

PART 1 - GENERAL

- 1.1 DESCRIPTION .1 This section specifies requirements for supply and installation of waterlines and hose bibs on new finger pier extension.
- 1.2 SHOP DRAWINGS .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- 1.3 EXISTING WATERLINE .1 Contractor to determine location of type of existing waterline to which he must connect.
- 1.4 AS-BUILT DRAWINGS .1 Provide data necessary to produce As-Built Drawings, including details of pipe material, elevations, location of tees, bends, valves, and end caps. Include all directions for openings valves, list of equipment required for operating valves, maintenance & operating instructions.
- 1.5 SCHEDULING OF WORK .1 Schedule work to minimize interruptions to existing services.
- .2 Submit schedule of expected interruptions for approval by Departmental Representative and adhere to interruptions schedule as approved by Departmental Representative. Submit copies of all expected interruptions to Departmental Representative and Municipal Authority for approval.
- .3 Notify building and wharf occupants a minimum of 24 hours in advance of any interruption in service. Post notification 48 hours in advance of any interruption in service.

- .4 Do not interrupt water service for more than 3 hours, and confine this period between 10:00 and 16:00 unless otherwise authorized.
- .5 Notify fire department 24 hours in advance of any planned interruption. Notify immediately of any accidental interruptions of water supply (including cleaning, disinfecting and swabbing).
- .6 Swabbing of waterline shall be done before waterline is accepted by the Departmental Representative.

1.6 MEASUREMENT FOR PAYMENT

- .1 Waterlines: No separate measurement shall be made under this section for supply and installation of all pipe, fittings, service connections, service pipe, valves, keys, and all related work. Include all costs in the lump sum arrangement as noted on the bid and acceptance form.

PART 2 - PRODUCTS

2.1 PIPE FITTINGS

- .1 Polyvinyl Chloride Pressure Pipe: Schedule 80, solvent weld.
- .2 Fittings to match pipe material. Pipe shall be made from polyethylene resin compound qualified as Type III, Category 5, Class C, Grade P34 in ASTM D-1248-78. This material shall have a long term hydrostatic strength of 10 MPa. Where required to be hung from the wharf deck, use galvanized hangers and rods and uniformly slope to drain.
- .3 All fittings shall be of the same material solvent welded.

- .4 The pipe shall be adapted to the existing pipe as required. This connection shall be flanged using bolts of compatible material and suitable gaskets.
- .5 All valves to be used on the wharf (except if drain valves and extension) shall be P.V.C., Chemline or equal Diaphragm valves. Value to be solid P.V.C. body and bonnet. P.V.C. compound to be Type 1, Grade 1, Cell Classification 12404-A Valve to be flanged type, on piece moulded.

2.2 PIPE
DISINFECTION

- .1 Sodium hypochlorite, Calcium hypochlorite or Liquid chlorine to AWWA B300-80 and AWWA B301-59 disinfect water mains.
- .2 Swab all lines before disinfecting.

2.3 TOOLS AND
EQUIPMENT

- .1 The Contractor shall turn over to the Departmental Representative.
 - .1 One tee-handle operating key for valves, where applicable.

PART 3 - EXECUTING

3.1 PREPARATION

- .1 Clean pipes, fittings, valves and appurtenances of accumulated debris and water before installation. Carefully inspect materials for defects. Remove defective materials from site.

3.2 PIPE INSTALLATION

- .1 Install pipe as shown on plans. Pipe on wharf to be installed to allow for drainage for all lines. (Min. slope 0.5%; 1.0% on drain lines). Install drain connections at low points of piping. Entire system shall be capable of being drained.

- .2 Supply and install all adaptors necessary.
- .3 Handle pipe by approved methods. Do not use chain or cables passes through pipe bore so that weight of pipe bears on pipe ends.
- .4 Keep materials and pipe free of dirt and water and other foreign materials. Whenever work is stopped, install a removable watertight bulkhead at one end of last pipe laid to prevent entry of foreign materials.
- .5 Position and join pipes with approved equipment.
- .6 Cut pipes as required for special, fittings, or closure pieces, in neat manner as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe. Flame cutting and burning of pope not permitted. File smooth any sharp edges which might damage the gasket.
- .7 Align pipes carefully before joining.
- .8 Install to manufacturer's recommendations.
- .9 Protect hose bibs, valves and appurtenances from freezing.
- .10 Leave joints and fittings exposed for hydrostatic and leakage testing.
- .11 Contractor to supply and install 50 mm diameter sch. 80 P.V.C waterline c/w 25 mm diameter branch lines as required. Contractor to supply and install all fittings as required including drain cocks at low points. All installed waterlines to be completely drainable as shown on

drawings. Slope all piping towards drains. Contractor to cut decking and/or timbers as required to achieve minimum slope on waterline.

3.3 VALVE
INSTALLATION

- .1 Install valves to manufacturer's recommendations at locations indicated.

3.4 PRESSURE TEST

- .1 All newly laid pipe, or valved section thereof, shall be subjected to a hydrostatic pressure of 1050 kPa. Where water service pits or hose bibs are in the test section, the test shall be made against the closed diaphragm valve. The contractor to supply all labour and materials required to conduct all test. Note: contractor to confirm valves can withstand test pressure before testing.
- .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 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 the air can be expelled, the corporation cocks shall be closed and the test pressure applied.
- .4 The pressure test shall be of duration of at least 2 hours and the pressure shall not vary by more than +/- 35 kPa.

3.5 LEAKAGE TEST

- .1 A leakage test shall be conducted concurrently with the pressure test. The Contractor shall apply all equipment necessary for the conducting of this test.
- .2 "Leakage" shall be defined as the quantity of water that must be supplied into the newly installed pipe or any valved section thereof, to maintain pressure within 35.kPa of the test pressure after the air in the pipeline has been expelled.
- .3 No pipe installation will be accepted if the leakage is greater than the allowable leakage for joints plus the allowable leakage for closed metal seated valves.
- .4 Allowable leakage for joints is calculated as follows:

$$L = \frac{ND(P)^5}{128}$$

Where:

L = the allowable leakage in l/h

N = the number of joints in the length of pipeline tested

D = the nominal diameter of pipe in metres

P = the average test pressure during the leakage test in kilopascals.

- .5 Allowable leakage for closed metal seated valves shall be 0.00121 l/h/mm of nominal valve size.
- .6 If any test of pipe discloses leakage greater than the allowable, the Contractor shall, at his own expense, locate the repair the defective joints until the leakage is within the specified allowance. All joints until the leakage is within the specified allowance. All visible leaks are to be repaired regardless of the amount of leakage.

- .7 Notify Departmental Representative at least 24 hrs in advance of all proposed tests.
- .8 Leave joints and fittings exposed.
- .9 Strut and brace caps, bends, tees and valves, to prevent movement when pressure is applied.
- .10 Repeat hydrostatic tests until all defects have been corrected.

3.6 FLUSHING AND DISINFECTING

- .1 Flushing and disinfecting operations shall be witnessed by Departmental Representative. Notify Departmental Representative at least four (4) days in advance of proposed date when disinfecting operations will commence.
- .2 Disinfection of water mains shall be done in accordance with AWWA C601. Provide connections and pumps as required.
- .3 Prior to being chlorinated to mains shall be filled to eliminate air pockets and shall be flushed to remove particles. Flush with a sufficient flow to produce a velocity of 1.5 m/s, unless the Departmental Representative determined that conditions do not permit the required flow to be discharged, or until foreign materials have been removed and flushed water is clear.
- .4 Flushing flows shall be as follows:

Pipe Size mm	Flow (l/s) Minimum
150 and below	38
200	75
250	115
300	150
350	200
400	250

Water from existing distribution system, or other approved source of supply, shall be made to flow at a constant measured rate to the newly installed water mains and water service pits leads.

- .5 Open and close valves (except those isolating town services) to ensure thorough flushing.
- .6 At a point not more than 3 m downstream from the beginning of the new main, water entering the new main shall receive a dose of chlorine fed at a constant rate, such that the water will have not less than 25 mg/l free chlorine. To assure that this concentration is provided, measure the chlorine concentration at regular intervals.
- .7 During the application of chlorine, valves shall be positioned so that the strong chlorine solution in the main being treated, will not flow into water mains in active service. Chlorine application shall not cease until the entire main is filled with heavily chlorinated water. The chlorinated water shall remain in the main for at least 24 hours, during which time all valves and hydrants in the section treated shall be operated in order to disinfect the appurtenances. At the end of this 24 hour period, the treated water in all portions of the main shall have a residual of not less than 10 mg/l free chlorine.
- .8 After all final flushing and before the water main is placed in service, water samples shall be collected from the line and tested for bacteriological quality and shall show the absence of coliform organisms, disinfection shall be repeated until satisfactory samples have been

obtained. All water samples to be submitted to Dept. of Health for testing. Submit copies of test result to Departmental Representative.

- .9 The Contractor shall get approval of the governing agency or agencies before the heavily chlorinated water can be discharged into storm, sanitary or other receiving systems. If the heavily chlorinated water cannot be accepted by nearby storm, sanitary or other receiving systems, the water shall be discharged into tanks, dechlorinated or disposed of at an approved site. The cost associated with disposing of heavily chlorinated water shall be borne by the Contractor.

3.10 SWABBING

- .1 Appropriately sized and designed water main swabs shall be inserted into the line at as many locations as needed to ensure every section of waterline is swept by a swab when the water is first charged into the system.