PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Pipe and fittings for extension of existing salt water intake line located on site.

.2 Concrete thrust blocks.

1.2 RELATED SECTIONS

.1 Section 03 30 00 - Cast-in-place Concrete.

.2 Section 31 05 16 - Aggregate Materials.

.3 Section 31 23 25 – Rock and Gravel Fill.

.4 Section 33 05 13 - Manholes And Catch Basins Structures.

1.3 REFERENCES

.1 Codes and standards referenced in this section refer to the latest edition thereof.

.2 ASTM International:

.1 ASTM D698-07e1 - Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/cu m).

.2 ASTM D1557-09 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN-m/cu m).

.3 ASTM D3139-98(2005) - Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.

.4 ASTM D3035-08 - Polyethylene (PE) Plastic Pipe (DR-PR)

Based on Controlled Outside Diameter.

.5 ASTM D6938-10 - Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

.3 AWS (American Welding Society) A5.8/A5.8M-2004 - Filler Metals for Brazing and Braze Welding.

.4 American Water Works Association (AWWA) / Manual of Practice

.1 AWWA C901-08 - Polyethylene (PE) Pressure Pipe and Tubing, 13 mm (1/2 inch) through 76 mm (3 inch), for Water Service.

1.4 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submittal Procedures.

.2 Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.

1.5 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submittal Procedures.

1.6 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Close Out Submittals.

.2 Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations.

.3 Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.7 DELIVERY, STORAGE AND PROTECTION

.1 Section 01 61 00: Common Product Requirements.

1.8 MEASUREMENT AND PAYMENT

.1 Water piping will be measured in meters of each size od pipe installed, and shall include all fittings in the unit price.

PART 2 - PRODUCTS

2.1 PIPE & FITTINGS

.1 Polyethylene Pressure pipe in accordance with CSA B137 Series-13 (unless otherwise specified).

.1 Polyethylene to polyethylene joints: to be thermal butt fusion welded in accordance with AWWA C207-13 or flanged with steel backing flanges.

.2 Polyethylene fittings in accordance with CSA B137 Series-13 for pipe sizes NPS 4 and less.

2.2 BEDDING MATERIAL

.1 Granular material, Type 1 Bedding, to: Section 31 05 16 – Aggregate Material and following requirements;

.1 Type 1 bedding: clean, hard durable crushed gravel or stone, free from shale clay, friable materials, organic matter and other deleterious substances and graded within the following limits when tested to ASTM C136-84a and ASTM C117-87 and giving a smooth curve without sharp breaks when plotted on a semi-log chart:

ASTM sieve designation	% passing
25.000 mm	100
19.000 mm	75 - 100
12.500 mm	-
9.500 mm	50 - 100
4.750 mm	30 - 70
2.000 mm	20 - 45
0.425 mm	10 - 25
0.180 mm	-
0.075 mm	3 - 8

.2 Concrete required for cradles, encasement, supports, thrust blocks and cut-off walls all to Section 03 30 00, strength 25 MPa.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 TRENCHING

.1 Do trenching work in accordance with Sections 31 23 25 – Rock and Gravel Fill.

.2 Trench depth to provide cover over pipe of not less than 3.05 m from finished grade or as indicated.

.3 Trench alignment and depth require

Departmental Representative approval prior to placing bedding material and pipe.

3.3 CONCRETE BEDDING AND ENCASEMENT

.1 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete. Place concrete to details as indicated as directed by Departmental Representative.

.2 Pipe may be positioned on concrete blocks to facilitate placing of concrete. When necessary, rigidly anchor or weight pipe to prevent flotation when concrete is placed.

.3 Do not backfill over concrete within 24 hours after placing.

3.4 GRANULAR BEDDING

.1 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth of 150 mm below bottom of pipe.

.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 density to ASTM D698.

.6 Fill authorized or unauthorized excavation below design elevation of bottom of specified bedding in accordance with Sections 31 23 25

– Rock and Gravel Fill.

3.5 PIPE INSULATION

.1 Lay pipes to manufacturer's standard instructions and specifications. Do not use blocks except as permitted in 3.3.2.

.2 Join pipes in accordance with manufacturer's recommendations.

.3 Handle pipe by methods recommended by pipe manufacturer. Do not use chains or cables passed through pipe bore so that weight of pipe bears on pipe ends.

.4 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.

.5 Do not exceed permissible deflection at joints as recommended by pipe manufacturer.

.6 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.

.7 Position and join pipes with equipment and methods approved by Departmental Representative.

.8 Cut pipes in 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.

.9 Align pipes before jointing.

.10 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.

.11 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.

.12 Complete each joint before laying next length of pipe.

.13 Minimize deflection after joint has been made.

.14 Apply sufficient pressure in making joints to ensure that joint is completed to manufacturer's recommendations.

.15 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes or as otherwise approved by Departmental Representative.

.16 When stoppage of work occurs, block pipes in an approved manner to prevent creep during down time.

.17 Do not lay pipe on frozen bedding.

.18 Do hydrostatic and leakage test

and have results approved by Departmental Representative before surrounding and covering joints and fittings with granular material.

.19 Backfill remainder of trench.

3.6 THRUST BLOCKS AND RESTRAINED JOINTS

.1 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.2 Place concrete thrust blocks between valves, tees, plugs, caps, bends, changes in pipe diameter, reducers, hydrants and fittings and undisturbed ground as indicated or as directed by Departmental Representative.

.3 Keep joints and couplings free of concrete.

.4 Do not backfill over concrete within 24 hours after placing.

.5 For restrained joints: only use restrained joints approved by Departmental Representative.

3.7 SWABBING

.1 Appropriately sized and designed watermain swabs shall be inserted into the main at as many locations as need be to ensure every section of watermain is swept by a swab when the water is first charged into the system. After main lines have been swabbed, hydrant leads will be thoroughly flushed, but not swabbed. Flushing shall be accomplished by opening and closing valves and hydrants several times using water, under expected line pressure, with flow

velocities adequate to flush foreign material out of the valves and hydrants.

3.8 HYDROSTATIC AND LEAKAGE TESTING

.1 Do tests in accordance with ANSI/AWWA C600.

.2 Provide labour, equipment and materials required to perform hydrostatic and leakage tests hereinafter described.

.3 Notify Departmental Representative at least 24 hours in advance of proposed tests. Perform tests in presence of Departmental Representative.

.4 Where 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.

.5 Test pipeline in sections not exceeding 365 m in length, unless otherwise authorized by Departmental Representative.

.6 Upon completion of pipe laying and after Departmental Representative has inspected work in place, surround and cover pipes between joints with approved granular material placed to dimensions indicated.

.7 Leave valves, joints and fittings exposed.

.8 When testing is done during freezing weather, protect hydrants, valves, joints and fittings from freezing.

.9 Strut and brace caps, bends, tees, and valves, to prevent movement when test pressure is applied.

.10 Open valves.

.11 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.

.12 Thoroughly examine exposed parts and correct for leakage as necessary.

.13 Apply hydrostatic test pressure of 1000 kPa based on elevation of lowest point in main and corrected to elevation of test gauge, for period of 1 hour.

.14 Examine exposed pipe, joints, fittings and appurtenances while system is under pressure.

.15 Remove joints, fittings and appurtenances found defective and replace with new sound material and make watertight.

.16 Repeat hydrostatic test until defects have been corrected.

.17 Define leakage as amount of water supplied from water storage tank in order to maintain test pressure for 2 h.

.18 Do not exceed allowable leakage of 0.03 L/mm diameter per 300 m of pipe, including lateral connections, per hour.

.19 Locate and repair defects if leakage is greater than amount specified.

.20 Repeat test until leakage is within specified allowance for full length of watermain.

.21 Co-ordinate test procedure with Departmental Representative and provide certification of test acceptance.

3.9 PRESSURE TEST

.1 After the pipe has been laid and backfilled and following the installation of service pipes and fittings, all newly laid pipe, or valved section thereof, shall be subjected to a hydrostatic pressure of 150% of normal operating pressure based on the elevation of the lowest point in the main and corrected to elevation at the test gauge location or a minimum of 1000 kPa, whichever is greater, for a period of 1 hour. Where hydrants are in the test section, the test shall be made against the closed hydrant valve.

.2 Each valved section of pipe shall be slowly filled with water and the test pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Departmental Representative. The pump, pipe connection and all necessary apparatus shall be furnished by the Contractor.

.3 Before applying the test pressure, all air shall be expelled from the pipe. If permanent air vents are

not located at all high points the Contractor shall install corporation cocks at such points so that the air can be expelled, the corporation cocks shall be closed and the test pressure applied.

.4 The pressure test shall be of a duration of at least 1 hours and the pressure shall not vary by more than +/- 35 kPa.

.5 Pressure testing of PE pipe to be carried out as per Manufacturer’s recommendations.

.6 All faulty or leaking connections shall be corrected at the Contractor’s expense.

3.10 PIPE SURROUND

.1 Upon completion of pipe laying and after Departmental Representative has inspected work in place, surround and cover pipes as indicated.

.2 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated. Do not dump material within 1.00 m of pipe.

.3 Place layers uniformly and simultaneously on each side of pipe.

.4 Do not place material in frozen condition.

.5 Compact each layer from pipe invert to mid height of pipe to at least 95% maximum density to ASTM D698.

.6 Compact each layer from mid height

of pipe to underside of backfill to at least 90 % of corrected maximum density to ASTM D698.

3.11 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 Under footings, parking area and walks, compact backfill to at least 95% maximum density to ASTM D698.

3.12 SURFACE RESTORATION

.1 After installing and backfilling over water mains, restore surface to original condition as directed by Departmental Representative.

3.13 QUALITY ASSURANCE

.1 Provide copies of all inspections and test results for Commissioning Manuals.