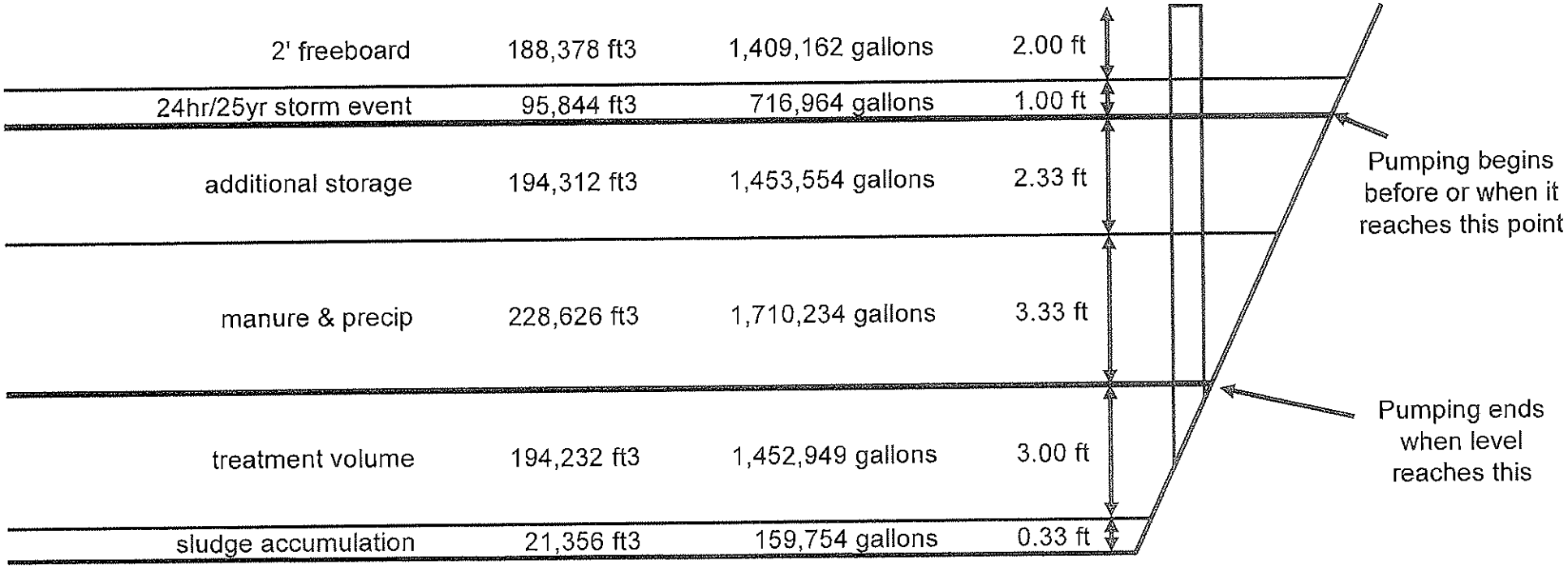
Westridge Dairy
Lagoon Pumpdown Marker

2' freeboard	188,378 ft3	1,409,162 gallons	2.00 ft
24hr/25yr storm event	95,844 ft3	716,964 gallons	1.00 ft
additional storage	194,312 ft3	1,453,554 gallons	2.33 ft
manure & precip	228,626 ft3	1,710,234 gallons	3.33 ft
treatment volume	194,232 ft3	1,452,949 gallons	3.00 ft
sludge accumulation	21,356 ft3	159,754 gallons	0.33 ft



Westridge Dairy -- Manure Storage Analysis

Location	Daily Manure Cubic Feet	Storage Needs - Cubic Feet 180 days	Storage Needs - Cubic Feet 365 days	Facility Size Length	Width	Depth	Cubic Feet	Storage Excess (Deficit) Cubic Feet 180 days	Storage Excess (Deficit) Cubic Feet 365 days	Storage Capacity Days
Solid Dairy Manure										
Barn 1	268.73	48,371	98,086	300	50	0.25	3,750	(44,621)	(94,336)	14
Barn 2	268.73	48,371	98,086	300	50	0.25	3,750	(44,621)	(94,336)	14
Barn 3	268.73	48,371	98,086	300	50	0.25	3,750	(44,621)	(94,336)	14
Barn 4	268.73	48,371	98,086	350	50	0.25	4,375	(43,996)	(93,711)	16
Barn 5	223.94	40,309	81,738	210	50	0.25	2,625	(37,684)	(79,113)	12
Barn 6	134.36	24,186	49,043	60	60	0.25	900	(23,286)	(48,143)	7
Barn 7	68.06	12,252	24,844	130	40	0.25	1,300	(10,952)	(23,544)	19
Barn 8	201.39	36,250	73,508	300	50	0.25	3,750	(32,500)	(69,758)	19
Manure Basin 101				100	100	8.00	80,000	80,000	80,000	
Manure Basin 102				180	30	4.00	21,600	21,600	21,600	
Manure Basin 103				60	60	6.00	21,600	21,600	21,600	
Total	1,702.68									
Manure retain as solid	40%									
Total Solid Manure	681.07					Total	147,400			216

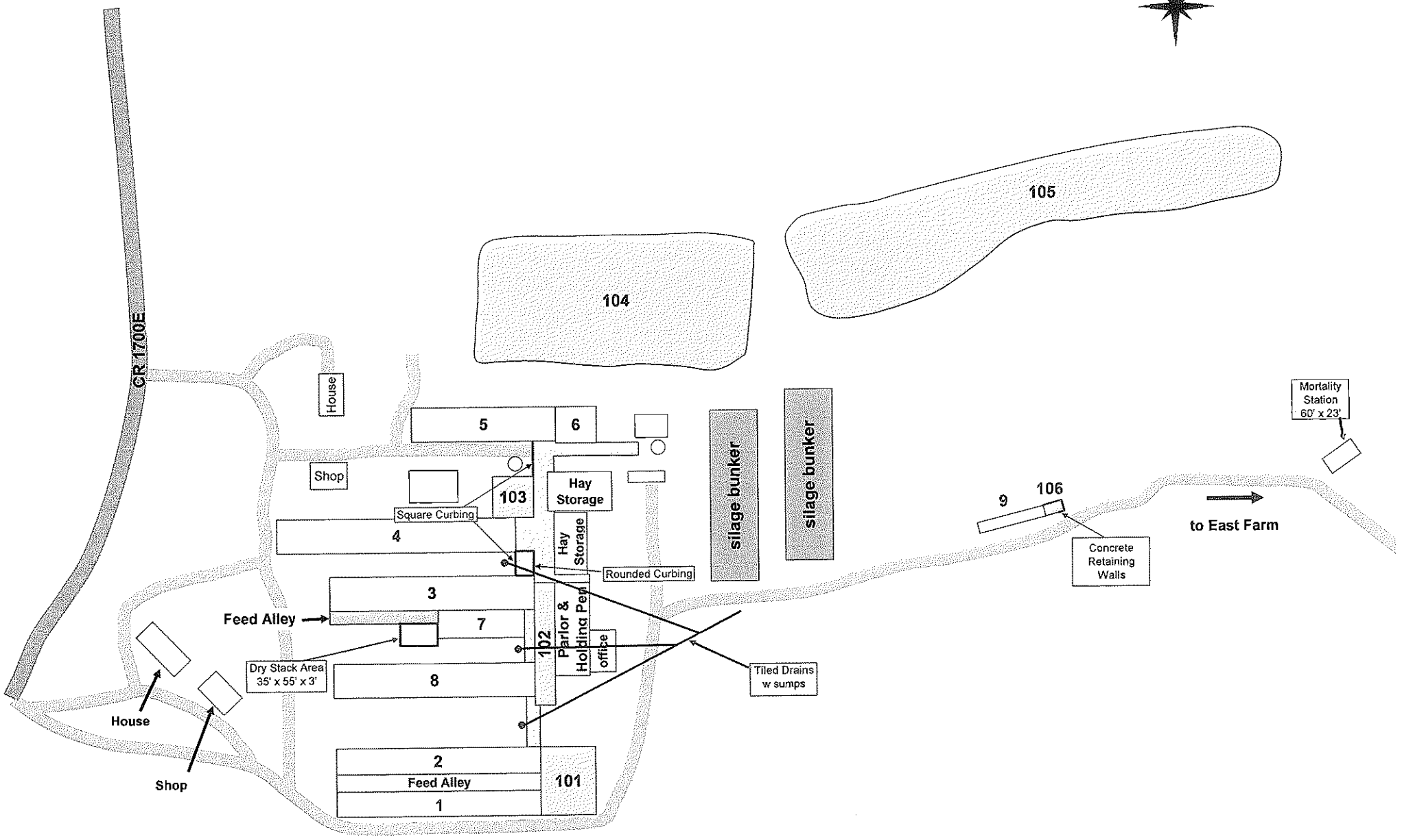
Location	Daily Manure Cubic Feet	Storage Needs - Cubic Feet 270 days	Storage Needs - Cubic Feet 365 days	Facility Size Length	Width	Depth	Cubic Feet	Storage Excess (Deficit) Cubic Feet 270 days	Storage Excess (Deficit) Cubic Feet 365 days	Storage Capacity Days
Slurry Dairy Manure - Holding Pond 104										
Manure retained in HP 104	50%									
Manure retained in HP 104	851.34	229,861	310,738					(229,861)	(310,738)	
Holding Pond 104				400	200	10.00	534,512	534,512	534,512	
Total Slurry Manure	851.34					Total	534,512			628

Slurry Dairy Manure - Lagoon 105										
Manure retained in Lagoon 105	10%									
Manure retained in Lagoon 105	170.27	45,972	62,148					(45,972)	(62,148)	
Milk Parlor Waste Water	199.18	53,780	72,702					(53,780)	(72,702)	
Precipitation Gain	705.04	190,362	125,325					(190,362)	(125,325)	
Lagoon 105		105 usable storage capacity		775	125	12.00	422,938	422,938	422,938	
Total Slurry Manure	1,074.50					Total	422,938			394

Westridge Dairy -- Manure Storage Analysis

Location	Daily Manure Cubic Feet	Storage Needs - Cubic Feet		Facility Size				Storage Excess (Deficit) Cubic Feet		Storage Capacity Days
		180 days	365 days	Length	Width	Depth	Cubic Feet	180 days	365 days	
Solid Dairy Manure										
Barn 9	9.68	1,742	3,532	100	20	0.5	1,000	(742)	(2,532)	103
Barn 10	28.23	5,081	10,302	200	12	1.5	3,600	(1,481)	(6,702)	128
Barn 11	28.23	5,081	10,302	200	12	1.5	3,600	(1,481)	(6,702)	128
Barn 12	7.74	1,394	2,826	100	20	0.5	1,000	(394)	(1,826)	129
Barn 13	52.15	9,387	19,035	40	130	1.5	7,800	(1,587)	(11,235)	150
Dry Stack 106				20	30	3	1,800	1,800	1,800	
Dry Stack 107				25	25	3	1,875	1,875	1,875	
Total Solid Manure	126.02					Total	20,675			164

Westridge Dairy
Proposed Facilities - Main Farm



Mortality Management Station Calculations
Westridge Dairy

Weight of carcasses to be composted:

Calves per Year	810	810 cows x 1calf /year
Average Weight	100	
Mortality Percentage	7.50%	92.5% Survival rate
Death Loss Lbs per Year	6,075	
Lbs / Day of Carcass to Compost	16.64	

Cow Inventory	810	
Average Weight	1400	
Mortality Percentage	2.00%	2% Death Loss per year
Death Loss Lbs per Year	22,680	
Lbs / Day of Carcass to Compost	62.14	

Primary and Secondary Bin Volume:

	Primary Bin	
Lbs / Day of Carcass to Compost	78.78	
X 20	1,576	Cu Ft Primary Bin Volume
	Secondary Bin	
Lbs / Day of Carcass to Compost	78.78	
X 20	1,576	Cu Ft Secondary Bin Volume

Bin Area Calculation:

	Primary Bin
Cu Ft Primary Bin Volume	1,576
Depth, Ft	4
Sq Ft Primary Bin	394
	Secondary Bin
Cu Ft Primary Bin Volume	1,576
Depth, Ft	4
Sq Ft Primary Bin	394

Calculation of Number of Bins: (Minimum 3 Bins Required)

	Primary Bin
Sq Ft Primary Bin	394
Sq Ft / Bin	130
Primary Bins Required	3
	Secondary Bin
Sq Ft Secondary Bin	394
Sq Ft / Bin	130
Secondary Bins Required	3

Calculate Bin Dimensions:

Bin Area sq ft	130
Bin Depth ft	4
Bin Width ft	10
Bin Length ft	13

Mortality Station Bin Requirements:

6 Bins -- Total

3 - Primary Bins -- 10' X 13' X 4'

3 - Secondary Bins -- 10' X 13' X 4'

Proposed Compost Overal Dimensions

Length	60'
Depth	23'
Height	4'

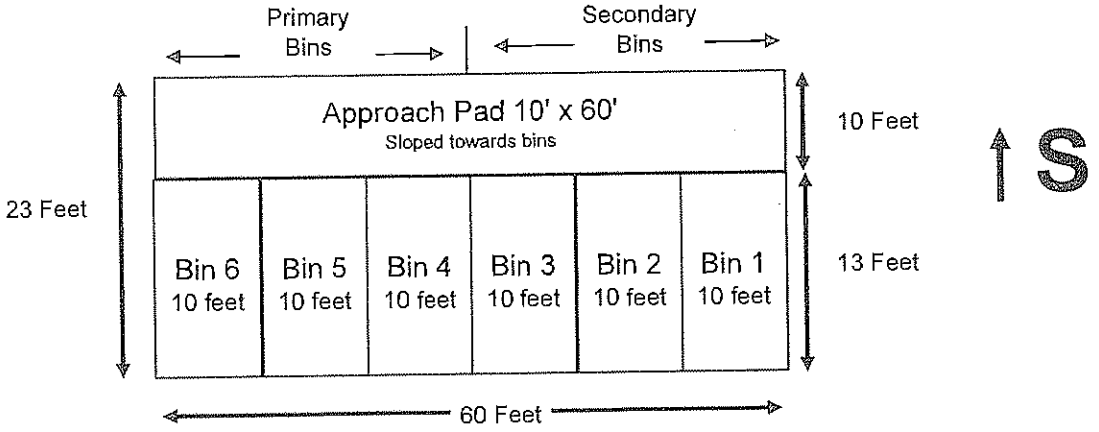
Annual Sawdust Requirements:

Death Loss Lbs per Year	28,755	
X 0.0037	106	Cubic Yards of Sawdust per Year

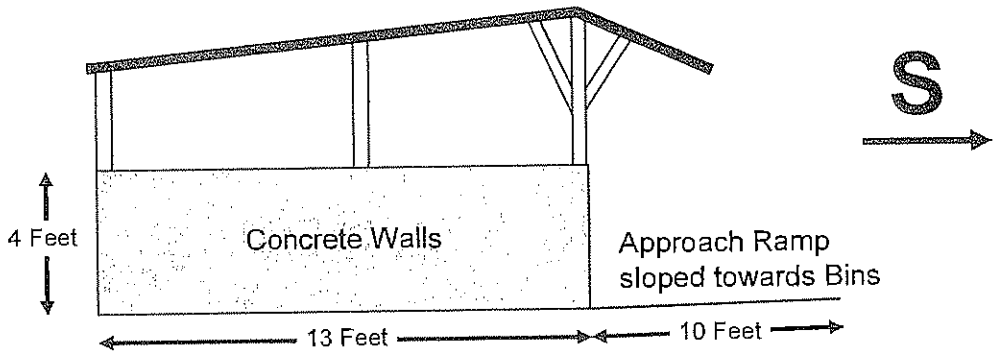
Westridge Dairy
Proposed Mortality Station

The proposed mortality station will be placed just East of Barn 9. It will consist of 3 primary and 3 secondary compost bins each holding 390 cubic feet.

Overhead View



Side View



NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

WASTE TREATMENT LAGOON

(No.)

CODE 359

DEFINITION

A waste treatment impoundment made by constructing an embankment and/or excavating a pit or dugout.

PURPOSE

To biologically treat waste, such as manure and wastewater, and thereby reduce pollution potential by serving as a treatment component of a waste management system.

CONDITIONS WHERE PRACTICE APPLIES

- Where the lagoon is a component of a planned agricultural waste management system.
- Where treatment is needed for organic wastes generated by agricultural production or processing.
- On any site where the lagoon can be constructed, operated and maintained without polluting air or water resources.
- To lagoons utilizing embankments with an effective height of 35 feet or less where damage resulting from failure would be limited to damage of farm buildings, agricultural land, or township and country roads.

CRITERIA

General Criteria for All Lagoons

Laws and Regulations. Waste treatment lagoons must be planned, designed, and constructed to meet all federal, state, and local laws and regulations, including the Illinois Livestock Management Facilities Act (LMFAct) and provisions of Title 35E, State of Illinois Rules and Regulations.

Utilities and Permits. The landowner shall be responsible for locating all buried utilities in the project area, including drainage tile and other structural measures.

The landowner shall obtain all necessary permissions from regulatory agencies, including the Illinois Department of Agriculture, US Army Corps of Engineers, US Environmental Protection Agency, Illinois Environmental Protection Agency and Illinois Department of Natural Resources – Office of Water Resources, or document that no permits are required. Lagoons that have berms higher than 25 feet and more than 15 acre-ft of storage volume typically require a dam safety permit from IDNR-OWR.

Location. To minimize the potential for contamination of streams, lagoons should be located outside of floodplains. However, if site restrictions require location within a floodplain, they shall be protected from inundation or damage from a 25-year flood event, or larger if required by laws, rules, and regulations. Lagoons shall be located so the potential impacts from breach of embankment, accidental release, and liner failure are minimized; and separation distances are such that prevailing winds and landscape elements such as building arrangement, landforms, and vegetation minimize odors and protect aesthetic values.

Lagoons should be located so they have as little drainage area as possible. If a lagoon has a drainage area, the volume of normal runoff during the treatment period and 25-

year, 24-hour storm event runoff shall be included in the required volume of the lagoon.

Setback distances for lagoons shall be as per the Livestock Management Facilities Act 900.602 (LMF Act).

Soils and Foundation. A site investigation shall be performed as per requirements in the LMF Act. If the results of that investigation indicate the need for a liner, a liner shall be installed as per requirements in Section 506.205 of the Rules and Regulations for the LMF Act.

The lagoon shall have a bottom elevation that is a minimum of 2 feet above the seasonal high water table unless special design features are incorporated that address buoyant forces, lagoon seepage rates, and non-encroachment of the water table by contaminants. The water table may be lowered by use of perimeter drains to meet this requirement.

Flexible Membranes. Flexible membrane liners shall meet or exceed the requirements of flexible membrane linings specified in NRCS Practice Standard Pond Sealing or Lining - Flexible Membrane (code 521A).

Required Volume. The lagoon shall have the capability of storing the following volumes:

- Volume of accumulated sludge for the period between sludge removal events;
- Minimum treatment volume (anaerobic lagoons only);
- Volume of manure, wastewater, and other wastes accumulated during the treatment period;
- Depth of normal precipitation less evaporation on the surface area (at the required volume level) of the lagoon during the treatment period;
- Depth of the 25-year, 24-hour storm precipitation on the surface area (at the required volume level) of the lagoon.
- Runoff volume for the 25-year, 24 hour storm from watershed areas not diverted away from the lagoon.

Treatment Period. The treatment period is the detention time between drawdown events. Treatment period shall be the greater of either 60 days; or the time required to provide the storage that allows environmentally safe utilization of waste considering the climate, crops, soil, and equipment requirements; or as required by local, state, and Federal regulations.

Waste Loading. Daily waste loading shall be based on the maximum daily loading considering all waste sources that will be treated by the lagoon. Reliable local information or laboratory test data should be used if available. If local information is not available Chapter 4 of the AWMFH may be used for estimating waste loading.

Embankments. The minimum elevation of the top of the settled embankment shall be 1 foot above the lagoon's required volume. This height shall be increased by the amount needed to ensure that the top elevation will be maintained after settlement. This increase shall be not less than 5 percent. The minimum top widths are shown in Table 1. The combined side slopes of the settled embankment shall not be less than 5 horizontal to 1 vertical, and neither slope shall be steeper than 2 horizontal to 1 vertical unless provisions are made to provide stability.

Table 1 – Minimum Top Widths

Total embankment Height, ft.	Top Width, ft.
15 or less	8
15 – 20	10
20 – 25	12
25 – 30	14
30 – 35	15

Excavations. Unless supported by a soil investigation, excavated side slopes shall be no steeper than 2 horizontal to 1 vertical.

Inlet. Inlets shall be of any permanent type designed to resist corrosion, plugging, freeze damage, and ultraviolet ray deterioration, while incorporating erosion protection as necessary. Inlets shall be provided with a water-sealed trap and vent, or similar device if there is a potential, based on design

configuration, for gases to enter buildings or other confined spaces.

Outlet. Outlets from the required volume shall be designed to resist corrosion and plugging. No outlet shall automatically discharge from the required volume of the lagoon.

Facility for Drawdown. Measures that facilitate safe drawdown of the liquid level in the lagoon shall be provided. Access areas and ramps used to withdraw waste shall have slopes that facilitate a safe operating environment. Docks, wells, pumping platforms, retaining walls, etc. shall permit drawdown without causing erosion or damage to liners.

Sludge Removal. Provision shall be made for periodic removal of accumulated sludge to preserve the treatment capacity of the lagoon.

Erosion Protection. Embankments and disturbed areas surrounding the lagoon shall be treated to control erosion. This includes the inside slopes of the lagoon as needed to protect the integrity of the liner.

Safety. Design shall include appropriate safety features to minimize the hazards of the lagoon. The lagoon shall be fenced a minimum of 5 feet above ground around the perimeter and warning signs posted to prevent children and others from using the lagoon for other than its intended purpose.

Additional Criteria for Anaerobic Lagoons

Loading Rate. Anaerobic lagoons shall be designed to have a minimum treatment volume based on Volatile Solids (VS) loading per unit of volume. The maximum loading rate shall be as indicated in AWMFH Figure 10-22 or according to state regulatory requirements, whichever is more stringent.

Operating Levels. The maximum operating level shall be the lagoon level that provides the required volume less the 25-year, 24-hour storm event precipitation on the surface of the lagoon. The maximum drawdown level shall be the lagoon level that provides volume for the required minimum treatment volume plus the volume of accumulated sludge between sludge removal events. Permanent markers shall be installed at these elevations. The proper operating range of the lagoon is above the maximum drawdown level and below the maximum operating level. These markers shall be referenced and described in the O&M plan.

Depth Requirements. The minimum depth at maximum drawdown shall be 6 feet. If subsurface conditions prevent practicable construction to accommodate the minimum depth at maximum drawdown, a lesser depth may be used, if the volume requirements are met.

Additional Criteria for Naturally Aerobic Lagoons

Loading Rate. Naturally aerobic lagoons shall be designed to have a minimum treatment surface area as determined on the basis of daily BOD_5 loading per unit of lagoon surface. The required minimum treatment surface area shall be the surface area at maximum drawdown. The maximum loading rate shall be as indicated by AWMFH Figure 10-25 or according to state regulatory requirements, whichever is more stringent.

Operating Levels. The maximum operating level shall be the lagoon level that provides the required volume less the 25-year, 24-hour storm event on the lagoon surface. The maximum drawdown level shall be the lagoon level that provides volume for the volume of manure, wastewater, and clean water accumulated during the treatment period plus the volume of accumulated sludge between sludge removal events. Permanent markers shall be installed at these elevations. The proper operating range of the lagoon is above the maximum drawdown level and below the maximum operating level. These markers shall be referenced and described in the O&M plan.

Depth Requirements. The minimum depth at maximum drawdown shall be 2 feet. The maximum liquid level shall be 5 feet.

Additional Criteria for Mechanically Aerated Lagoons

Loading Rate. Mechanically aerated waste treatment lagoons' treatment function shall be designed on the basis of daily BOD_5 loading and aeration equipment manufacturer's performance data for oxygen transfer and mixing. Aeration equipment shall provide a minimum of 1 pound of oxygen for each pound of daily BOD_5 loading.

Operating Levels. The maximum operating level shall be the lagoon level that provides the required lagoon volume less the 25-year, 24-hour storm event precipitation and shall not exceed the site and aeration equipment limitations. A permanent marker or recorder shall be installed at this elevation. The proper operating range of the lagoon is below this elevation and above the minimum treatment elevation established by the manufacturer of the aeration equipment. This marker shall be referenced and described in the O&M plan.

CONSIDERATIONS

General

Lagoons should be located as close to the source of waste as possible.

Solid/liquid separation treatment should be considered between the waste source and the lagoon to reduce loading.

The configuration of the lagoon should be based on the method of sludge removal and method of sealing.

Due consideration should be given to economics, the overall waste management system plan, and safety and health factors.

Considerations for Minimizing the Potential for and Impacts of Sudden Breach of Embankment or Accidental Release from the Required Volume

Features, safeguards, and/or management measures to minimize the risk of embankment failure or accidental release, or to minimize or mitigate impact of this type of failure should be considered when any of the categories listed in Table 2 might be significantly affected.

The following should be considered either singly or in combination to minimize the potential of or the consequences of sudden breach of embankments when one or more of the potential impact categories listed in Table 2 may be significantly affected:

- An auxiliary (emergency) spillway
- Additional freeboard
- Storage volume for the wet year rather than normal year precipitation
- Reinforced embankment -- such as, additional top width, flattened and/or armored downstream side slopes
- Secondary containment
- Water level indicators or recorders

Table 2- Potential Impact Categories from Breach of Embankment or Accidental Release

- Surface water bodies -- perennial streams, lakes, wetlands, and estuaries
- Critical habitat for threatened and endangered species
- Riparian areas
- Farmstead, or other areas of habitation
- Off-farm property
- Historical and/or archaeological sites or structures that meet the eligibility criteria for listing in the National Register of Historical Places

The following should be considered to minimize the potential for accidental release from the required volume through gravity outlets when one or more of the potential impact categories listed in Table 2 may be significantly affected:

- Outlet gate locks or locked gate housing
- Secondary containment
- Alarm system
- Another means of emptying the required volume