

Waste Storage Facility (No.) 313

DEFINITION

A waste storage impoundment made by constructing an embankment and/or excavating a pit or dugout, or by fabricating a structure.

PURPOSES

To temporarily store wastes such as manure, wastewater, and contaminated runoff as a storage function component of an agricultural waste management system.

CONDITIONS WHERE PRACTICE APPLIES

- Where the storage facility is a component of a planned agricultural waste management system or comprehensive nutrient management plan.
- Where temporary storage is needed for organic wastes generated by agricultural production or processing.
- Where the storage facility can be constructed, operated, and maintained without polluting air or water resources.
- Where site conditions are suitable for construction of the facility.
- To facilities utilizing embankments with an effective height of 35 feet (10.7 m) or less where damage resulting from failure would be limited to damage of farm buildings, agricultural land, or township and country roads.
- To fabricated structures including tanks, stacking facilities, and pond appurtenances.

CRITERIA

General Criteria Applicable To All Purposes

Laws and Regulations. Waste storage facilities must be planned, designed, and constructed to meet all federal, state, and local laws and regulations.

Location. To minimize the potential for contamination of streams, waste storage facilities 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. Waste storage facilities 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.

For the purpose of well head protection, no storage facility shall be located closer than 75 feet (25 m) to a private well. Use a separation distance of 300 feet (90 m) for public wells.

All field tile (subsurface drains) within 50 feet (16 m) of a waste storage facility shall be removed and capped. The distance shall be measured from the nearest point in the storage facility at the maximum operating level. This does not apply to drainage systems designed in accordance with the Water Table section of this standard.

Storage Period. The storage period is the maximum length of time anticipated between emptying events. The minimum storage period shall be:

- 6 months, or
- 6 months less the time period equivalent to the volume of manure spread on land suitable for winter application based on the Manure Application Risk Index analysis for each field where winter application of manure is planned.

If livestock are in confinement less than 6 months, the duration of confinement may be used in lieu of 6 months in the minimum storage period criteria above.

Design Storage Volume. The design storage volume equal to the required storage volume, shall consist of the total of the following, as appropriate:

- (a) Manure, wastewater, bedding, and other wastes accumulated during the storage period.
- (b) Normal (mean monthly) precipitation less evaporation on the surface area of the facility during the storage period.
- (c) Normal (mean monthly) runoff from the facility's drainage area during the storage period.

- (d) 25-year, 24-hour precipitation on the surface of the facility.
- (e) 25-year, 24-hour runoff from the facility's drainage area.
- (f) Drifted snow accumulation. (Accumulation in excess of the precipitation that falls directly onto the structure surface.)
- (g) Residual solids after liquids have been removed. A minimum of 6 inches (150 mm) shall be provided for tank fabricated structures. (This may be eliminated if a sump or other device that allows for complete emptying is included in the design.)
- (h) Additional storage as may be required to meet management goals or regulatory requirements.

Non-polluted runoff shall be excluded from the structure to the fullest extent possible except where its storage is advantageous to the operation of the agricultural waste management system.

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.

Emptying Component. Some type of component shall be provided for emptying storage facilities. It may be a facility such as a gate, pipe, dock, wet well, pumping platform, retaining wall, or ramp. Features to protect against erosion, tampering, and accidental release shall be incorporated as necessary.

Ramps used to empty liquids shall have a slope of 4 horizontal to 1 vertical or flatter. Those used to empty slurry, semi-solid, or solid waste shall have a slope of 10 horizontal to 1 vertical or flatter unless special traction surfaces are provided.

Accumulated Solids Removal. Provisions shall be made for periodic removal of accumulated solids to preserve storage capacity. The anticipated method for doing this must be considered in planning, particularly in determining the configuration of ponds and type of seal, if any.

Safety. Design shall include appropriate safety features to minimize the hazards of the facility. Warning signs, fences, ladders, ropes, bars, rails, and other devices shall be provided, as appropriate, to ensure the safety of humans and livestock. Ponds and uncovered fabricated structures for liquid or slurry

waste with walls less than 5 feet (1.5 m) above ground surface shall be fenced and warning signs posted to prevent children and others from using them for other than their intended purpose.

Ventilation and warning signs must be provided for covered waste storage facilities, as necessary, to prevent explosion, poisoning, or asphyxiation. Pipelines 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.

Covers and gratings over openings shall be designed such that livestock or humans cannot accidentally displace them and fall into the facility.

Livestock shall be excluded from the storage facility when it is being used for storage.

Erosion Protection. Embankments and disturbed areas surrounding the facility shall be treated to control erosion.

Service Life and Durability. Storage facilities shall be planned, designed, and installed to provide a minimum service life of 10 years.

Planning, design, and construction shall ensure that the storage facility is sound and of durable materials commensurate with the anticipated service life, initial and replacement costs, maintenance and operation costs, and safety and environmental considerations.

Water Table. The seasonal high water table shall be determined either by long-term monitoring or by the presence of diagnostic soil redoximorphic features as identified during on-site investigations conducted by an individual trained in soil and water relationships. For the purposes of this standard, "seasonal high water table" refers to the upper limit of soil saturation with water during the wettest season, and can occur at any depth within the entire soil profile observed during an on-site soils investigation. The National Soils Handbook recognizes three types of season high water tables: apparent, perched, and artesian.

Gravity flow artificial drainage may be used to lower perched seasonal high water tables if approved by the State Conservation Engineer. Artificial drainage may not be used to lower an apparent or artesian seasonal high water table, and pumped artificial drainage may not be used in any situation.

Subsurface Investigations. A subsurface investigation is required for all waste storage

facilities. Subsurface investigations shall be conducted by individuals trained in soil science, engineering, geology, or a related field. The number and depth of test holes, pits, or borings will vary depending on the planned surface area and depth of the structure and the conditions encountered during the investigation such as the complexity of the soils, the depth to groundwater, and the presence or absence of seeps. At a minimum, there shall be one test hole, pit, or boring for each 5,000 ft² (460 m²) for the first 20,000 ft² (1,840 m²) of planned storage facility surface area plus at least one test hole, pit, or boring for each additional 10,000 ft² (920 m²). Each test hole, pit, or boring shall extend at least 2 feet (0.6 m) below the planned bottom of the structure. The log for each test hole, pit, or boring shall indicate the following:

- Existing ground surface elevation.
- A description of the soil material encountered using the Unified Classification System.
- Depth to changes in the soil material encountered.
- Depth to any seeps encountered.
- Depth to high water (note method of determination: mottling, free water encountered, etc.).
- Depth to bottom of test hole, pit, or boring.

The location and log information for all test holes, pits, and/or borings in or near the structure shall be shown on the construction drawings.

Additional Criteria For Waste Storage Ponds

Soil and Foundation. The pond shall be located in soils with an acceptable permeability that meets all applicable regulations, or the pond shall be lined. Information and guidance on controlling seepage from waste impoundments can be found in the Agricultural Waste Management Field Handbook (AWMFH), Appendix 10D.

Design Bottom Elevation. The design bottom elevation of the waste storage pond shall be no lower than 2 feet (0.6 m) above the seasonal high water table.

Liners. Self-sealing ponds are not an acceptable means of containing waste. The storage pond shall be sealed by one of the liners as described below. The subgrade shall be a dense base regardless of liner method.

Compacted Earth - A compacted earth liner with a minimum thickness of 1 foot (0.3 m) on pond sides

and bottom, measured perpendicular to the finished surface. The liner material shall be placed in layers not over 9 inches (230 mm) thick before compaction. A minimum of two compacted layers is required. Liner compaction shall result in 90 percent of Standard Proctor Density (ASTM D-698) or compaction shall follow the methods described in Construction Specification MI-154, Earthfill.

Earth liner material shall have a laboratory permeability rate of 1×10^{-6} cm/sec or less with a compaction of 90 percent of the maximum density as determined by the Standard Proctor Test. Materials that are acceptable without a permeability test are soils that have a Plasticity Index (PI) of at least 10 and classify as CL, CH, MH, SC, or GC based on the Unified Classification System. Organic soils are not acceptable as earth liner material.

Compacted earth liners shall have side slopes of 3:1 or flatter, except where compacted earth liners are part of (brought up with) an earthfill.

The compacted earth liner shall be covered with not less than 1 foot (0.3 m) of compacted on-site material measured perpendicular to the finished surface.

Flexible Membrane - A flexible membrane liner designed and constructed in accordance with NRCS Practice Standard 521-A, Pond Sealing or Lining - Flexible Membrane; and Construction Specification MI-184, Flexible Membrane Liners.

Bentonite - A bentonite liner designed and constructed in accordance with NRCS Practice Standard 521-C, Pond Sealing or Lining - Bentonite or Other High Swell Clay Material; and Construction Specification MI-183, Bentonite Sealant.

Concrete - A concrete liner designed and constructed in accordance with Construction Specification MI-158, Concrete Construction and the following criteria:

1. For side slopes and bottoms that will not have any vehicular traffic, use a minimum 5-inch (125 mm) thick concrete slab. No joints, wire mesh, or fiber reinforcement is required.
2. For concrete lined areas such as approaches, ramps, and bottoms that will have vehicular traffic of any kind, use a minimum 5 inch (125 mm) thick concrete slab placed over a minimum 4 inch (100 mm) thick layer of compacted sand. No joints, wire mesh, or fiber reinforcement is required.

- Concrete lined side slopes shall be 2:1 or flatter, except for concrete push-off ramps. Concrete push-off ramp slopes shall be 1:1 or flatter on cut slopes or fill slopes with 5 feet (1.5 m) or less of fill. Concrete push-off ramps on fill slopes with greater than 5 feet (1.5 m) of fill must be approved by the State Conservation Engineer.

Natural Clay Base - A natural clay base liner shall have a minimum thickness of 10 feet (3 m) below the design bottom elevation of the storage pond. The soil shall meet the criteria for a unified soil classification of CL, CH, MH, SC, or GC. Subsurface investigations must demonstrate that suitable natural soil material exists for the entire 10 feet (3 m) below the design bottom elevation of the pond.

Natural clay based liners shall have side slopes of 2:1 or flatter.

Maximum Operating Level. The maximum operating level for waste storage ponds shall be the pond level that provides for the required volume less the volume contribution of precipitation and runoff from the 25-year, 24-hour storm event. A permanent marker or recorder shall be installed at this maximum operating level to indicate when drawdown should begin. The marker or recorder shall be referenced and explained in the Operation and Maintenance plan.

Outlet. No outlet shall automatically release storage from the required design volume. Manually operated outlets shall be of a permanent type designed to resist corrosion and plugging.

Embankments. The minimum elevation of the top of the settled embankment shall be the waste storage pond's required volume plus a 1-foot freeboard. This settled 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.

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.

Additional Criteria For Fabricated Structures

Foundation. The foundations of fabricated waste storage structures shall be proportioned to safely support all superimposed loads without excessive movement or settlement.

Where a non-uniform foundation cannot be avoided or applied loads may create highly variable foundation loads, settlement should be calculated from site-specific soil test data. Index tests of site soil may allow correlation with similar soils for which test data is available. If no test data is available, presumptive bearing strength values for assessing actual bearing pressures may be obtained from Table 2 or another nationally recognized building code. In using presumptive bearing values, adequate detailing and articulation shall be provided to avoid distressing movements in the structure.

Foundations consisting of bedrock with joints, fractures, or solution channels shall be treated or a separation distance provided consisting of a minimum of 1 foot (0.3 m) of impermeable soil between the floor slab and the bedrock, or an alternative that will achieve equal protection.

Foundation Description	Allowable Stress
Crystalline Bedrock	12,000 psf (575,000 Pa)
Sedimentary Rock	6,000 psf (285,000 Pa)
Sandy Gravel or Gravel	5,000 psf (240,000 Pa)
Sand, Silty Sand, Clayey Sand, Silty Gravel, Clayey Gravel	3,000 psf (145,000 Pa)
Clay, Sandy Clay, Silty Clay, Clayey Silt	2,000 psf (95,000 Pa)

^{1/} Basic Building Code, 12th Edition, 1993, Building Officials and Code Administrators, Inc. (BOCA)

Design Bottom Elevation. The design bottom elevation of the fabricated structure waste storage facility shall be no lower than the seasonal high water table.

Design Storage Volume. In addition to the design volume, a minimum of 6 inches (150 mm) shall be provided for freeboard except for solid stacking fabricated structures. Solid stacking implies that the manure has a consistency that does not flow, but stays in place even during the wettest time of the storage

period. The design volume for solid stacking fabricated structures may exceed the height of the structure walls. The anticipated stacking angle of the manure must be considered in determining the required wall height.

Liquid Tightness. Applications such as tanks, that require liquid tightness, shall be designed and constructed in accordance with standard engineering and industry practices appropriate for the construction materials used to achieve this objective.

Structural Loadings. Waste storage structures shall be designed to withstand all anticipated loads including internal and external loads, hydrostatic uplift pressure, concentrated surface and impact loads, water pressure due to seasonal high water table, frost or ice pressure, and load combinations in

compliance with this standard and applicable local building codes. Hydrostatic uplift pressures from perched seasonal high water tables shall be eliminated by a drain system with a gravity outlet. Refer to the Water Table section of this standard.

The design load under footings for walls and columns shall not exceed 3,000 lb/ft² (145,000 Pa) unless the design is based on soil bearing strength tests made at the site.

The lateral earth pressures should be calculated from soil strength values determined from the results of appropriate soil tests. Lateral earth pressures can be calculated using the procedures in TR-74, Lateral Earth Pressures. If soil strength tests are not available, the presumptive lateral earth pressure values indicated in Table 3 shall be used.

TABLE 3 - Lateral Earth Pressure Values^{1/}

Soil		Equivalent Fluid Pressure lb/ft ² /ft of depth (Pa/m)	
		Above Seasonal High Water Table ^{2/}	
Description ^{3/}	Unified Classification ^{3/}	Free-Standing Walls	Frame Tanks
Clean gravel, sand, or sand-gravel mixtures (maximum 5% fines) ^{4/}	GP, GW, SP, SW	30 (4,700)	50 (7,900)
Gravel, sand, silt, and clay mixtures (less than 50% fines) Coarse sands with silt and/or clay (less than 50% fines)	All gravel/sand dual symbol classifications and GM, GC, SC, SM, SC-SM	35 (5,500)	60 (9,400)
Low-plasticity silts and clays with some sand and/or gravel (50% or more fines) Fine sands with silt and/or clay (less than 50% fines)	CL, ML, CL-ML, SC, SM, SC-SM	45 (7,100)	75 (11,800)
Low to medium plasticity silts and clays with little sand and/or gravel (50% or more fines)	CL, ML, CL-ML	65 (10,200)	85 (13,300)
High plasticity silts and clays (liquid limit more than 50) ^{5/}	CH, MH	NA	NA

^{1/} For lightly compacted soils (85-90 percent maximum standard density). Includes compaction by use of typical farm equipment.
^{2/} Also below perched seasonal high water table if adequate drainage is provided. Refer to Water Table section of this standard.
^{3/} All definitions and procedures in accordance with ASTM D-2488 and D-653.
^{4/} Generally, only washed materials are in this category.
^{5/} Not recommended. Requires special design if used.

Lateral earth pressures based upon equivalent fluid assumptions shall be assigned according to the following conditions:

- **Rigid Frame or Restrained Wall.** Use the values shown in Table 3 under the column “Frame Tanks,” which gives pressures comparable to the at-rest condition.

- **Flexible or Yielding Wall.** Use the values shown in Table 3 under the column “Free-Standing Walls,” which gives pressures comparable to the active condition. Walls in this category are designed on the basis of gravity for stability or are designed as a cantilever having a base wall thickness to height of backfill ratio not more than 0.085.

Internal lateral pressure used for design shall be 65 lb/ft² (3,120 Pa) where the stored waste is not protected from precipitation. A value of 60 lb/ft² (2,880 Pa) may be used where the stored waste is protected from precipitation and will not become saturated. Lesser values may be used if supported by measurement of actual pressures of the waste to be stored. If heavy equipment is to be operated within 5 feet (1.5 m) of the walls, a surcharge (horizontal pressure) of 100 lb/ft² (4,800 Pa) on the wall shall be added.

Tank covers shall be designed to withstand both dead and live loads. The live load values for covers contained in ASAE EP378.3, Floor and Suspended Loads on Agricultural Structures Due to Use, and in ASAE EP393.2, Manure Storages, shall be the minimum used. The actual axle load for tank wagons having more than a 2,000 gallon (7,600 l) capacity shall be used.

If the facility is to have a roof, snow and wind loads shall be as specified in ASAE EP288.5, Agricultural Building Snow and Wind Loads.

If a fabricated structure is to serve as part of a foundation or support for a building, the total load shall be considered in the structural design and the following conditions shall be met:

1. The building shall not cause any eccentric loads on the storage structure walls. Therefore, the building walls shall: (a) be located so that the load is directly over the storage structure wall; (b) be located outside the storage structure wall by a distance no less than the depth of the storage structure wall below ground; or (c) have footings that extend at least to the bottom elevation of the storage structure and are not connected to the storage structure footings.
2. Sill plates for the building walls should not be placed in direct contact with slatted floors.
3. Storage structure reinforcing steel shall not be extended to connect the building to the storage structure. Bolts or separate reinforcing steel may be used to connect the building to the storage structure. The distance from the face of the storage structure wall to the connecting bolts or reinforcing steel shall be at least 1.5 inches (40 mm).

Structural Design. The structural design shall consider all items that will influence the performance of the structure, including loading assumptions,

material properties, and construction quality. Design assumptions and construction requirements shall be indicated on the plans. For structures that include slatted floors, the walls, which parallel the slats, are usually not supported at the top by the slats and therefore may require a special design.

Tanks may be designed with or without covers. Covers, beams, or braces that are integral to structural performance must be indicated on the construction drawings. The openings in covered tanks shall be designed to accommodate equipment for loading, agitating, and emptying. These openings shall be equipped with grills or secure covers for safety, and for odor and vector control. Adequate reinforcing shall be designed and detailed for all areas around cover openings. Exposed reinforcing bars across openings shall not be used to provide structural strength.

All structures shall be underlain by free draining material or shall have a footing located below the anticipated frost depth.

Fabricated structures shall be designed according to the criteria in the following references as appropriate:

- Steel: "Manual of Steel Construction," American Institute of Steel Construction.
- Timber: "National Design Specifications for Wood Construction," American Forest and Paper Association, or Construction Specification MI-174, Timber Fabrication and Installation.
- Concrete: "Building Code Requirements for Reinforced Concrete, ACI 318," American Concrete Institute.
- Masonry: "Building Code Requirements for Masonry Structures, ACI 530," American Concrete Institute.

Slabs on Grade. Slab design shall consider the required performance and the critical applied loads along with both the subgrade material and material resistance of the concrete slab. Construction Specification MI-158, Concrete Construction, with the following criteria, shall be used:

1. For areas that will not have any vehicular traffic, use a minimum 5-inch (125 mm) thick concrete slab. No joints, wire mesh, or fiber reinforcement is required.
2. For areas that will have vehicular traffic of any kind, use a minimum 5-inch (125 mm) thick concrete slab placed over a minimum 4-inch (100

mm) thick layer of compacted sand. No joints, wire mesh, or fiber reinforcement is required.

- When heavy equipment loads are to be resisted and/or where a non-uniform foundation cannot be avoided, an appropriate design procedure incorporating a subgrade resistance parameter(s) such as ACI 360, "Design of Slabs on Grade," shall be used.

CONSIDERATIONS

Waste storage facilities should be located as close to the source of waste and polluted runoff as practicable.

Solid/liquid separation of runoff or wastewater entering waste storage facilities should be considered to minimize the frequency of accumulated solids removal and to facilitate pumping and application of the stored waste.

Due consideration should be given to environmental concerns, economics, the overall waste management system plan or comprehensive nutrient management plan, and safety and health factors.

Location

The following factors shall be considered in selecting a site for waste storage structures:

- Proximity of the structure to the source of wastes;
- Access to other facilities;
- Ease of loading and emptying wastes;
- Appropriate health regulations;
- Direction of prevailing winds to minimize odors;
- Compatibility with the existing landforms and vegetation, including building arrangement, to minimize odors and adverse impacts on visual resources; and
- Adequate maneuvering space for operating, loading, and unloading equipment.

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 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 4 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 4 may be significantly affected:

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

TABLE 4 - Potential Impact Categories From Breach of Embankment or Accidental Release

<ol style="list-style-type: none"> 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 options 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 4 may be significantly affected:

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

Considerations For Minimizing The Potential Of Waste Storage Pond Liner Failure

Sites with categories listed in Table 5 should be avoided unless no reasonable alternative exists. Under those circumstances, consideration should be given to providing an additional measure of safety from pond seepage when any of the potential impact categories listed in Table 5 may be significantly affected.

TABLE 5 - Potential Impact Categories for Liner Failure	
1.	Any underlying aquifer is at a shallow depth and not confined.
2.	The vadose zone is rock.
3.	The aquifer is a domestic water supply or ecologically vital water supply.
4.	The site is located in an area of solutionized bedrock such as limestone or gypsum.

Should any of the potential impact categories listed in Table 5 be affected, consideration should be given to the following:

1. A clay liner designed in accordance with procedures of AWMFH Appendix 10D with a thickness and coefficient of permeability so that specific discharge is less than 1×10^{-6} cm/sec.
2. A flexible membrane liner over a clay liner.
3. A geosynthetic clay liner (GCL) flexible membrane liner.
4. A concrete liner designed in accordance with slabs on grade criteria for fabricated structures requiring water tightness.

Considerations For Minimizing The Impact Of Odors

For sites located near urban areas, practices such as the following should be considered to reduce odor emissions:

1. Covering storage facility with a suitable cover.
2. Using naturally aerated or mechanically aerated lagoons.
3. Using composting in conjunction with a solid waste system rather than a liquid or slurry system.
4. Using a methane digester and capture system.

PLANS AND SPECIFICATIONS

Plans and specifications shall be prepared in accordance with the criteria of this standard and shall describe the requirements for applying the practice to achieve its intended use.

Support data documentation requirements are as follows:

- Inventory and evaluation records
 - CONS-6 notes or special report
- Survey notes, where applicable
 - Design survey
 - Construction layout survey
 - Construction check survey

- Design records
 - Physical data, functional requirements, and site constraints, where applicable
 - Soils/subsurface investigation report, where applicable
- Design and quantity calculations
- Construction drawings/specifications with:
 - Location map
 - “Designed by” and “Checked by” names or initials
 - Approval signature
 - Job class designation
 - Initials from preconstruction conference
 - As-built notes
- Construction inspection records
 - CONS-6 notes or separate inspection records
 - Construction approval signature
- Record of any variances approved, where applicable
- Record of approvals of in-field changes affecting function and/or job class, where applicable
- For Waste Storage Ponds with a clay liner, include an evaluation report (soils lab or qualified specialist) documenting suitability of liner material

OPERATION AND MAINTENANCE

An operation and maintenance plan shall be developed that is consistent with the purposes of the practice, its intended life, safety requirements, and the criteria for its design.

The plan shall contain the operational requirements for emptying the storage facility. This shall include the requirement that waste shall be removed from storage and utilized at locations, times, rates, and volume in accordance with the overall waste management system plan. In addition, for ponds, the plan shall include an explanation of the permanent marker or recorder installed to indicate the maximum operating level. The plan shall include a strategy for removal and disposition of waste with least environmental damage during the normal storage period to the extent necessary to ensure the pond’s safe operation. This strategy is for the removal of the contribution of unusual storm events that may cause the pond to fill to capacity prematurely with subsequent design inflow and usual precipitation prior to the end of the normal storage period. Development of an emergency action plan should be considered for waste storage facilities where there is a potential for significant impact from breach or accidental release. The plan shall include site-specific provisions for emergency actions that will minimize these impacts.