

Waste Storage Facility (313)

Items which must be adhered to.

- The storage facility must be constructed, operated, and maintained without polluting air or water resources.

Laws

- IDEM approval required for facilities meeting the size requirements or causing a pollution violation.

Location

- Waste storage facilities must not be constructed in the 100-year floodway unless permitted by the Indiana Department of Natural Resources, Division of Water.
- Access to all manure management systems shall be constructed two (2) feet above the 100-year flood elevation.
- The waste storage facility must be located to allow for access and maintenance.
- Setback distances, Table 1.

Required Volume

- Design volume requirements.
- Use average weight and maximum number of animals to size the structure.
- Five-percent (5%) of the volume should be used to account for incomplete removal of solids.
- A minimum of two (2) feet of freeboard is required for structures exposed to rainfall. Structures not exposed to rainfall are required to have six (6) inches of freeboard.

Soils

- Document location of water table along with soils information.

Inlet

- Inlet pipes shall meet the requirements of Manure Transfer (634).
- Inlets from enclosed buildings shall be provided with a water-sealed trap and vent or similar devices to control gas entry into the buildings or other confined spaces.

Emptying Facilities

- Facilities shall be provided for emptying the facility.

Accumulated Solids Removal

- Provisions should be made for periodic removal of accumulated solids.

Staff Gauge

- A staff gauge or marker shall be installed to identify the design full and 50 percent design full elevations.

Safety

- Ramps used to empty liquids shall have a slope of 4 horizontal to 1 vertical or flatter.

- Ramps for vehicle access into a structure shall have a slope of 10 horizontal to 1 vertical or flatter, unless special traction surfaces are provided.
- Push-off ramps shall include a safety fence, cable, and/or posts.
- Warning signs, fences, ladders, ropes, bars, rails, and other devices shall be provided, as appropriate.
- Ventilation and warning signs must be provided for covered waste holding structures.

Erosion Protection

- Areas disturbed by construction must be treated to control erosion and revegetated.

Liners

- Liners shall meet or exceed the requirements of NRCS Practice Standard 521A-C, Pond Sealing or Lining.

O&M

- O&M plan must be provided. It must include information to keep the waste storage facility structurally and environmentally sound. Emergency action procedures should be contained in the plan and prominently displayed.
- The O&M plan should address the removal and disposal of sludge.

Waste Storage Ponds

Location

- Waste storage ponds shall not be constructed on slopes greater than 12%.
- Shall not be located in karst terrain or over mines without a detailed geologic exploration and specific design considerations for these sites.

Soil & Foundation

- If a compacted soil liner is used, it must have a maximum specific discharge of $1/16 \text{ in}^3/\text{in}^2/\text{day}$ ($1.8 \times 10^{-6} \text{ cm}^3/\text{cm}^2/\text{sec}$). Clay liners shall be a minimum of one (1) foot thick.
- If in-situ soils meet the maximum specific discharge criteria, the existing soils shall be over-excavated a minimum of six (6) inches and recompact.
- The water table must be at least two (2) feet below the bottom of the holding pond or provisions made to lower the water table below the pond bottom. IDEM requires an access point for sampling with any drainage system.
- IDEM requires a minimum separation distance of two (2) feet between bedrock and the pond bottom.

Outlet

- The storage pond shall have no outlets than can automatically release effluent from the storage portion of the pond, except an outlet, which releases into another storage pond.
- Outlet pipes shall meet the requirements of Manure Transfer (634).
- Anti-seep collars shall be provided around all pipes.

- An emergency spillway shall be provided for storage structures where the contributing drainage area exceeds 50% of the surface area of the storage structure. The emergency spillway shall be designed for the 50-year, 24-hour storm event. The top of the berm shall be a minimum of one (1) foot above the crest of the emergency spillway.
- The emergency spillway flow shall be directed to a secondary containment area, infiltration area, or other appropriate manure storage structure.

Embankments

- Minimum top widths, Table 2.
- The side slopes shall not be steeper than 2.5 horizontal to 1 vertical.
- The embankment shall be overbuilt by five-percent (5%).
- A cutoff of impermeable soil shall be provided at or just upstream of the embankment centerline unless a liner is used. The cutoff trench shall have a minimum depth of two (2) feet (after stripping), a minimum bottom width of eight (8) feet, and side slopes not steeper than 1.5:1.

Emptying Facilities

- Anti-scour protection must be installed where agitation is planned.
- The concrete anti-scour pads should extend in all directions a minimum of 10 feet outward and/or up the side slopes from each point where the agitator pump is operated.

Fabricated Structures

Foundation

- The water table must be below the bottom of the structure or provisions made to lower the water table below the structure. IDEM requires an access point for sampling with any drainage system.
- If a perimeter drain is used, it should be placed no more than 3 feet horizontally from the structure.
- If no test data is available, presumptive bearing strength values for assessing actual bearing pressures may be obtained from Table 3 or other nationally recognized building code.
- Foundations consisting of bedrock with joints, fractures, or solution channels shall be treated or a separation distance consisting of a minimum one (1) foot of impermeable soil between the floor slab and the bedrock. IDEM requires a minimum separation distance of two (2) feet between bedrock and the bottom of the structure.

Structural Loadings

- Unless soil strength values from testing are available, lateral earth pressures from Table 4 shall be used.
- Manure shall be assumed to exert a hydrostatic load of 65 lb/ft²/ft if exposed to precipitation. 60 lb/ft²/ft can be used if manure is protected from precipitation.
- Heavy equipment operated within five (5) feet of a wall shall be assumed to exert a surcharge load of 100 lb/ft²/ft.
- Covers for structures shall withstand both live and dead loadings. Use ASAE EP378 and EP393 for live loadings.

- Snow and wind loads shall be as specified in ASAE S288.

Structural Design

- Structural design shall consider all items influencing performance.
- Covers, beams, braces, and openings, which are integral to the structural performance, must be shown on the drawings.
- Footings shall be designed to prevent frost heaving.
- Minimum requirements are listed for steel, timber, concrete, and masonry structures and components.
- All structures shall be designed to prevent leakage.

Slabs on Grade

- The minimum slab thickness is four (4) inches where liquid tightness is not required.
- If steel reinforcement is used in a slab, the minimum thickness of the slab shall be five (5) inches.
- Where liquid tightness is required, the minimum thickness of the slab shall be five (5) inches and shall contain distributed reinforcing steel.
- The required area of steel shall be based on subgrade drag theory as discussed in ACI 360, "Design of Slabs-on-Grade".

Waterstops

- Control joints on floors of tanks and slabs that must restrict seepage shall be filled with a hydrophilic rubber waterstop.
- Construction joints between the walls and the floor of the structure shall be sealed with hydrophilic rubber, vinyl, or a colloidal type waterstop.
- All other construction joints shall be sealed with a bulb-type vinyl waterstop.
- Pipes or other ports shall be sealed with a hydrophilic rubber waterstop or an expanding sealant.

Buried Tanks

- Tanks shall be anchored to prevent flotation if a high water table is present.
- Used tanks and steel tanks are not allowed.

Items which are at the discretion of the designer.

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- Site selection should consider proximity to the source of waste and polluted runoff, surface and ground water, access to other facilities, loading and unloading, health regulations, foundation, prevailing winds, expansion and compatibility with the surrounding landscape.
- Non-polluted runoff should be excluded from the waste storage facility.
- For storage facilities requiring approval from IDEM, the minimum storage period shall be 180 days.
- Earthen liquid waste storage facilities requiring IDEM approval must also have a professional engineer's certification of the plans and specifications.

- Inside slopes should be flattened to ease compaction on the side slopes.
- A sump one-foot lower than the bottom will facilitate solids removal from the pond.
- Solids can be removed from the waste before it enters the waste storage facility.
- 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 6 might be significantly affected.
- Waste storage facilities should be located to minimize the impact of odors and to minimize the impact on visual resources.
- Minimizing the impact of odors may be accomplished by using an anaerobic lagoon rather than a waste storage pond or by utilizing other practices listed within the standard.
- Stacking facilities should be roofed or have a means to collect and store polluted runoff.
- Tanks can be designed either with or without a cover.