SUDAS Revision Submittal Form

Status Date:	As of 10/26/2018	**Topic:**	Foamed cellular concrete
Manual:	Specifications	**Manual Location:**	3010, 2.06, 3.05; 3020, 2.04, 2.05, 3.04 4010, 3.08; 4020, 3.07

Requested Revision:

From Section 3010 (Trench Excavation and Backfill):

2.06 SPECIAL PIPE EMBEDMENT AND ENCASEMENT MATERIAL

A. Concrete Cradle, Arch, or Encasement: Use Iowa DOT Class C concrete.

B. Flowable Mortar: Comply with Iowa DOT Article 2506.02.

C. CLSM:

1. Approximate quantities per cubic yard:
   a. Cement: 50 pounds
   b. Fly ash: 250 pounds
   c. Fine aggregate: 2,910 pounds
   d. Water: 60 gallons

2. A compressive strength of at least 50 psi compressive strength at 28 calendar days can be expected.

3. Comply with material requirements of Iowa DOT Article 2506.02.

D. Foamed Cellular Concrete:

1. If specified or approved by the Engineer, foamed cellular concrete may be substituted for flowable mortar.

2. Comply with Iowa DOT Article 2506.02.

3. Submit mix design to the Engineer. Include base cement slurry mix per cubic yard, expansion factor from the foaming agent, and wet density.

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3.05 PIPE BEDDING AND BACKFILL

A. General: Comply with Figures 3010.101, 3010.102, 3010.103, 3010.104, and 3010.105, as appropriate.

1. Bedding and backfill used for pipe installation will depend on:
   a. Type of installation (water main, sanitary sewer gravity main, sanitary sewer force main, or storm sewer).
   b. Pipe material.
   c. Depth of bury.
   d. Pipe diameter.

2. After pipe installation, place remaining bedding material and immediately place backfill in trench.

3. Adjust the moisture content of excessively wet, but otherwise suitable, backfill material by spreading, turning, aerating, and otherwise working material as necessary to achieve required moisture range.

4. Adjust the moisture content of excessively dry, but otherwise suitable, backfill material by adding water, then turning, mixing, and otherwise blending the water uniformly throughout the material until the required moisture range is achieved.

5. Hydraulic compaction (flooding with water) is not allowed unless authorized by the Engineer.

6. Special Pipe Embedment and Encasement Materials:
   a. If specified, use concrete, flowable mortar, CLSM, or foamed cellular concrete as a substitute for pipe bedding, haunch support, or primary and secondary backfill.
   b. Secure pipe against displacement or flotation prior to placing special pipe embedment and encasement material.
   c. Place Class IV clay material for a waterstop and compacted to 90% of Standard Proctor Density. Obtain required compaction within a soil moisture range of optimum moisture to 4% above optimum moisture content. If trench stabilization material is used, extend waterstop through stabilization material to the bottom of the trench.

B. Pipe Bedding:

1. Granular Material:
   a. Class I granular bedding material is required for all gravity mains. Use when specified for pressure pipes.
   b. Comply with Figures 3010.101, 3010.102, 3010.103, 3010.104, and 3010.105.
   c. Place bedding material in the bottom of the trench in lifts no greater than 6 inches thick. Consolidate and moderately compact bedding material.
   d. Shape bedding material to evenly support pipe at the proper line and grade, with full contact under the bottom of the pipe. Excavate for pipe bells.
   e. Install pipe and system components.
   f. Place, consolidate, and moderately compact additional bedding material adjacent to the pipe to a depth equal to 1/6 the outside diameter of the pipe.

2. Suitable Backfill Material:
   a. Only use with pressure pipe. Comply with Figure 3010.104.
   b. Use suitable backfill material to shape trench bottom to evenly support pipe at the proper line and grade, with full contact under the bottom of the pipe. Excavate for pipe bells.

~~**3. Special Pipe Embedment and Encasement Materials:**~~
   ~~**a. Concrete, Flowable Mortar, or CLSM:**~~
      ~~1) If specified in the contract documents, use concrete, flowable mortar, or CLSM in lieu of other bedding materials.~~
      ~~2) Secure pipe against displacement or flotation prior to placing concrete, flowable mortar, or CLSM.~~
   ~~**b. Waterstop:**~~
      ~~1) Place Class IVA clay backfill material, and compact to at least 90% of Standard Proctor Density. Obtain required compaction within a soil moisture range of optimum moisture to 4% above optimum moisture content.~~
      ~~2) If trench stabilization material is required, extend waterstop through stabilization material to bottom of trench.~~

C. Haunch Support: Place from the top of the pipe bedding to the springline of the pipe.

1. Granular Material:
   a. Place Class I material in lifts no greater than 6 inches thick.
   b. Consolidate and moderately compact by slicing with a shovel or using other approved techniques.

2. Suitable Backfill Material:
   a. Place in lifts no greater than 6 inches thick.

b. For Class II backfill material, consolidate and moderately compact by slicing with a shovel or using other approved techniques.
c. For Class III and Class IVA backfill materials, compact to at least 90% of Standard Proctor Density. Obtain required compaction within a soil moisture range of optimum moisture to 4% above optimum moisture content.

~~**3. Special Pipe Embedment and Encasement Materials:**~~
~~**a. Concrete, Flowable Mortar, or CLSM:**~~
~~1) If specified in the contract documents, use concrete, flowable mortar, or CLSM in lieu of other bedding materials.~~
~~2) Secure pipe against displacement or flotation prior to placing concrete, flowable mortar, or CLSM.~~
~~**b. Waterstop:** Place and compact Class IVA clay backfill material according to the suitable backfill material requirement above.~~

D. Primary and Secondary Backfill:

1. General:
a. For primary backfill, place from the springline of the pipe to the top of the pipe.
b. For secondary backfill, place from the top of the pipe to 1 foot above the top of the pipe.

2. Granular Material:
a. Place in lifts no greater than 6 inches thick.
b. Compact to at least 65% relative density.

3. Suitable Backfill Material:
a. Place in lifts no greater than 6 inches thick.
b. For Class II backfill material, compact to at least 65% relative density.
c. For Class III and Class IVA backfill materials, compact to at least 95% of Standard Proctor Density. Obtain required compaction within a soil moisture range of optimum moisture to 4% above optimum moisture content.

~~**4. Special Pipe Embedment and Encasement Materials:**~~
~~**a. Concrete, Flowable Mortar, or CLSM:**~~
~~1) If specified in the contract documents, use concrete, flowable mortar, or CLSM in lieu of other bedding materials.~~
~~2) Secure pipe against displacement or flotation prior to placing concrete, flowable mortar, or CLSM.~~
~~**b. Waterstop:** Place and compact Class IVA clay backfill material according to the suitable backfill material requirement above.~~

From Section 3020 (Trenchless Construction):

2.04 BACKFILL FOR ABANDONED TUNNELS

A. Use Iowa DOT Class C concrete, approximately 4 inch slump.

B. Flowable mortar, foamed cellular concrete, or CLSM according to Section 3010, 2.06.

2.05 BACKFILL MATERIAL

A. Excavated Materials: Comply with Section 3010 for classification of excavated materials. Use only suitable material for backfill material.

B. Special Fill Materials: For use where specified in the contract documents.

1. PCC: Use Iowa DOT Class C concrete, approximately 4 inch slump.

2. **Flowable Mortar:** Comply with ~~Iowa DOT Article 2506.02~~ Section 3010, 2.06.

3. **CLSM:** Comply with Section 3010, 2.06.

4. **Foamed Cellular Concrete:** Comply with Section 3010, 2.06.

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3.04 TRENCHLESS INSTALLATION

C. Carrier Pipe Installation through Casing:

1. Clean dirt and debris from the interior of the casing pipe after installation.

2. Install casing spacers on carrier pipe sections as necessary to support the pipe barrel according to the pipe manufacturer's recommendations subject to the following minimum requirements:
   a. Install a spacer within 1 foot of each side of the carrier pipe joint and at a maximum spacing of 6 feet.
   b. Do not allow the pipe to be supported by joint bells.
   c. Lubricate casing spacers with drilling mud or flax soap. Do not use petroleum-based lubricants or oils.

3. Ensure that thrust loads will not damage carrier pipe joints. Provide thrust collars between joint shoulders of concrete pipe.

4. Provide timbers for sufficient cushioning between the end of the pipe pushed and the jacking equipment to prevent damage to the pipe. Do not allow the steel jack face to thrust against the unprotected pipe end.

5. Position jacks so the resulting force is applied evenly to the entire end of the pipe.

6. Assemble pipe joints in the jacking pit before pushing the carrier pipe into the casing.

7. Close the end of the casing pipe around the carrier pipe with a casing end seal.

~~8. When specified in the contract documents, fill the annular space between the carrier and casing pipe with flowable mortar or CLSM.~~

D. Annular Space Grouting: If specified, fill the annular space between the carrier pipe and the casing pipe with flowable mortar, foamed cellular concrete, or CLSM according to Section 3010. Batching, mixing, and placing may be started when the temperature is 34°F and rising. Cease mixing and placing when temperature is 38° F or less and falling.

1. **Flowable Mortar and CLSM:** Fill voids by staged grouting. Construct bulkheads at each end of the pipe. Ensure all voids are filled with flowable mortar by providing 2 feet of head when filling.

2. **Foamed Cellular Concrete:**
   a. Construct bulkheads sufficient to withstand pressure of grouting operation at each end of the pipe.
   b. Use sufficient grouting pressures to ensure all voids between the inner pipe and the casing pipe have been filled without collapsing or deforming the inner pipe by more than 5% of the diameter. Multiple grout lifts may be necessary. Follow manufacturer's recommendations.
   c. Check wet density at the beginning of the placement and a minimum of every 2 hours thereafter. Provide test results to the Engineer.
   d. If grout holes are utilized, insert cylindrical wood plugs or other approved plugs until grout has set. Fill holes with concrete after plugs have been removed.

From Section 4010 (Sanitary Sewers):

3.08 SANITARY SEWER ABANDONMENT

A. Plug:

1. Prior to placing the sewer plug, the Engineer will verify the sewer line is not in use.

2. Construct sewer plug by completely filling the end of the pipe with concrete. Force concrete into the end of the pipe for a distance of 16 inches, or one-half the pipe diameter, whichever is greater.

B. Fill:

1. Prior to filling the sewer, the Engineer will verify the sewer line is not in use.

2. If specified in the contract documents, fill the line to be abandoned with flowable mortar, foamed cellular concrete, or CLSM (comply with Section 3010) by gravity flow or pumping.

3. Batching, mixing, and placing may be started when temperature is 34°F and rising. Cease mixing and placing when temperature is 38°F or less and falling.

From Section 4020 (Storm Sewers):

3.07 STORM SEWER ABANDONMENT

A. Plug:

1. Prior to placing the sewer plug, the Engineer will verify the sewer line is not in use.

2. Construct sewer plug by completely filling the end of the pipe with concrete. Force concrete into the end of the pipe for a distance of 16 inches, or one-half the pipe diameter, whichever is greater.

B. Fill:

1. Prior to filling the sewer, the Engineer will verify the sewer line is not in use.

2. If specified in the contract documents, fill the line to be abandoned with flowable mortar, foamed cellular concrete, or CLSM (comply with Section 3010) by gravity flow or pumping.

3. Batching, mixing, and placing may be started when temperature is 34°F and rising. Cease mixing and placing when temperature is 38°F or less and falling.

Reason for Revision: Added foamed cellular concrete as an option for special pipe embedment and encasement material, backfill for abandoned tunnels, annular space grouting, and sewer abandonment fill.

Comments: Same changes will be made to the Iowa DOT Specifications.

District:	☒ 1	☒ 2	☒ 3	☒ 4	☒ 5	☒ 6
Comments:	None.					
Action:	☐ Deferred		☐ Not Approved		☒ Approved	

Final District Action Summary: All 6 districts approved.

Board of Directors Action: