A. Procedure Used to Qualify Dual Wall Plastic Pipe for Installation in Fills

The following procedure may be used on a site specific basis to determine if a dual wall (corrugated plastic tubing with smooth interior) pipe product conforms to the applicable specifications, along with the maximum soil fill height allowed over the installed tile and the depth of fill required before the pipe can sustain traffic. This procedure is also used to prequalify dual wall pipe at the manufacturer’s request for inclusion in the IL NRCS preapproved materials list.

Procedure:

1. The manufacturer must certify the following items in writing for the pipe and fittings:
   a. Type of material used
   b. Manufacture quality - ASTM or AASHTO specifications met or exceeded (ASTM F405, F667, F2306, or F2648, or AASHTO M252 or M294)
   c. Independent lab test results verifying the pipe stiffness at 5% deflection, 3 samples minimum (for prequalification, need pipe stiffness for each size of pipe requested)
   d. Pipe joints are watertight to 5 psi internal pressure.

2. Determine the Modulus of Soil Reaction, E’, for the proposed backfill material surrounding the pipe from Table 1 below. Soil Survey information may be used to determine Liquid Limit and proportion of coarse-grained particles (coarse-grained particles are those retained on the 200 sieve and above).

<table>
<thead>
<tr>
<th>E’, psi</th>
<th>Backfill Description and Method of Compaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>CL, ML, or ML-CL with less than 25% coarse-grained particles, Liquid Limit less than 50, and backfill is hand compacted but density not tested.</td>
</tr>
<tr>
<td>400</td>
<td>CL, ML, or ML-CL with less than 25% coarse-grained particles, Liquid Limit less than 50, and backfill is hand compacted to 90% Standard Proctor Density. DOCUMENT COMPACTION. OR CL, ML, or ML-CL with more than 25% coarse-grained particles, Liquid Limit less than 50, and backfill is hand compacted but density not tested.</td>
</tr>
<tr>
<td>600</td>
<td>CL, ML, or ML-CL with more than 25% coarse-grained particles, Liquid Limit less than 50, and backfill is hand compacted to 90% Standard Proctor Density. DOCUMENT COMPACTION.</td>
</tr>
</tbody>
</table>

Table 1. Modulus of Soil Reaction E’ for Fine Grained Soils.

3. Using the E’ determined from Table 1 and pipe stiffness from the independent test results provided by the manufacturer, determine the Total Load on Pipe at 5% Deflection from Figure 2. Note: Use the lowest pipe stiffness value submitted, not the average.

4. Using the Total Load on Pipe (at 5% Deflection) from Figure 2, find the Height of Fill over pipe for both curves in Figure 3: Minimum Fill Over Pipe Before Applying Wheel Load and Maximum Fill Over Pipe.
Figure 2. Pipe Stiffness vs. Total Load

Pipe Stiffness, psi

Total Load on Pipe at 5% Deflection, psi

E = 600,000 psi

E = 400,000 psi

E = 200,000 psi

(210-IV-EFH, Notice IL59, January 2013)
Example:

A landowner is constructing a small dam on and would like to utilize dual wall polyethylene pipe for the principal spillway pipe. The manufacturer has certified the pipe meets the requirements of ASTM F 667, the joints are watertight, and the minimum pipe stiffness at 5% deflection is 45 psi. Since this structure is simple and straightforward, we are not going to test for 90% Proctor density. Soils at the site that will be used for backfill around the pipe are 86D2, Osco, and 119E2, Elco.

What is the maximum allowable fill over this pipe? And how much cover/fill should there be over the pipe before construction equipment can drive over it?

1. Manufacturer has certified information we need.
2. Determine Modulus of Soil Reaction, E’
   a. From the Engineering Properties Table in the Soil Survey, below 8 inches, both soils have liquid limits less than 50 and less than 25% retained on the 200 sieve. Assume borrow will be taken from a depth greater than 8 inches.
   b. Looking at Table 1, the parameters for this job fall under E’ = 200 psi
3. Determine Total Load on Pipe from Figure 2
   a. Using the E’ = 200 psi line and the 45 psi minimum pipe stiffness from the independent test results provided by the manufacturer, find the Total Load.

![Figure 2. Pipe Stiffness vs. Total Load](image)

Total load from Figure 2 is 6.3 psi.
4. Using 6.3 psi total load, determine maximum allowable fill over pipe and minimum fill (cover) over pipe prior to wheel loading (traffic) from Figure 3.

**Figure 3. Height of Fill vs. Total Load**

- Maximum fill over pipe = 6.3 ft.
- Required fill over pipe before equipment can drive over pipe = 3.7 ft