

1. **GENERAL**

1.1. **General Requirements**

1. Read and be governed by conditions of the *Contract Documents*, including sections of Division 01.
2. Conform to the requirements stated in the General Conditions, Supplementary General Conditions of this Specification and all addenda for all work, including work outside the property line including work within Regional and Municipal right of way unless otherwise noted.

1.2. **Description**

1. The work included in this Section includes for all labour, equipment and materials required for the watermain construction within the site, and watermain construction within the municipal right of way connecting to existing municipal servicing.
2. Included in the work is coordination and cooperation with Municipal forces as required to complete the work including providing temporary blow offs, isolation valves, pressure testing and chlorination as required by Municipal forces.

1.3. **Related Work**

1. Excavating, Trenching and Backfilling Section 31 23 10

1.4. **References**

1. The Municipality Standards and Specifications for watermain construction.

1.5. **Scheduling Of Work**

1. Schedule work to minimize interruptions to existing services.

2. **PRODUCTS**

1. All products utilized within the water system to comply with the Municipality Standards and Specifications.

3. **EXECUTION**

3.1. **Preparation**

1. Clean pipes, fittings, and appurtenances of accumulated debris and water before installation. Carefully inspect materials for defects to approval of Consultant. Remove defective materials from site as directed by Consultant.

3.2. **Trenching**

1. Do trenching work in accordance with Section 31 23 10 – Excavating, Trenching and Backfilling.
2. Trench depth to provide cover over pipe of not less than 2.0 metres from finished grade or as indicated.
3. Trench alignment and depth require Consultants' approval prior to placing bedding material and pipe.

3.3. **Granular Bedding**

1. Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth of 300 mm below bottom of pipe or to depth as indicated.
2. Do not place material in frozen condition.
3. Shape bed true to grade to provide continuous uniform bearing surface for pipe.
4. Shape transverse depressions in bedding as required to suit joints.
5. Compact each layer full width of bed to at least 95% of corrected maximum dry density.
6. Fill authorized or unauthorized excavation below design elevation of bottom of specified bedding in accordance with Section 31 23 10 – Excavating, Trenching and Backfilling with compacted bedding material.

3.4. **Pipe Installation**

1. Lay pipes to ANSI/AWWA C600 Manual of Practice and manufacturer's standard instructions and specifications. Do not use blocks except as permitted in 3.3.2.
2. Join pipes in accordance with ANSI/AWWA C600, ANSI/AWWA C206, AWWA Manual of Practice and manufacturer's recommendations.
3. Bevel or taper ends of PVC pipe to match fittings.
4. Handle pipe by methods approved by Engineer recommended by pipe manufacturer. Do not use chains or cables passed through pipe bore so that weight of pipe bears on pipe ends.
5. Lay pipes on prepared bed, true to line and grade. Ensure barrel of each pipe is in contact with shaped bed throughout its full length. Take up and replace defective pipe. Correct pipe which is not in true alignment or grade or pipe which shows differential settlement after installation greater than 10 mm in 3 m.
6. Face socket ends of pipe in direction of laying. For mains on a grade of 2% or greater, face socket ends upgrade.
7. Do not exceed permissible deflection at joints as recommended by pipe manufacturer.
8. Keep jointing materials and installed pipe free of dirt and water and other foreign materials. Whenever work is stopped, install a removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.
9. Position and join pipes with equipment and methods approved by Consultant.
10. Cut pipes in an approved manner as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
11. Align pipes carefully before jointing.
12. Install gaskets to manufacturer's recommendations. Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
13. Avoid displacing gasket or contaminating with dirt or other foreign material. Gaskets so disturbed or contaminated shall be removed, cleaned, lubricated and replaced before jointing is attempted again.
14. Complete each joint before laying next length of pipe.
15. Minimize deflection after joint has been made.
16. Apply sufficient pressure in making joints to ensure that joint is completed to manufacturer's recommendations.
17. Ensure completed joints are restrained by compacting bedding material alongside and over

installed pipes or as otherwise approved by the Consultant.

18. Provide necessary fittings and adaptors as required between existing watermain pipe materials and proposed watermain pipe materials.
19. When stoppage of work occurs, block pipes in an approved manner to prevent creep during down time.
20. Recheck plastic pipe joints assembled above ground after placing in trench to ensure that no movement of joint has taken place.
21. Do not lay pipe on frozen bedding.
22. Contractor responsible for satisfactory completion of hydrostatic and leakage testing to Consultant's approval. Contractor also responsible for degree of backfilling complete prior to hydrostatic and leakage testing as well as isolation and correction of any leaks resulting in failed tests.
23. Backfill remainder of trench.

3.5. **Cathodic Protection And Tracer Wire**

1. ALL mechanical restraint systems shall be installed with cathodic protection complete with 12-gauge tracer wire along the top of Polyvinyl Chloride (PVC) and concrete Pressure Pipe (CPP).

3.6. **Hydrostatic And Leakage**

1. Provide labour, equipment and materials required to perform hydrostatic and leakage tests hereinafter described as required by the Municipality standards.
2. Notify Consultant at least 24 h in advance of all proposed tests. Perform tests in presence of Consultant.
3. Where any section of system is provided with concrete thrust blocks, conduct tests at least 5 days after placing concrete or 2 days if high early strength concrete is used.
4. Test pipeline in sections not exceeding 365 m in length, unless otherwise authorized by Consultant.
5. Upon completion of pipe laying and after Consultant has inspected work in place, surround and cover pipes between joints with approved granular material placed to dimensions indicated or directed by Consultant.
6. Leave hydrants, valves, backflow preventer, water meter, joints and fittings exposed.
7. When testing is done during freezing weather, protect hydrants, valves, backflow preventer, water meter, joints and fittings from freezing.
8. Strut and brace caps, bends, tees, and valves, to prevent movement when test pressure is applied.
9. Open valves.
10. Expel air from main by slowly filling main with potable water. Install corporation stops at high points in main where no air-vacuum release valves are installed. Remove stops after satisfactory completion of test and seal holes with plugs.
11. Thoroughly examine exposed parts and correct for leakage as necessary.
12. Examine exposed pipe, joints, fittings and appurtenances while system is under pressure.
13. Remove joints, fittings and appurtenances found defective and replace with new sound material and make watertight.
14. Repeat hydrostatic test until all defects have been corrected.
15. Apply a leakage test pressure of equal to design pressure after complete backfilling of

trench, based on elevation of lowest point in main and corrected to elevation of gauge, for period of 2 h.

16. Define leakage as amount of water supplied from water meter in order to maintain test pressure for 2 h.
17. Do not exceed allowable leakage of 0.03 L/mm diameter per 300 m of pipe, including lateral connections, per hour.
18. Locate and repair defects if leakage is greater than amount specified.
19. Repeat test until leakage is within specified allowance for full length of water main.

**Pipe Surround**

20. Upon completion of pipe laying and after Consultant has inspected work in place, surround and cover pipes as indicated.
21. Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated. Do not dump material within 5 m of pipe.
22. Place layers uniformly and simultaneously on each side of pipe.
23. Do not place material in frozen condition.
24. Compact each layer from pipe invert to mid height of pipe to at least 95% of SPMDD to ASTM D698.
25. Compact each layer from (mid height) of pipe to underside of backfill to at least 95% of SPMDD and in accordance with Geotechnical Report for site.

3.7. **Backfill**

1. Place backfill material above pipe surround in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.
2. Do not place backfill in frozen condition.
3. Compact native backfill to at least 95% of SPMDD.

3.8. **Flushing And Disinfecting**

1. The Municipality shall perform all chlorination works.
2. Flush water mains through available outlets with a sufficient flow of potable water to produce a velocity of 1.5 m/s, within pipe for 10 min., or until foreign materials have been removed and flushed water is clear.
3. Flushing flows shall be as follows:

<u>Pipe Size NPS</u>	<u>Flow (L/s) Minimum</u>
6 and below	38
8	75

4. Provide connections and pumps for flushing as required.
5. Open and close valves, hydrants and service connections to ensure thorough flushing.
6. Complete flushing to satisfaction of Consultant and The Municipal forces.

**END OF SECTION**