NORTH ZONE

This drawing is valid for all Illinois counties except:
Jackson, Franklin, Williamson, Hamilton, White, Saline, Gallatin, Union,
Johnson, Pope, Hardin, Alexander, Pulaski, and Massac.

DESIGN ASSUMPTIONS
1. Meets ACI 318-14 and NDQ Part 536
2. Concrete mix must be designed to yield a 28 day compressive
   strength of 4000 psi. All rebar must be Grade 60.
3. Lateral pressure from water = 65 psf (per CPNS 13.3, unproctected
   from precipitation)
4. Soil Density = 130 pcf
5. Allowable Soil Bearing Pressure = 2000 psf

DESIGN USES
1. This standard design can be used with 0 to 6 foot soil backfill.
2. Vehicular traffic is allowed next to the wall.
3. The wall is designed as a freestanding wall—however, if the wall
   is not restrained by an opposing wall with the same backfill height,
   minimum 5 inch floor slab length must be at least 80 feet (not
   including footing). See IL AWMF Supplement IL65.10-17 for more
   details.

CONSTRUCTION NOTES
10. All reinforcing steel must have a minimum concrete cover over
    reinforcement 3 inches, except the cover at the top of slab is 2
    inches.
11. Lap splices of reinforcing steel must have a minimum lapped length
    of: Mark B & C = #4 bars = 33", all other #4 bars = 25", all
    #5 bars = 32".
12. Place concrete on top of 3 inch layer on approved base course
    material. Approved base course material includes IDOT Grad No
    CA 7, 8, 11, 12, 13, 14, 15, 16 or FA 1, 2, 4.
13. The 5 inch floor slab will have #4 bars at 15 inch spacing each
    way.
14. Where ever the floor slab exceeds 30 feet in length or width, install
    watertight contraction joints with dowel bars. See page 4 for
details of contraction joints.
15. The wall will be built with contraction and expansion joints. No
    section of wall will be over 30 feet long between contraction joints,
    and no more than 90' between expansion joints. See page 4 for
details of contraction joint. See page 2 for details of expansion
    joint.
16. Place a construction joint anywhere the concrete placement is not
    continuous and the joint will have concrete against concrete
    with no filler material. See Construction Joint Notes on page 3.
17. Connect and weld all waterstop splices and intersections according
to manufacturers instructions.
18. Fill expansion joints with preformed expansion joint filler with a
    minimum thickness of 3/4 inch. Joint filler must conform to ASTMD
    1752 Type I, II, or III; D 994; or D 1751.

Not To Scale

MANURE STORAGE FACILITY
6' HIGH R/C WALL
NORTH ZONE

PLAN

ESTIMATED QUANTITIES

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete (28 Days, 4000 PSI)</td>
<td>Cu. Yd.</td>
<td></td>
</tr>
<tr>
<td>Reinforcing Steel #4 Rebars</td>
<td>Lbs.</td>
<td></td>
</tr>
<tr>
<td>Reinforcing Steel #6 Rebars</td>
<td>Lbs.</td>
<td></td>
</tr>
<tr>
<td>3/4&quot; Dowel Bar</td>
<td>Lin. Ft.</td>
<td></td>
</tr>
<tr>
<td>6&quot; Nonmetallic Water Stop</td>
<td>Lin. Ft.</td>
<td></td>
</tr>
<tr>
<td>1/2&quot; Preformed Joint Filler</td>
<td>Lin. Ft.</td>
<td></td>
</tr>
<tr>
<td>Base Course Material</td>
<td>Tons</td>
<td></td>
</tr>
<tr>
<td>Perimeter Drain Fill</td>
<td>Tons</td>
<td></td>
</tr>
<tr>
<td>4&quot; Perforated CPT</td>
<td>Lin. Ft.</td>
<td></td>
</tr>
<tr>
<td>Geotextile</td>
<td>Sq. Yd.</td>
<td></td>
</tr>
</tbody>
</table>

REINFORCING STEEL SCHEDULE

<table>
<thead>
<tr>
<th>Location</th>
<th>Mark</th>
<th>Size</th>
<th>Qty.</th>
<th>Length</th>
<th>Type</th>
<th>A</th>
<th>B</th>
<th>Tot. Ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall Vertical</td>
<td>A</td>
<td>#5</td>
<td>8'-9&quot;</td>
<td>2</td>
<td>2'</td>
<td>3'</td>
<td>6'-6&quot;</td>
<td></td>
</tr>
<tr>
<td>Wall Horizontal</td>
<td>B</td>
<td>#4</td>
<td>10</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wall Horizontal</td>
<td>C</td>
<td>#4</td>
<td>10</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Footing Top Bar</td>
<td>D</td>
<td>#5</td>
<td>11'-6&quot;</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Footing Bottom Bar</td>
<td>E</td>
<td>#5</td>
<td>11'-6&quot;</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Footing Horizontal</td>
<td>F</td>
<td>#4</td>
<td>16</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Footing Horizontal</td>
<td>G</td>
<td>#4</td>
<td>16</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corner Horizontal</td>
<td>H</td>
<td>#4</td>
<td>6'-6&quot;</td>
<td>2</td>
<td>3'-0&quot;</td>
<td></td>
<td></td>
<td>3'-0&quot;</td>
</tr>
</tbody>
</table>
**Drainage Notes:**
1. Provide perimeter drain if water table can rise above floor level.
2. Perimeter drain pipe and gravel/geotextile filter is to be routed around all sides of the tank and drain freely to a surface water outlet or other subsurface drainage outlet.
3. Perimeter drain pipe and fittings must be perforated, corrugated polyethylene (CPT) meeting ASTM specifications listed below:

<table>
<thead>
<tr>
<th>CPT</th>
<th>ASTM F405, F667</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual Wall CPT</td>
<td>ASTM F2306, F2648, F405, F667</td>
</tr>
</tbody>
</table>

4. Drain fill will consist of sand, gravel or concrete aggregate mixture with a maximum size of 3" and not more than 5% passing a #200 sieve. Qualifying IDOT gradations for drain fill include:
   - CA-1, CA-3, CA-5, CA-7, CA-8, CA-11, CA-12, CA-13, CA-14, CA-15, CA-16, CA-18

5. Geotextile (non-woven, needle punched) minimum criteria:
   - Grab tensile strength (lb) ASTM D 4632
   - Elongation at failure (%) ASTM D 4632
   - Tensile tear strength (lb) ASTM D 4533
   - Puncture strength (lb) ASTM D 6241
   - Ultraviolet light (% retained strength) ASTM D 4456
   - Apparent opening size (AOS) ASTM D 4751
     - Max. 0.22 mm (US sieve size 70)
   - Permeability sec^-1 ASTM D 4491

6. Overlap any geotextile splices a minimum of 18 inches.
7. Encase all drain fill with geotextile.

**Construction Joint Notes:**
1. A construction joint must be prepared when the concrete pour is not continuous, typically between the floor and wall.
2. Prepare all surfaces that will be in contact with new concrete as per note 5.
3. Let concrete cure at least 12 hours prior to steel taping and form construction for the next pour.
4. New concrete must not be placed until the hardened concrete has cured at least 12 hours.
5. Construction joints must be prepared using one of the following two methods:
   - Method 1 – Water-Air or Sandblasting. Clean the joint surface of all unsatisfactory concrete, laitance, coating, stains, and debris by sandblasting or high-pressure air-water cutting, or both. Sandblasting can be used after the concrete has gained sufficient strength to resist excessive cutting, and high-pressure air-water cutting can be used as soon as the concrete has hardened sufficiently to prevent the jet from displacing the coarse aggregates. The surface of the concrete in place must be cut to expose clean, sound aggregate, but not so deep as to undercut the edges of larger particles of the aggregate. Cut the surface to at least 1/4" depth. Thoroughly wash the surface to remove all material after cutting. 
   - Method 2 – Mechanical. Clean the joint surface of all unsatisfactory concrete, laitance, coatings, stains, and debris by washing and scrubbing with a wire brush, wire broom, or other means approved by the engineer to expose course aggregate without displacing it. The surface must be roughened to at least 1/4" depth.

6. All construction joints must be wetted and standing water removed immediately before new concrete is placed.
7. New concrete must be sufficiently vibrated to ensure good contact into the prepared joint.
8. Keyways or steel plates cannot be substituted for the construction joint methods above.

**Example Wall Joint Placement Sequence**

<table>
<thead>
<tr>
<th>Expansion Joint</th>
<th>Contraction Joint</th>
<th>Contraction Joint</th>
<th>Expansion Joint</th>
</tr>
</thead>
<tbody>
<tr>
<td>30'</td>
<td>30'</td>
<td>30'</td>
<td></td>
</tr>
</tbody>
</table>

**Scale:**
- **Corner Detail - Plan View:** Scale 1/2" = 1'-0"
- **Perimeter Drain Detail:** Scale 3/4" = 1'-0"
SECTION @ DOWEL CENTERLINE

FLOOR SLAB CONTRACTION JOINT

Scale: 1" = 1'-0"

Note: Dowel sleeve for contraction joints may be manufactured plastic sleeve, PVC sleeve, grease, or any other means to prevent a bond between half of the dowel and the concrete. Place A Dowel Sleeve On One End Of Each Dowel.

PLAN

FLOOR SLAB CONTRACTION JOINT 30' C.C. SPACING

Scale: 3/4" = 1'-0"

WALL CONTRACTION JOINT

30' C.C. SPACING

Not To Scale

FOOTING CORNER REINFORCING

PLAN VIEW

Scale: 3/16" = 1'-0"