

## 1.0 GENERAL

### 1.1 Scope

- 1.1.1 This section refers to the permanent abandonment of facilities including water mains, manhole, catch basin, valve chamber, sanitary and storm sewer mains and culverts.
- 1.1.2 Facilities deemed fit for abandonment considering the location and other vital conditions that surround such facilities, shall be abandoned at the full supervision of the Engineer.
- 1.1.3 The abandonment of small diameter pipes (diameters ranging from 100 mm to 300 mm) shall entail cementing or grouting off to a pipe insertion distance of at least two times the diameter of the pipe at all open pipe ends or properly capped using approved fittings and appurtenances. Other abandonment methods will be permitted only when approved by the Engineer.
- 1.1.4 The abandonment of large diameter pipe (diameters greater than 300 mm) and other facilities deemed fit for abandonment shall entail completely filling the entire interior void space in the designated section with a flowable fill product that will cure and harden in that physical environment and prevent future collapse of the pipe wall. Other abandonment methods will be permitted only when approved by the Engineer.

### 1.2 Related Sections

- 1.2.1 Section 02315 – Trench Excavation and Backfill
- 1.2.2 Section 02500 – Supply of Portland Cement Concrete

## 2.0 PRODUCTS

### 2.1 Mix Design

- 2.1.1 Submit mix design for each type of material for review by Engineer including proposed aggregate size, water cement ratio and any admixtures to be used to increase flow-ability and workability.

### 2.2 Grout

- 2.2.1 Non-shrink cementitious grout shall be a pre-proportioned, prepackaged, precision cement-based grout requiring only the addition of potable water. Grout material shall meet all the following typical performance criteria when cured at 73°F (23°C):
  - .1 Grout shall not contain metallic aggregate, expansive cement, or gas generating additives, such as aluminum powder.
  - .2 Grout shall contain an air release aggregate to generate positive expansion.
  - .3 Early Height Change, ASTM C827 0.0 to 4.0%
  - .4 Hardened Height Change, ASTM C1090 0.0 to 0.3%

- .5 Effective Bearing Area 95%
- .6 Compressive Strength, ASTM C942 28 Days of minimum 30 MPa at 28 days.
- .7 ASTM C940 - Standard Test Method for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory
- .8 ASTM C1107 - Standard for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)

2.2.2 Flowable fill shall be low-strength, self leveling and self-compacting cementitious material which consist of fluid mixture of cement, aggregate, water, fly ash, and admixture enough to provide the needed quality. Components of the flowable fill shall be as follows:

Strength at 28 days	1.0 ± 0.25 MPa (measured in accordance with CSA A23.1/ A23.2 latest edition)
Slump	200 ± 25 mm (measured in accordance with CSA A23.1/ A23.2 latest edition)

2.2.3 Low Shrink Backfill to Section 2500 – Supply of Portland Cement Concrete

### 3.0 EXECUTION

3.1 Codes and Standards

- 3.1.1 Perform the operation while adhering to the requirements of the following codes and standards:
- .1 Local Codes and Bylaws
  - .2 *The Workers Compensation Act*, (Saskatchewan), latest edition
  - .3 National Building Code of Canada, latest edition.

3.2 Abandonment of Pipes up to and including 300 mm diameter:

3.2.1 Pipe ends up to 300 mm shall be dry packed using grout to a distance of two times the pipe diameter from the end of the pipe.

3.3 Abandonment of Pipes larger than 300 mm:

- 3.3.1 Flowable fill or low shrink shall be used for abandonment of pipes larger than 300mm.
- 3.3.2 Flowable fill or low shrink shall be pumped into the pipe, unless otherwise specified or directed by the Engineer.
- 3.3.3 Monitor the pressure being exerted on the interior of the pipe during the grouting operation.

- 3.3.4 Do not allow the monitored pressure exerted on the interior of the pipe to exceed 700 kPa (100 psi).
  - 3.3.5 Provide whatever is required to allow the grouting procedure to proceed without exceeding the maximum allowable internal pressure.
  - 3.3.6 Monitor the vents and standpipes provided to ensure that filling of the pipe to a point where grout fills the vent pipes to a level at least 600 mm above the top of the main.
- 3.4 Pipe Dewatering
- 3.4.1 Carry out any dewatering of the pipe necessary to allow the grouting of filling operation to proceed as intended and without dilution of the grout mixture being installed.
  - 3.4.2 Do not permit trench water to enter the pipe.
  - 3.4.3 Ensure that the discharge from the dewatering equipment is disposed of in a manner that does not create a nuisance, cause injury to anyone, or cause damage to any property and shall not be disposed to any body of water, sanitary sewer or storm sewer without proper treatment. Disposal in sanitary and storm sewers requires prior approval by the City of Regina.
- 3.5 Catchbasin, Manhole and Valve Chambers Abandonment
- 3.5.1 Remove and dispose of at least the top 0.6 m of structure below subgrade.
  - 3.5.2 Backfill below 0.6 m with low shrink backfill.
  - 3.5.3 Backfill and compact above to top of subgrade to Section 2315 Trench, Excavation and Backfill.
- 3.6 Area Cleanup
- 3.6.1 Remove all materials and excess excavated materials from the site after grouting and backfilling is completed. Burning of rubbish and paper waste on the site is prohibited. Dispose of this material according to local ordinance requirements.
- 3.7 Hot and Cold Weather
- 3.7.1 Placement of material during hot and cold weather shall be in accordance with CSA A23.1 – Concrete Materials and Methods of Concrete Construction.
  - 3.7.2 Protect fill and grout from freezing until hardened.