Runoff Structure (558), Waste Storage Facility (313), and Waste Treatment (629).

**Before Practice Situation:**

Applicable where the exclusion of precipitation from an animal waste storage or treatment lagoon will improve the management of an existing or planned system, capture and controlled release or flaring of emissions from an existing or planned agricultural waste storage to improve air quality, and/or biogas production and capture for energy use are part of the existing or planned animal waste management system.

**After Practice Situation:**

A 100,000 SF fabricated rigid, semi-rigid, or flexible membrane over a waste storage or treatment facility. The membrane will cover the entire surface of a waste storage or treatment facility (e.g. waste treatment lagoon or anaerobic digester). Included will be a collection pipe for methane, a system of weighted tubes to create channels for rainwater collection and also keep membrane tight to surface. Methane collection pipe connected to flare with gas meter, flame arrestor and moisture control. Rainwater removal will be made under Pumping Plant (533).

Payment based on surface area at top inside slope.

**Scenario Feature Measure:**

Surface of Area of Storage Facility

<b>Scenario Typical Size:</b>	100000	Square Foot	Tot Unit Cost	\$2.12
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Cost Category	Component Name	Quantity	Unit	Unit Cost	Cost
Equip./Install.	Skidsteer, 80 HP	94	Hour	\$47.33	\$4,449.02
Equip./Install.	Earthfill, Manually Compacted	126	Cubic yard	\$6.05	\$762.30
Labor	Skilled Labor	80	Hour	\$39.82	\$3,185.60
Labor	General Labor	160	Hour	\$23.16	\$3,705.60
Labor	Equipment Operators, Light	208	Hour	\$24.05	\$5,002.40
Mobilization	Mobilization, very small equipment	2	Each	\$78.08	\$156.16
Mobilization	Mobilization, medium equipment	1	Each	\$282.78	\$282.78
Materials	Synthetic Liner, 40 mil	14444	Square Yard	\$5.65	\$81,608.60
Materials	Covered Lagoon Flare	2	Each	\$12,452.92	\$24,905.84
Materials	Covered Lagoon Gas Collection	2	Each	\$38,655.33	\$77,310.66
Equip./Install.	Trencher, 8"	24	Hour	\$98.60	\$2,366.40
Equip./Install.	Track Loader, 95HP	80	Hour	\$97.13	\$7,770.40

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**Payment types:**

Total Cost: \$211,505.76

<u>PayType</u>	<u>Unit Payment</u>	<u>PayType</u>	<u>Unit Payment</u>
EQIP	\$1.59	EQIP-HU	\$1.90
WHIP	\$0.00	WHIP-HU	\$0.00