



Stonecrest Engineering Newsletter

February, 2005

With the implementation of the Nutrient Management Act, a number of changes have been legislated with regards to the process of designing and constructing a manure storage tank. This guideline has been prepared to help clarify some of the concerns that contractors and owners have expressed with respect to liquid manure storages. Please feel free to contact Stonecrest Engineering with any questions or concerns about the information below.

Liquid Manure Storage Design Procedure

There are three possibilities for the process of designing a liquid manure storage tank:

- Option 1. The manure tank is being built under an OMAF-approved (Guelph Approvals Office) or “Provincial” nutrient management plan. This is primarily for new operations or operations of 300 nutrient units or more.
- Option 2. The manure tank is being built under a municipality/township-required nutrient management plan. The operation is existing and has less than 300 nutrient units. The nutrient management plan is reviewed by a local OMAF office on behalf of the municipality/township.
- Option 3. The manure tank is not built under a nutrient management plan at all.

OPTION 1 – OMAF Approved Storages

For all OMAF-approved manure storages, Form A and B must be signed by the engineer and included in the nutrient management plan. By signing Form A and B, the engineer is taking responsibility for all aspects of design and construction, including location of the structure, transfer systems and geotechnical aspects.

Procedure:

1. Arrange a meeting between the owner, engineer and nutrient management planner to discuss areas of concern (wells, surface water, tile inlets) and the proposed location of the tank. The engineer can collect data at this time to prepare a site plan. Contractor and building official may wish to attend. The size of the tank must be determined by the engineer, or the planner, based on number of animals in the NMP.
2. Contact geotechnical engineer to perform soil testing.
3. Site plan to be prepared by engineer. Planner may produce own, more detailed site plan as part of NMP. The engineer's site plan is needed to confirm "spatial separation" of manure storage – distances to wells, watercourses and tile inlets.
4. Once the soil tests are received, the engineered drawings can be prepared, including information regarding transfer system and liner requirements.

DRAWINGS WILL NOT BE PREPARED UNTIL SOIL TESTS ARE RECEIVED AND TRANSFER SYSTEM INFORMATION IS PROVIDED.

OPTION 2 – Municipality Approved Storages

For municipality-approved tanks, Form A and B may be signed by the engineer at the request of the municipality/township. If Form A and B are signed, the engineer is taking responsibility for all aspects of design and construction and the procedure is as Option 1. If form A and B are not requested by the municipality/township, then the procedure is as Option 3.

OPTION 3 – Manure Storages Not Covered by a Nutrient Management Plan

Although not required by law to perform a soil investigation, it is our professional responsibility to do so and to adhere to the standards set out in the Nutrient Management Act.

Procedure:

1. Contact geotechnical engineer to perform soil testing.
2. Determine, with the help of the engineer if required, the size of the manure storage.
3. Once the soil tests are received, the engineered drawings can be prepared, including information regarding transfer system and liner requirements.

Note that the manure storage must still meet the distance requirements as set out in MDS II. The building official should provide these distances and verify the location of the tank on site.

DRAWINGS WILL NOT BE PREPARED UNTIL SOIL TESTS ARE RECEIVED AND TRANSFER SYSTEM INFORMATION IS PROVIDED.

Standpipe/Monitoring Station

All new liquid manure storages require a drainage tile, wrapped in filter cloth and packed in gravel to be placed around the perimeter of the tank at footing depth. This tile serves two purposes – to reduce external water pressure on the tank floor and walls and to provide a method of ensuring tank integrity and containment.

The perimeter tile can be connected to field tiles (more than 50' from the tank) provided a monitoring station with shut off valve is installed to prevent field tile contamination should a leak occur. The owner must be made aware of his responsibility to monitor any liquid entering the field tile for signs of manure. Copies of a waiver to be provided?

Alternatively, the perimeter tile can be connected to a standpipe at the tank. This standpipe can be used to monitor the level of groundwater surrounding the tank. The standpipe should be sufficient in size to allow for a pump to be inserted and the water drawn down. The owner should be made aware of the need to keep the groundwater down as low as possible, particularly when the storage is empty. Copies of a waiver to be provided?

Liner Requirements

At this point, there are only two types of liners approved for use by the Nutrient Management Act – geosynthetic clay liners and geomembrane liners. Both liner types have their pros and cons. Contact Stonecrest for more information regarding suppliers.

Concrete Quality

Stonecrest Engineering is currently specifying CFBA Class C-3 (30MPa) concrete for the manure tank floor and Class C-2 (32MPa) for the walls, as identified in the Nutrient Management Act.

The Act also dictates that floor cracking should be controlled by the proper use of control, expansion or isolation joints. Alternatively, a floor slab could be designed “joint-free” provided enough “reinforcing material” is used “to limit shrinkage or stress cracks”. As a result, Stonecrest now requires that all manure tank floors be constructed with polypropylene fibre mesh reinforcement.

Site Inspection Requirements

Note that the following are the typical site inspections to be performed during the construction of a manure storage. Other inspections may be identified by the engineer prior to construction.

1. Soil inspection – performed by the geotechnical engineer, this provides an opportunity to compare the actual conditions with what was found in the initial investigation.
2. Footing inspection – performed by the engineer, this inspection should occur when the exterior forms and continuous footing reinforcement have been placed.
3. Reinforcement inspection – performed by the engineer, this should be completed when the majority of the reinforcement for the tank has been tied.
4. Transfer system inspection – performed by the engineer, this should be completed when the pipe is in place or forms set.
5. Final Inspection – performed when tank has been backfilled, monitoring station/standpipe completed and safety fence installed.

If you have any questions regarding this information, please don't hesitate to contact Stonecrest Engineering.