This is a supplement to the *Standard Specification for Municipal Services* specific to the requirements of HRWC.

PART 1 GENERAL

1.1 Work Included

.1 This SECTION specifies requirements for installing HRWC Water Systems. Work includes supply, installation and testing of water mains and appurtenances.

1.2 Related Sections

.1	Concrete	SECTION 03 30 00.
.2	Metal Fabrications	SECTION 05 50 00.
.3	Earthwork	SECTION 31 20 00.
.4	Reinstatement	SECTION 32 98 00.
.5	Manholes, Catch Basins and Structures	SECTION 33 39 00.
.6	Standard Details	HRWC STANDARD DETAILS.

1.3 Reference Standards

.1	ASME B16.1-15	Gray Iron Flanges and Standards Flanged Fittings, Class 25, 125 and 250.
.2	AWWA B300-10	Hypochlorites.
.3	AWWA B301-10	Liquid Chlorine.
.4	AWWA C104/A21.4-16	Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water.
.5	AWWA C105/A21.5-10	Polyethylene Encasement for Ductile Iron Pipe Systems.

.6	AWWA C110/A21.10-12	Ductile-Iron and Gray-Iron Fittings.
.7	AWWA C111/A21.11-17	Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
.8	AWWA C115/A21.15-11	Flanged Ductile Iron Pipe and Ductile Iron or Gray Iron Threaded Flanges.
.9	AWWA C116/A21.16-15	Protective Fusion-Bonded Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings
.10	AWWA C150/A21.50-14:	Thickness Design of Ductile-Iron Pipe
.11	AWWA C151/A21.51-17	Ductile-Iron Pipe, Centrifugally Cast, for Water.
.12	AWWA C153/A21.53-11	Ductile Iron Compact Fittings.
.13	AWWA C206-17	Field Welding of Steel Water Pipe.
.14	AWWA C217-16	Microcrystalline Wax and Petrolatum Tape Coating Systems for Steel Water Pipe and Fittings.
.15	AWWA C219-11	Bolted, Sleeve Type Couplings for Plain End Pipe.
.16	AWWA C220-12	Stainless Steel Pipe 1/2 In. (13 mm) & Larger.
.17	AWWA C223-13	Fabricated Steel and Stainless Steel Tapping Sleeves.
.18	AWWA C301-14	Prestressed Concrete Pressure Pipe, Steel-Cylinder Type.
.19	AWWA C304-14	Design of Prestressed Concrete Cylinder Pipe.

.20	AWWA C500-09	Metal-Seated Gate Valves for Water Supply Service.
.21	AWWA C502-14	Dry-Barrel Fire Hydrants.
.22	AWWA C504-15	Rubber-Seated Butterfly Valves.
.23	AWWA C509-15	Resilient-Seated Gate Valves for Water-Supply Service.
.24	AWWA C510-07	Double Check Valve Backflow Prevention Assembly.
.25	AWWA C511-07	Reduced Pressure Principle Backflow Prevention Assembly.
.26	AWWA C512-15	Air Release, Air/Vacuum, and Combination Air Valves for Waterwork and Wastewater Service.
.27	AWWA C515-15	Reduced–Wall, Resilient Seated Gate Valves, for Water and Sewerage Systems.
.28	AWWA C600-10	Installation of Ductile Iron Water Mains and Their Appurtenances.
.29	AWWA C605-13	Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
.30	AWWA C606-15	Grooved and Shoulder Joints.
.31	AWWA C651-14	Disinfecting Water Mains.
.32	AWWA C655-09	Field Dechlorination.
.33	AWWA C800-14	Underground Service Line Valves and Fittings.
.34	AWWA C900-16	Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. Through 60 in. (100 mm Through 1500 mm).

.35	AWWA C904-16	Cross-Linked Polyethylene (PEX) Pressure Pipe, 1/2 In. (13mm) Through 3 In. (76 mm), for Water Service.
.36	AWWA C906-15	Polyethylene (PE) Pressure Pipe and Fittings, 4 in. (100mm) Through 65 in. (1,650mm), for Waterworks.
.37	NSF 61-2016	Drinking Water System Components Health Effects (Includes Amendment).
.38	ASSE 1060-2017	Performance Requirements for Outdoor Enclosures for Fluid Conveying Components.
.39	ASTM A36/A36M-14	Carbon Structural Steel.
.40	ASTM A183-14	Carbon Steel Track Bolts and Nuts.
.41	ASTM A240/A240M-16a	Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
.42	ASTM A276/A276M-17	Stainless Steel Bars and Shapes.
.43	ASTM A283/A283M-13	Low and Intermediate Tensile Strength Carbon Steel Plates.
.44	ASTM A536-84(2014)	Standard Specifications for Ductile Iron Castings.
.45	ASTM B62-17	Standard Specification for Composition Bronze or Ounce Metal Castings.
.46	ASTM B88M-16	Seamless Copper Water Tube.
.47	ASTM B418-16a	Cast and Wrought Galvanic Zinc Anodes.

.48	ASTM B584-14	Standard Specification for Copper Alloy Sand Castings for General Applications.
.49	ASTM B843-13	Standard Specification for Magnesium Alloy Anodes for Cathodic Protection
.50	ASTM D3139-98(2011)	Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
.51	ASTM F477-14	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
.52	AWWA M23	PVC Pipe - Design and Installation
.53	AWWA M41	Ductile-Iron Pipe and Fittings
.54	CSA B64.10-17/B64.10.1-17	Selection and Installation of Backflow Preventers/ Maintenance and Field Testing of Backflow Preventers.
.55	CSA B137 Series-17	Thermoplastic pressure piping compendium.
.56	ULC 701-11	Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.4 Shop Drawings

.1 Submit shop drawings in accordance with SECTION 01 10 00 for all pipe, fittings, valves and all other items necessary for a complete Water System installation.

1.5 Certificates

.1 Submit manufacturer's test data and certification that products and materials meet requirements of this SECTION and are in accordance with SECTION 01 10 00.

1.6 Handling and Storage

.1 Handle and store pipe, valves and fittings, in such manner as to avoid shock and damage. Do not use chains or cables passing through pipe bore. Do not damage coatings or linings.

.2 Store gaskets in cool location, out of direct sunlight, and away from petroleum products.

.3 Store hydrants and valves to prevent retention of water and damage by freezing.

1.7 Scheduling of Work

.1 Contractors are to coordinate with HRWC to minimize service interruption to affected HRWC customers. This would include scheduling work in off peak hours and/or providing temporary service to affected HRWC customers.

.2 Service interruptions affecting industrial, commercial and institutional (ICI) customers, the contractor is to engage HRWC Water Services and HRWC customers at least **one week in advance**, to determine the HRWC customer's specific minimum needs and provide temporary service as needed.

.3 A minimum 48 hours' notice to HRWC Water Services and HRWC customers of scheduled service interruption.

.4 Do not interrupt service between 6:00 a.m. and 12:00 p.m. All service interruptions are to be approved by the HRWC Water Services.

.5 HRWC Water Services to notify Halifax Regional Fire & Emergency of service interruption.

.6 Work deemed emergency or routine maintenance by HRWC Water Services may result in service interruption of any HRWC customers at any time.

PART 2 PRODUCTS

2.1 General

.1 Diameter, material and strength class of pipe and fittings: as indicated.

.2 Any material in contact with drinking water must comply with NSF-61.

2.2 Ductile Iron Pipe

.1 Pipe:

.1 Special class 52 to AWWA C151/A21.51.
.2 Special class 54 to AWWA C151/A21.51.

.2 Joints:

.1 Push-on to AWWA C111/A21.10.
.2 Mechanical to AWWA C111/A21.10.
.3 Flanged to AWWA C110/A21.10 or AWWA C153/A21.53.

.3 Fittings:

.1 Full body to AWWA C110/A21.10.
.2 Compact to AWWA C153/A21.53.

.4 Pipe coatings:

.1 Interior: cement mortar lining with asphaltic seal coat to AWWA C104/A21.4.
.2 Exterior: asphaltic seal coat to AWWA C151/A21.51.

2.3 Polyvinyl Chloride (PVC) Pressure Pipe and Fittings

.1 Pipe:

.1 Pipes 100 mm to 300 mm, class 305, DR14 to AWWA C900.
.2 Pipes 350 mm to 1200 mm, class 305, DR14 to AWWA C905.

.2 Joints:

.1 Push-on integrally thickened bell and spigot type to ASTM D3139-98 with single elastomeric gasket to ASTM F477.

.3 Fittings:

.1 Full body to AWWA C110/A21.10.
.2 Compact to AWWA C153/A21.53.

2.4 Polyethylene Pipe and Fittings

.1 Pipe:

.1 100 mm and larger to AWWA C906.

.2 Joints:

.1 Thermal butt fusion.
.2 Electro-fusion coupling.
.3 Mechanical connections: polyethylene flange end with metal back-up ring.

.3 Fittings:

.1 Polyethylene to AWWA C906.
.2 Full body to AWWA C110/A21.10.
.3 Compact to AWWA C153/A21.53.

2.5 Concrete Pressure Pipe and Fittings

.1 Pipe:

.1 Steel cylinder type, pre-stressed, concrete lined: to AWWA C301 (L).
.2 Steel cylinder type, pre-stressed, concrete embedded: to AWWA C301 (E).
.3 Steel cylinder type, pre-tensioned, concrete lined: to AWWA C303.

.2 Joints:

.1 Push-on bell and spigot, mechanical or welded to AWWA C301 (L).
.2 Push-on bell and spigot, mechanical or welded to AWWA C301 (E).
.3 Push-on bell and spigot, mechanical or welded to AWWA C303.

.3 Fittings:

.1 Steel fabrication to AWWA C301 (L).
.2 Steel fabrication to AWWA C301 (E).
.3 Steel fabrication to AWWA C303.

2.6 Protective Coating

.1 Anti-corrosion petrolatum paste, tape and mastic conforming to AWWA C217.

.1 Acceptable products:

.1 Winn & Coates (Denso) Ltd.
.2 Trenton.
.3 Petro.
.4 Tapecoat.
.5 STAC.
.6 PetroGuard
.7 PCS- Petro Coating Systems

2.7 Polyethylene Encasement

.1 Polyethylene encasement, 200 micron polyethylene tube or sheet conforming to AWWA C105/A21.5.

.2 Use manufacturer's recommended tape or sheathing tape (cannot use red tape, red tape signifies mechanically restrained joints). Duct tape not permitted.

2.8 Gaskets, Nuts & Bolts for Flanges

.1 Gaskets:

.1 Full face, 3.18 mm thick, red virgin rubber one piece gaskets to AWWA C115/A21.15.

.2 Nuts & bolts:

.1 Bolts are to project between 5mm and 10mm beyond the nut. Bolt diameter to be within 3mm of the diameter of the hole it is to be inserted in. Stud bolts may be used when approved by the HRWC.

Hexagonal head bolt and hexagonal nuts for all sizes to conform to AWWA C115/A21.15.

.3 Nuts & bolts for buried pipe:

.1 T-head bolt and nut, high strength steel meeting AWWA C111/A21.10.

2.9 Couplings

.1 Direct bury couplings (ductile installations):

.1 Mechanical joint sleeve type to AWWA C110/A21.10, for use on ductile iron pipe.

.2 Direct bury couplings (connections to existing non-ductile water main):

.1 Collar type to AWWA C219, steel with a minimum pressure rating of 1035 kPa, appropriate to the type and size of pipe being joined, epoxy coated with type 316 stainless steel bolts and nuts. This type of coupling is not to be used in ductile iron pipe installations unless approved by HRWC.

.1 Acceptable products:

.1 Robar / Baker 1506.
.2 Romac XR501.
.3 Baker.
.4 Smith Blair 441 & 421 series.
.5 Mueller Maxi Range
.6 Georg Fischer Multi/Joint 3000

.3 Chamber couplings:

.1 Grooved and shoulder type to AWWA C606 with malleable iron housing, halogenated butyl gasket and heat treated, plated carbon steel bolts and nuts to ASTM A183. This type of coupling is not to be used in new ductile iron pipe buried installations.

.1 Acceptable product:

.1 Victaulic.

2.10 Buried Valves

.1 Gate buried valve: to AWWA C509 and AWWA C515 minimum design working pressure of 1380 kPa up to and including 300 mm and as follows:

.1 Body: cast iron (AWWA C509) / ductile iron (AWWA C515) with mechanical joint ends.

.2 Mechanism: solid resilient wedge, epoxy coated bonnet, ss. packing gland nuts and bolts, non-rising spindle, and O-ring seals.

.3 Direction to close:

.1 All serviced areas within the former City of Halifax: counterclockwise.
.2 All other areas: clockwise.

For further clarification refer to HRWC STANDARD DETAILS.

.4 Operating nut: 50 mm square.

.5 Acceptable products to AWWA C509:

.1 Clow 2640, F-6100 resilient wedge valve.
.2 Mueller A-2360-23 resilient wedge valve.

.6 Acceptable products to AWWA C515:

.1 Clow 2638, F-6100 resilient wedge valve.
.2 Mueller A-2361-23 resilient wedge valve.

.2 Butterfly buried valves: to AWWA C504 greater than 300 mm, short body, Class 150B, minimum pressure rating 1035 kPa and as follows:

.1 Body: cast-iron with mechanical joint ends.

.2 Mechanism: cast-iron, cast steel, alloy cast-iron or ductile-iron disc, type 304 stainless steel shafts to ASTM A276/A276M, rubber seated for positive shut-off at minimum one (1) MPa differential pressure, either direction.

.3 Direction to close:

.1 All serviced areas within the former City of Halifax; counterclockwise.
.2 All other areas; clockwise.

For further clarification refer to HRWC STANDARD DETAILS.

.4 Operating nut: 50 mm square.

.5 Acceptable products:

.1 Mueller Lineseal III.
.2 Clow M&H Style 4500 and 1450.

2.11 Chamber Valves & Piping

.1 Gate chamber valve: to AWWA C509 and AWWA C515 minimum design working pressure of 1380 kPa up to and including 300 mm and as follows:

.1 Body: cast iron (AWWA C509) / ductile iron (AWWA C515) with Class 125 flanged ends to ASME B16.1.

.2 Mechanism: solid resilient wedge gates, O.S. & Y., rising stem, and hand wheel.

.3 Direction to close: clockwise.

.4 Acceptable products to AWWA C509:

.1 Clow/Kennedy 8068A resilient wedge valve.
.2 Mueller A-2360-6 resilient wedge valve.

.5 Acceptable products to AWWA C515:

.1 Clow/Kennedy 7068A resilient wedge valve.
.2 Mueller A-2361-6 resilient wedge valve.

.2 Butterfly chamber valve : to AWWA C504, greater than 300 mm, short body, Class 150B, minimum pressure rating 1035 kPa and as follows:

.1 Body: cast-iron with Class 125 flanged ends to ASME B16.1.

.2 Mechanism: cast-iron, cast steel, alloy cast-iron or ductile-iron, type 304 stainless steel shafts to ASTM A276/A276M, rubber seated for positive shut off at minimum one (1) MPa differential pressure either direction. Provide hand wheel operator.

.3 Direction to close: clockwise.

.4 Acceptable products:

.1 Mueller Lineseal III.
.2 Clow M7H style 4500 and 1450.

.5 Epoxy coat all butterfly valves with minimum 150 microns coating.

.3 Chamber piping:

.1 Ductile iron special class 54 to AWWA C151/A21.51.

.2 Stainless steel to AWWA C220.

.4 Check valves

.1 Wafer swing check: wafer style, ANSI series 125, minimum working pressure two (2) MPa, and as follows:

.1 Body: ductile-iron with stainless steel disc.
.2 Spacers: teflon O-rings.
.3 Seat: Buna N O-ring seal.
.4 Acceptable product:

.1 CheckRite, Model 210.

2.12 Air Release, Air/Vacuum & Combination Air Valves

.1 75 mm diameter and larger to AWWA C512:

.1 Heavy duty type of cast-iron body with bronze trim and combination of small orifice and large orifice units. Small orifice size 2 mm. Valves suitable working pressure of 2068 kPa and have flanged ends to ASME B16.1.

.2 Independent floating stainless steel buoy balls located in both orifices.

.3 Orifices are to be capable of expelling air at a high rate during filling and at a low rate during operation and will admit air while draining the pipeline. Provide replaceable seats..

.4 Valves are to have no moving parts except for stainless steel balls which remain in the throat area discharging air without blowing shut or collapsing the balls.

.5 Valves are not leak in the closed position when pipe is filled.

.1 Acceptable products:

.1 G.A. Industries Ltd., Fig 960-C.
.2 APCO, Model 147C.
.3 Crispin, Model AL30.
.4 ARI Bermad D-060-C HF

.6 Tee: Flanged to AWWA C110/A21.10 and ASME B16.1, Class 125.

.2 50 mm diameter to AWWA C512:

.1 Heavy duty type body consisting of metal and nylon reinforced glass fibre high impact plastic, with a combination small and large orifice. Small orifice to be stainless steel with a minimum opening of one (1) mm, valve suitable for working pressure of 2068 kPa. Size as indicated.

.2 Independent floats located in both orifices.

.3 Orifices to be capable of expelling air at a high rate during filling and at a low rate during operation and will admit air while draining the pipeline. Provide replaceable seats.

.4 Valves to have no moving parts except for the floats which remain in the throat area discharging air without blowing shut.

.5 Valves are not leak in the closed position when pipeline is filled.

.1 Acceptable products:

.1 Bermad, model C30.
.2 Val-Matic, model 202C.
.3 APCO, model 145C.
.4 Crispin, model AL20.
.5 ARI Bermad D-040-C.

.6 Corporation stop: brass c/w IPS inside and CC outside thread, size as indicated.

.1 Acceptable products:

.1 Mueller A-218. B 20045N.
.2 Cambridge Brass 301NL.

.7 Service saddle: bronze, double stainless steel strap type.

.1 Acceptable products:

.1 Mueller BR2 SS.
.2 Smith-Blair 325.
.3 Ford 202 BS.
.4 Robar 2706.

.8 Stainless steel nipples and ball valve are to be provided between corporation stop and air relief valve.

.9 Stainless steel gooseneck pipe arrangement to be provided at the threaded outlet for discharge protection.

2.13 Pressure Reducing Valves

.1 For use on services, sizes less than 100 mm diameter:

.1 Acceptable products:

.1 Watts series no. U5B, no. 25 AUB, no. 223.
.2 Ross model t. series, model 82EP.

.2 For use on transmission and distribution mains:

.1 On PRV's 100 mm and larger, include a pilot control system equipped with a second pilot with a single, manually adjusted set point with isolating ball valves. The backup pilot is to be piped to sense the downstream pressure beyond any flow restrictions that may be part of the control system and be furnished with indicator rod as an integral part of the valve to show position of piston.

.1 Valve Sizes 65 mm to 200 mm, diaphragm type globe valve:

.1 General: hydraulically operated globe valve with inner valve assembly both top and bottom guided by means of replaceable bearing bushings. Main valve complete with a direct acting, spring loaded, diaphragm actuated pressure reducing pilot valve.

.2 Body: ductile iron to ASTM A536-84, with heat fused internal and external epoxy coating to NSF 61 or FDA standards and 150 lb. flanges complete with stem position indicator.

.3 Seat: stainless steel stationary seat, with abrasion and erosion resistant mechanically held, polyurethane disc. Valve actuation via a flat diaphragm and consist of nylon fabric, bonded with synthetic rubber. Lip seals or packing may not be used to seal actuator.

.4 Pilot valve: easily adjustable and equipped with a stainless steel seat and urethane disc. Pilot circuit to include a strainer, and three shut-off cocks.

.5 Acceptable products:

.1 Singer 106-PR.
.2 Cla-val 90-01.

.6 Diaphragm valve to be supplied with digital limit switch connected to the RTU if it is the larger valve in the standard chamber configuration.

.2 Valve Sizes greater than 200 mm, Piston type valve:

.1 Body: cast iron, globe design with flanged covers from which all inside parts are accessible without its removal from the line. Flanges in accordance with ASME B16.1, Class 125.

.2 Seat: single seat design with seat base equal to size of valve. Piston and seat component metal parts to be bronze to ASTM B62. Piston to be guided and cushioned to ensure positive closure and be furnished with indicator rod as an integral part of the valve to show position of piston.

.3 Packing: leather to ensure tight closure and prevent metal to metal wearing of surfaces of piston.

.4 Pilot valve and component parts: bronze of single seated balance design type, globe body pattern. Hydraulic pilot valves are to be diaphragm operated and spring loaded permitting convenient adjustment over the specified range.

.5 Acceptable product:

.1 Ross Model – 40WR-PR-SL/W Stainless Steel trim with digital limit switch connected to RTU.

.

.3 The size, configuration, type of pressure reducing valves and additional valve features for a specific application will be determined by HRWC based on functional performance requirements for the location.

2.14 Valve Boxes

.1 Valve boxes: (For new installations or replacements) to AWWA C500 and as follows:

.1 Cast iron, slide type, adjustable for depth of pipe below finished grade or; composite valve box with one piece ABS lower and ductile iron upper (minimum length 686 mm). Maintain minimum of 125 mm between the top of the lower and flange of the upper. Lower valve box section minimum length 1.5 metres, refer to HRWC STANDARD DETAILS.

.2 For use on Type 2, Type 3 and Type 4 adjustments.

.3 Intermediate adjustments are not permitted.

.4 Mark covers *Water*, *Sprinkler*, *Service* or *Hydrant*, as applicable.

.5 Lugged to prevent turning and rolling of cover, and cover notched to suit.

.6 Bonnet on the bottom section which is capable of enclosing the packing gland section of the gate valve.

.7 Acceptable products:

.1 IMP model V.1.
.2 Mueller MVB 070C-27 composite valve box.
.3 Sigma valve box.

.2 Valve box extensions: (For Type 1 adjustments) to AWWA C500 and as follows:

.1 Type 1 valve adjustment is as follows: The supply and installation of adjustable top and cap, excavation and adjustment of adjustable top, setting top to finished grade and reinstatement to match existing grade.

.2 Material: ductile iron.

.3 Mark covers *Water, Sprinkler, Service* or *Hydrant,* as applicable.

.4 Lugged to prevent turning and rolling of cover, and cover notched to suit.

.5 Have a minimum inside diameter of 125 mm, a minimum length of 300 mm and a maximum length of 450 mm.

.6 Acceptable products:

.1 Bibby Ste Croix adjustable top and cap
.2 Mueller adjustable top and cap

.3 Valve boxes: (For Type 2, Type 3 & Type 4 adjustments) to AWWA C500 and as follows:

.1 Type 2 valve adjustments is as follows: The excavation and adjustment of upper valve box extension sleeve, setting top to finished grade and reinstatement to match existing grade.

.2 Type 3 valve adjustments is as follows: The supply and installation of upper valve box and cap (and intermediate section if required), excavation and adjustment of upper valve box extension sleeve; centering over the valve operating stem, setting top to finished grade and reinstatement to match existing grade.

.3 Type 4 valve adjustments is as follows: The supply and installation of both the upper, intermediate and lower valve box sections and cap, excavation, adjustment and replacement of upper valve box extension sleeve. Item also includes the centering of the new valve box sections over the valve operating nut, the setting of the top to finished grade and reinstatement to match existing grade.

2.15 Hydrants

.1 Dry barrel type: to AWWA C502, NSF 61 and as follows:

.1 Hydrant anchor tee at main to AWWA C153/A21.53 and AWWA C111/A21.10 c/w ductile iron rotatable mechanical joint gland on plain end branch.
.2 Depth of bury: as per pipe specification.
.3 Barrel: two-piece with safety break-away flange and break-away stem rod coupling.
.4 Main valve: compression type, minimum 134 mm diameter.
.5 Inlet connection: mechanical joint, 150 mm diameter.
.6 Nozzles (stated in imperial units, as legislated in the Fire Safety Regulations of Nova Scotia):

Dartmouth, Eastern Passage, Cole Harbour (East Region)

.1 Two hose ports. 2.5 inch coupling with a modified *Nova Scotia Standard Thread*, 3.23 inches outside diameter of finished male thread, 5 threads per inch with flat peaks and sharp valleys.

.2 One pumper (streamer) port. 4 inch coupling with *HRWC East Region Standard Thread*, 4.9 inches outside diameter of finished male thread, 6 threads per inch.

Halifax, Bedford, Sackville, Bennery Lake (West & Central Regions)

.1 Two hose ports. 2.5 inch coupling with modified *Nova Scotia Standard Thread*, 3.23 inches outside diameter of finished male thread, 5 threads per inch with flat peaks and sharp valleys.

.2 One pumper (streamer) port. 4 inch coupling with *HRWC West/Central Region Standard Thread*, 4.9 inches outside diameter of finished male thread, 5 threads per inch.

.7 Direction of opening: counterclockwise.

.8 Operating nut: 32 mm square.

.9 Colour: As below with nozzle caps and tops, defined by Water Services:

.1 Hydrants on Pockwock Lake water supply system, safety orange, Glidden DevGuard no. 4308-9200H.
.2 Hydrants on Lake Major and Bennery Lake water supply system, safety red, Glidden DevGuard no. 4308.
.3 Private hydrants, safety yellow, Glidden DevGuard no. 4338-9400.
.4 Hydrant tops and caps, granite grey, Glidden DevGuard no. 4308-0100H, mix code, BLK 5 P18, YOX 0 P40, OXR 0 P38.

.5 Hydrant tops and caps to be colour coded as follows:

.1 Pressure boosted, safety yellow.
.2 Gravity, granite grey.
.3 Pressure reduced:

.1 Pockwock Lake System, safety orange.
.2 Lake Major and Bennery Lake system, safety red.

For further clarification refer to HRWC STANDARD DETAILS. Confirm hydrant top and cap colour requirements with HRWC prior to painting.

.10 Acceptable products:

.1 Clow Brigadier M67.
.2 Canada Valve Century.
.3 Mueller Super Centurion 250.

2.16 Thrust Restraint

.1 Thrust blocks and anchors: Use 25 MPa concrete and 15M, grade 400 reinforcing steel where indicated. Refer to HRWC STANDARD DETAILS.

.2 Joint restraint device: 100 mm to 600 mm joint restraint device to AWWA C111/A21.10 and C153/A21.53 for mechanical or push-on joints with multiple wedge or gripper ring restraining mechanism, minimum working pressure rating 2410 kPa and minimum safety factor of 2:1. Installation is not to require special tools.

.1 Acceptable products for ductile iron (DI) pipe:

.1 Ebba Iron Megalug – series 1100DI
.2 Ford - RFAD
.3 Star – series 3000
.4 Mueller Aquagrip
.5 MJ Field Lok.
.6 Tufgrip – series 1000
.7 Smith-Blair 100 series
.8 Sigma One-Lok model SLDE

.2 Acceptable products for polyvinyl chloride (PVC) pipe:

.1 Ebba Iron Megalug – Series 2000PV
.2 Ford - RFAP
.3 Star – series 4000G2
.4 Mueller Aquagrip
.5 MJ Field Lok
.6 Tufgrip – series 2000
.7 Smith-Blair 100 series
.8 Sigma One-Lok model SLCE

.3 Mechanical joint restraint devices are generally to be used in combination with concrete thrust blocks. Mechanical joint restraint devices alone are permitted on 11.25°, 22.5° and 45° horizontal bends for sizes up to 300 mm diameter. No pipe joints are permitted within the “minimum pipe length”, refer to HRWC STANDARD DETAILS.

2.17 Anode Packs

.1 Zinc anodes (ZN24-48) to ASTM B418, complete with clamps, as directed.

.2 Magnesium alloy anodes to ASTM B843-13.

2.18 Trace Wire

.1 RWU90, number 10 gauge (AWG), single stranded, insulated copper wire with 60mil of black cross-linked polyethylene (XCPE) insulation specifically manufactured for direct burial application or approved equivalent.

.2 Make all spliced or repaired wire connections in the trace wire system using a Wing-Nut Wire Connector, model 454 (for two or four number ten wires), or approved equivalent, and made waterproof using an approved buried service wire closure.

.1 Buried service wire closure products:

.1 Klick–It II model C8816.
.2 Raychem GHFC-2-90.
.3 DryConn Direct Bury Lug Aqua.

.3 Trace wire test stations are to be installed at 300 metre intervals.

.1 Acceptable products are as follows:

.1 Handley Industries T452.
.2 Snakepit Model #22408.

2.19 Service Connections and Fittings

.1 Water Service Connections 100 mm and larger refer to specifications for mainline pipe.

.2 Water Service Connections 19 mm to 50 mm:

.1 Water Service Connection pipe:

.1 Copper tubing: to ASTM B88M, Type K annealed, minimum pressure rating of 1035 kPa.

.2 Cross Linked Polyethylene (PEXa) tubing for pressure applications: to AWWA C904, CAN/CSA B137.5, minimum pressure rating of 1035 kPa. Install a stainless steel support liner inside the pipe at each compression joint and at corporation stop connections.

.1 Acceptable products:

.1 Rehau – Municipex.
.2 Uponor – AquaPex.

.2 Joints and fittings:

.1 Copper tubing installations:

.1 Underground: AWWA C800 compression joint brass valves and fittings for underground connections. Minimum pressure rating 1035 kPa.

.2 Interior: Lead free soldered joints. One lead free soldered joint is permitted upstream of the water meter.

.2 PEXa installations:

.1 Underground: AWWA C800 compression joint brass valves and fittings for underground connections. Minimum pressure rating 1035 kPa.

.2 Interior: ASTM F877 compression sleeve fitting for transition to the copper tubing of the water meter arrangement.

.1 Acceptable products:

.1 Everloc+.
.2 ProPEX.

.3 Corporation stop: brass to ASTM B584, NSF 61, compression type, inlet threads to AWWA C800, minimum pressure rating of 1035 kPa.

.1 Acceptable products:

.1 19-50 mm Mueller B25008N (ball valve).
.2 19-50 mm Cambridge Brass 301NL- A3H3 to 301-7H7 (ball valve).

.4 Curb stop and drain: brass to ASTM B584, NSF 61, compression type joints. Minimum pressure rating of 1035 kPa.

.1 Acceptable products:

.1 19-50 mm Mueller H15219N (Oriseal).
.2 19-50 mm Cambridge Brass 203NL- H3H3 to 203-H7H7 (ball valve).

.5 Insulated couplings for use with PVC water mains.

.1 Acceptable products:

.1 19-50 mm Mueller.
.2 19-50 mm Cambridge Brass.

.6 Service saddle: bronze body to ASTM B62, confined O-ring seal cemented in place, double T304 stainless steel straps to ASTM A240/A240M suitable for connecting to a main. Outlet tapped and threaded to AWWA C800.

.1 Acceptable products:

.1 Smith Blair 325.
.2 Mueller B22 SS.
.3 Ford 202 BS.
.4 Robar 2706.

.7 Service box: adjustable type, cast iron bottom section, stainless steel operating rod and cotter pin, cast iron lid with recessed pentagon nut and internal stem to suit the depth of bury. Service boxes are to be metallic (schedule 40 coated pipe) to facilitate for future locates and are to have an appropriate foot piece. If an extension is required, use a threaded extension (galvanized or schedule 40 coated pipe). Set screw types are not permitted.

.1 Acceptable products:

.1 Mueller.
.2 Clow.

38 mm and 50 mm curb stops are to be fitted with full size valve boxes.

2.20 Tapping Sleeves

.1 Tapping sleeve: type 304 stainless steel to AWWA C223 for ductile iron and polyvinvyl chloride (PVC) pipe.

.1 Body: stainless steel per ASTM A240/A240M type 304.
.2 Outlet: integral MJ outlet.
.3 Test plug: ¾" NPT type 304 stainless steel, plug threads coated to prevent galling.
.4 Bolts/nuts/washers: type 304 stainless steel, coated to prevent galling.
.5 Gaskets: nitrile (Buna – N) NSF 61 listed as per ASTM D2000.

.1 Acceptable Products:

.1 Mueller H-304 (ss).
.2 Smith Blair 662.
.3 Romac SST420.
.4 Robar 6606 (ss).
.5 Ford FTSS.

. 2 Tapping sleeve: to AWWA C223 for Concrete Pressure Pipe AWWA C301 and AWWA C303.

.1 Body: carbon steel per ASTM A283/A283M grade C, or ASTM A36/A36M.
.2 Outlet: integral MJ outlet.
.3 Test plug; ¾" FNPT carbon steel, plug threads coated to prevent galling.
.4 Bolts/nuts/washers: HSLA carbon steel.

.5 Gaskets: nitrile (Buna – N) NSF 61 listed as per ASTM D2000.

.1 Acceptable products:

.1 Forterra (for AWWA C301 and C303).
.2 Romac FTS435 (for AWWA C301).
.3 Smith Blair 625 (for AWWA C303).

2.21 Disinfectant

.1 Sodium hypochlorite or calcium hypochlorite: to AWWA B300.

.2 Liquid chlorine: to AWWA B301.

2.22 Neutralizing Agent

.1 Calcium thiosulphate (CaS_2O_3) to AWWA C655.
.2 Ascorbic acid to AWWA C655

2.23 Insulation

.1 Insulation to ULC 701, type 4, for extruded polystyrene.

.1 Acceptable products:

.1 Styrofoam Highload 40.
.2 Formular 400.

.2 Polyethylene Water Service Connection insulation

.1 Acceptable product:

.1 Tundra-Seal – 12 mm

2.24 Marker Stake

.1 Timber marker stake – 40 mm x 90 mm painted **BLUE**. Marker stake must be installed as location marker for end of the Water Service Connection at property line.

2.25 Marker Tape

.1 Detectable metallic tape, 50mm wide, clearly marked as follows:

.1 "CAUTION - BURIED WATER LINE", coloured **BLUE**.

2.26 Geosynthetic

.1 Synthetic fiber, rot proof, unaffected by action of oil or salt water and not subject to attack by insects or rodents. The geosynthetic is to be of a non-woven construction, with minimum thickness of two (2) mm and minimum density of 200 g/m^2.

2.27 Meter and Air Release Valve Chambers

.1 Sump pump – Heavy duty, submersible type with auto start and shut-off non-clog impeller, stainless steel shaft, water-lubed bronze bushing, strainer, weights and 31 mm heavy duty vertical check valve.

.2 Frame and cover – Use adjustable manhole frame and cover in asphalt surfaces with HRWC marked in center of cover.

.1 Acceptable products:

.1 IMP C-56N;
.2 Mueller Model AJ600.

.3 Minimum size for air release and air vacuum valve chambers is 1200 mm. Precast concrete sections with O-ring gasket and bottom section with a precast floor. Refer to HRWC STANDARD DETAILS.

.4 Meter chamber for 38 mm and 50 mm diameter Water Service Connections to HRWC STANDARD DETAILS.

.5 Typical meter chamber for meters larger than 50 mm to HRWC STANDARD DETAILS.

.6 Meter chamber for PVC water main leak detection and system monitoring. Refer to HRWC STANDARD DETAILS.

.7 Air vent and drain as per HRWC STANDARD DETAILS.

2.28 Heated Outdoor Enclosures

.1 Pre-manufactured outdoor enclosure for backflow prevention device to ASSE 1060.

.2 Heated outdoor enclosure design to incorporate the following:

.1 Weatherproof.
.2 Secure.
.3 Insulated and heated.
.4 Drainage for backflow prevention device.

2.29 Pressure Gauges

.1 Minimum pressure gauge increment 14 kPa (2 psi); a minimum of 100 mm faced diameter, liquid filled, graduated in psi and kPa and have an accuracy of 3% at maximum reading. Stainless steel nipple and ball valve to be provided between water main and pressure gauge.

.1 Acceptable products:

.1 Ametek P545.
.2 Ashcroft Duralife 35-1009AWL-2L.
.3 Marsh P0154P.
.4 Winters part no. P606.

2.30 Automatic Flushing Stations

.1 Automatic flushing stations manufactured in accordance to NSF-61.

.1 Acceptable products:

.1 Hydro – Guard HG-4.
.2 Hydro – Guard HG-8.

2.31 Backflow Prevention Devices

The product requirements for backflow prevention device arrangements can be found in the *HRWC Water Meter & Backflow Prevention Device Design & Installation Manual*.

PART 3 EXECUTION

3.1 Preparation

.1 Inspect products for defects and remove defective products from site.

.2 Clean all pipe, fittings, valves, hydrants and appurtenances of debris and water before installation.

3.2 Excavation, Bedding and Backfilling

.1 Perform excavation, bedding and backfilling to SECTION 31 20 00 with the following exceptions:

.1 Common selected backfill is defined in SECTION 31 20 00 as follows:

.1 Common: excavated soil which is not rock, unsuitable, or topsoil.
.2 Selected Backfill: common which is free from stumps, trees, roots, sods, organics, rocks, boulders, and masonry larger than 200 mm in any dimension; and other deleterious materials.

.2 Use Type 1 gravel for pipe bedding and protection unless otherwise specified.

.3 Place pipe bedding by hand and compacted in 150 mm thick layers.

.4 Use clear stone in wet or freezing conditions where specified or in consultation with HRWC prior to the installation.

.5 Blasting is not permitted within 10 metres of a water main.

.6 Break rock three (3) metres beyond the end of water main and Water Service Connections for full trench width.

3.3 Pipe Installation

.1 Provide 24 hours' notice to HRWC prior to commencement of pipe installation.

.2 Lay and join pipe, fittings, and valves, as specified herein and according to manufacturer's published instructions.

.3 Do not lay pipe and fittings when the trench bottom is frozen, underwater or the trench or weather conditions are unsuitable.

.4 Lay pipe and fittings on prepared bed, true to line and grade indicated, within the following tolerances:

.1	Horizontal Alignment:	150 mm.
.2	Vertical Alignment:	75 mm.

.5 Prevent entry of bedding material, water or other foreign matter into pipe. Use temporary watertight bulkheads when pipe laying is not in progress.

.6 Face the bell ends in the direction of installation. On grades of 2% or greater, lay pipe up grade. For grades exceeding 16%, install an appropriately designed gradient thrust restraint.

.7 Align pipes before joining.

.8 Install gaskets as recommended by the manufacturers. Use only lubricant supplied by manufacturer. During cold weather store gaskets in heated area to promote flexibility.

.9 Support pipes as required to assure concentricity until joint is completed.

.10 Keep pipe joints free from mud, silt, gravel or other foreign materials.

.11 Avoid displacing the gasket or contaminating them with dirt, or other foreign materials. When a gasket is contaminated, remove, clean, re-install and lubricate the gasket. Do not reuse a gasket that has been contaminated with petroleum products.

.12 Where a deflection at a joint is permitted by the Engineer, deflect only after the spigot is fully inserted into the bell. Do not exceed maximum joint deflection recommended by the manufacturer.

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

.14 Provide a flexible joint, at structures, no more than 300 mm from outside face of structure. Support the pipe between the structure wall and the first joint with 20 MPa concrete.

.15 Cut pipe as required for fittings or closure pieces, square to centerline, and as recommended by manufacturer. Do not damage pipe lining or coating and leave smooth beveled edge.

.16 Provide concrete thrust blocks to undisturbed ground on all tees, bends, plugs and caps or as indicated on Project Documents. Construct as indicated and keep joints and couplings free of concrete.

.17 Install mechanical joint restraint to AWWA C111/A21.10 and tighten lug nuts until all wedges are in firm contact with pipe surface. Continue to tighten alternating between bolts until lug nuts twist off.

.18 Wrap all internally mechanical restrained bells with two bands of **RED** adhesive tape.

.19 Install zinc anodes on all valves, fire hydrants, and copper and ductile iron Water Service Connections to HRWC STANDARD DETAILS.

.20 Install magnesium anodes to any connections to existing unwrapped ductile or cast iron pipe.

.21 Install polyethylene encasement on ductile-iron pipe and fittings, to HRWC STANDARD DETAILS. Any damage to the polyethylene must be repaired to the satisfaction of HRWC. Where directed by HRWC, install anti-corrosion petrolatum paste, tape and mastic to valve and hydrant flange nuts and bolts and valve bonnet nuts and bolts for corrosion protection.

.22 Place marker tape upon bedding surround of plastic pipe.

3.4 Protective Coating

.1 Apply where alternative corrosion protection measures (polywrap, epoxy coating, cathodic protection) are not utilized, as directed.

.2 Utilize primer, mastic and tape in accordance with manufacturer’s instructions.

3.5 Under-crossing

.1 Excavate working pit to dimensions as indicated.

.2 Excavate working pit to not less than 0.6 metres below lowest invert of encasing pipe.

.3 Dewater excavation.

.4 Dewater area of under-crossing

.5 Install heavy timber or steel frame backstop.

.6 Place encasing pie to exact line and grade as indicated. Encasing pipe to cross under obstruction at angle as indicated.

.7 Install encasing pipe by jacking, boring or tunneling methods approved by HRWC.

.8 Encasing pipe not to be in tension.

.9 Joints for encasing pipe to be welded to AWWA C206.

.10 Submit shop drawings showing proposed method of installation of carrier pipe.

.11 For ductile iron carrier pipe only, install continuous zinc strip sacrificial anode electrically bonded to carrier pipe. Install sacrificial anodes for encasing pipe.

.12 Insert carrier pipe into encasing pipe, in end with larges open area, after placing levelling pad.

.13 Use chromated cooper arsenate salt treated blocking method or fabricated high density polyethylene casing spaced to maintain carrier pipe in true alignment and uniform separation from encasing pipe.

.14 Clearance between blocks or casing spacers and encasing pipe to be maximum 15 mm when carrier pipe is in position.

.15 Join carrier pipe one length at a time outside encasing pipe. Push or pull carrier pipe into position.

.16 Couplings of carrier pipe not to rest on levelling pad when carrier pipe is in position.

.17 Place 20 MPa concrete cradle around carrier pipe after it is in position. Cradle to be minimum 225mm and maximum of 300 mm above levelling pad.

.18 Fill open annular space at each end of encasing pipe with burlap bags filled with 20 MPa concrete.

3.6 Transmission Main Crossing

.1 Excavate existing backfill material over transmission main to spring line of pipe.

.2 Backfill in accordance with SECTION 31 20 00. Use Type 1 gravel to 450 mm above the top of the pipe. Use Type 2 for remainder.

.3 Maintain a minimum of 1.6 metres of ground cover from the top of the existing pipe to finished grade.

.4 Transmission main access road grade not to exceed 10%.

.5 Provide drainage for new and existing roads.

.6 Provide lockable gates across transmission main access road at the boundary of the right-of-way. Grade the surrounding area, as necessary, to prevent vehicular traffic bypassing the gate. Refer to HRWC STANDARD DETAILS.

.7 Provide *Road Gate Ahead* signs 150 m from gate along both directions of transmission main access road.

.8 Where a ditch crosses an existing transmission main, maintain a minimum cover of 1.6 meters. The minimum cover can be reduced to 1.2 metres with 50mm of insulation.

.9 Provide asphalt transition 3.0 metres on to transmission main access road.

.10 Exact location of existing transmission main to be determined by test pit prior to final approval of road crossing design.

.11 All work at transmission main is to be approved by HRWC.

3.7 Valves and Valve Boxes

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

.2 Install valve boxes on direct buried valves. Make valve box plumb and centered over operating nut, and true to line and grade.

.3 Install zinc anodes on all valves as specified in HRWC STANDARD DETAILS.

.4 Place select backfill material, maximum size 50 mm around valve box to subgrade.

.5 Provide an asphalt apron around valve boxes outside of the paved street right-of-way. Refer to HRWC STANDARD DETAILS.

.6 Install valves on PVC mains with a 450 mm x 450 mm pre-cast concrete block placed underneath for support. Refer to PVC handbook installation guide.

3.8 Hydrant Installation

.1 Install hydrants at locations indicated or where directed.

.2 Install 150 mm gate valve and valve box on hydrant anchor tee, as indicated.

.3 Set hydrant plumb, with hose nozzles parallel with edge of pavement or curb line, with pumper nozzle facing roadway at right angles to road centerline and with body flange set at elevation 50 mm to 150 mm above final grade.

.4 Provide mechanical joint restraints on all joints from the hydrant tee to the hydrant. In addition to joint restraint, provide concrete thrust blocks on all hydrants. Do not obstruct drain holes.

.5 Excavate a pit, not less than 0.5 m^3, and backfill with clear stone to a level 150 mm above top of hydrant lead from hydrant to main to provide drainage.

.6 Place geosynthetic over clear stone from the hydrant to water main.

.7 Where the water table is above drain holes, notify HRWC. Where hydrant cannot be appropriately relocated, plug drain holes and advise HRWC.

.8 Hydrants that come off Sprinkler Service Connection on private property are considered private. Paint private hydrants safety yellow.

.9 Set hydrants back a minimum of 700 mm from face of curb to the center of hydrant on local streets, 850 mm on all other urban streets, and behind the ditch for rural roads as per HRWC STANDARD DETAILS.

.10 Immediately after installation, place a 300 mm round *Out of Service* marker on hydrant pumper nozzle. Maintain markers prior to commissioning of the Water System. Remove the markers after the Water System has been commissioned.

.11 Install bollards as required in accordance with HRWC STANDARD DETAILS.

3.9 Thrust Blocks

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

.2 Place 6 mil polyethylene between interface of concrete and fitting.

.3 Provide mechanical joint restraint devices where specified.

.4 Keep joints and couplings free of concrete.

.5 Do concrete in accordance with SECTION 03 30 00 as indicated.

.6 Thrust block installation to avoid manholes in common trenches.

.7 Use timber blocking (hardwood sized to withstand thrust restraint against undisturbed earth or against a concrete thrust block) as reaction backing for plugs and caps. Timber blocking to allow future removal without disturbing pipe, cap or bedding.

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

3.10 Valve Chambers

.1 Construct valve chambers where indicated in accordance with applicable SECTIONS. Do not allow valve chamber to rest upon pipe.

3.11 Chamber Pipe Installation

.1 Flanges joints:

.1 Clean all flanges with a wire brush worked parallel to serrations prior to assembling joints.

.2 Lubricate gasket to ease gasket installation.

.3 During assembly, tighten diametrically opposing pairs of bolts simultaneously.

.2 Victaulic joints:

.1 Inspect and clean joint, pipe and nipple end prior to assembling joint.

.2 Apply a silicone graphite paste lubricant on pipe, nipple ends, lips and the back of gasket prior to assembly.

.3 Stainless steel pipe:

.1 Inspect and clean stainless steel pipe and fittings prior to welding.

.2 Certified welders to weld stainless steel pipe.

.3 Welds to be free from interior projections. Ground smooth exterior welds.

.4 Use only stainless steel chisels, hammers, brushes to assemble stainless steel pipe.

.5 Cut stainless steel pipe by sawing. Burning is not permitted.

3.12 Trace Wire

.1 Install trace wire on all non-ductile iron water mains, hydrant leads, and Water Service Connections except where such water service pipe is of copper material. Install trace wire in such a manner as to be able to properly trace all water mains, hydrant leads, and Water Service Connections without loss or deterioration of signal or without the transmitted signal migrating off the trace wire.

.2 At the point of connection between the cast or ductile iron water mains, with any non-iron water main, connect the trace wire to the first valve box, or as directed by HRWC.

.3 Lay trace wire flat and securely affix to the pipe at three metre intervals. Protect the trace wire from damage during the excavation of the works. At water service saddles, the trace wire is not permitted to be placed between the saddle and the water main.

.4 Except for approved spliced in connections, trace wire is to be one continuous piece without breaks or cuts from valve box to valve box, valve box to fire hydrant, or fire hydrant to fire hydrant.

.5 Test the trace wire system for functionality by HRWC only after the contractor has confirmed and demonstrated that the entire trace wire system is installed and is functioning properly.

.6 If deficiencies are found in the trace wire system by HRWC, the Contractor will be invoiced for the cost of additional site visits incurred by the HRWC to retest the trace wire system.

3.13 Connections to Existing Main

.1 Connect new mains to existing mains as indicated.

.2 Do not make a connection to an existing main within one (1) metre of a fitting, pipe joint or another Water Service Connection.

.3 HRWC does not guarantee leak tight operation of existing valves.

.4 Confirm all items required to complete the connection are on site and the outside diameter and type of pipe have been verified prior to commencing work.

.5 HRWC Water Services will operate valves in the existing system.

.6 HRWC will inspect the new tee and joints for leakage, under operating pressure, prior to backfilling.

3.14 Water Service Connections

.1 All Water Service Connections require the following general requirements:

.1 Every building is required to be connected separately to the mains from any other building, except that an ancillary building on the same property may be serviced by the same Water Service Connection (National Plumbing Code of Canada).

.2 A single Water Service Connection, from the main line to the property line, is required for HRWC Systems extensions to each lot.

.3 Minimum 1.6 metres cover.

.4 Maximum 2.0 metres cover.

.5 Minimum 300 mm horizontal and vertical separation distance from gravity Wastewater and Stormwater Service Connection.

.6 Minimum 450 mm vertical separation when crossing above a Wastewater or Stormwater Service Connection.

.7 Minimum 3.0 metre horizontal separation, separate trench, from a pressurized Wastewater Service Connection.

.8 Minimum 3.0 metre horizontal separation from an outdoor fuel tank and septic tank.

.9 Minimum 6.0 metre horizontal separation from septic disposal field.

.10 Minimum 2.0 metre horizontal separation from gas lines, underground electrical / telephone conduit, steam or hot water piping, transformer pads, utility poles or other utilities.

.11 Variance from the requirements outlined above, when it is impossible to obtain the specified separation distances, may be allowed. Where separations of Water Service Connections and Wastewater or Stormwater Service Connections cannot be met, the Wastewater or Stormwater Service Connections materials are to be water class and pressure tested to 1000 kPa (145 Psi) for water tightness. The pressure test is not required on residential service connections.

.2 Water Service Connection 50 mm & smaller. In addition to the general requirements, Water Service Connections 50 mm and smaller requires the following:

.1 Shut-off valve (curb stop) to be located within the right-of-way, 300 mm from the boundary. In areas where a public sidewalk exists, locate shut-off valve 1.0 metre from the sidewalk, and provide a minimum 1.0 metre easement, in all directions, around the shut-off valve. Do not place within 1.5 metres of the building.

.2 All Water Service Connections fitted with Zinc 24-48 anode.

.3 All Water Service Connections are to be installed with pipe sleeve insulation.

.4 No joints between the shut-off valve and the building. Services greater than 20 metres are permitted one compression fitting every 20 metres. No compression couplings within 1.5 metres of the foundation.

.5 A Water Service Connection that is set back 50 metres or greater from the public right of way or public easement boundary requires the water meter and backflow prevention device be installed in a private meter chamber, on private property, adjacent to the right-of-way or easement boundary.

.6 All Water Service Connections connecting to the Water System are to be tapped by HRWC Water Services. All parts and materials supplied by the Applicant.

.7 Rigid polystyrene insulation of Water Service Connections is required in the following situations:

.1 Sites where service connections are to be installed in trenches that have been excavated in rock.
.2 Sites where stockpiled or processed rock material is to be used for backfill.
.3 All situations where the service connection is considered to be at risk of freezing as determined by HRWC Water Services.
.4 Where a Water Service Connection is crossing a ditch with a minimum of 1.2 m of cover.

.8 The standard minimum domestic Water Service Connection sizing to be as follows:

.1 19 mm copper Type K.
.2 25 mm copper Type K where the Water System pressure is less than 345 kPa or the setback is greater than 30 metres.
.3 25 mm for all PEXa installations
.4 25 mm copper Type K or PEXa for all ICI installations

.9 Maximum velocity is 4.5 m/s in a Water Service Connection.

.10 Locate public portion of Water Service Connections, including curb stops, 1.5 metres from driveways.

.3 Water Service Connection 100 mm & greater (Sometimes referred to as a Sprinkler Service Connection if the sole purpose is to supply water from the water main is for fire protection). In addition to the general requirements, Water Service Connections 100 mm and greater requires the following:

.1 Where a Water Service Connection stub is not available, a new tee and valve is required to be cut into the water main. The installation requires disinfection as per the Supplementary Standard Specification.

.2 Tapping sleeves are only permitted under the direction of HRWC Water Services where the magnitude of a service disruption makes cutting in a new tee impractical. In this situation the use of a tapping sleeve will only be approved when the pipe to be tapped is a minimum of one size increment larger than the connecting pipe. Additionally, all tapping is subject to visual inspection by HRWC Water Services prior to tapping to confirm that the pipe structural condition is acceptable for tapping.

.3 All Water Service Connection valves in the right-of-way require a Zinc 24-48 anode.

.4 All pipe and fittings to be installed with polyethylene encasement.

.5 A Water Service Connection that is set back 50 metres or greater from the public right of way or public easement boundary requires the water meter and backflow prevention device be installed in a private meter chamber, on private property, adjacent to the right-of-way or easement boundary.

.6 The installation of a private fire hydrant off a Sprinkler Service Connection requires adherence to the National Building Code of Canada, Fire Department Connections section. The fire department connection to a hydrant is not more than 45 metres and is unobstructed.

.7 Private fire hydrants are to be installed such that the hydrant lead is connected to the Sprinkler Service Connection downstream of a CSA approved detector assembly backflow prevention device (Double Check Detector Assembly or Reduced Pressure Detector Assembly). The detector assembly device must be supplied with a positive displacement type meter. If the meter is not an HRWC approved water meter, HRWC will supply a water meter to be installed on the detector assembly's bypass.

.8 Water Service Connections in a master meter arrangement require a meter chamber be installed on private property adjacent to the street right-of-way.

.4 Water Service Connection installation:

.1 Lay the Water Service Connection in a smooth trench bottom with Type 1 gravel bedding 250 mm below the pipe and a minimum of 300 mm Type 1 gravel over the pipe.

.2 Condition of water mains at the proposed location of the Water Service Connection is not guaranteed by the HRWC. Additional work may be required. All costs to the Applicant.

.3 Where a Water Service Connection 100 mm or larger is connecting to the existing water system and no means of connection is provided to the water system (stub, cap and valve). A connection to the water system will be made by cutting in a new tee and valve.

.4 HRWC reserves the right to limit the number and location of bends on Water Service Connections.

.5 Install the service box over curb stop, set the plumb with the top of service box flush with the finished grade. Where the grade has not been finalized or established, leave the top of service box 150 mm above top of curb or edge of asphalt. Place select backfill material (maximum size 50 mm) around the service box to subgrade.

.6 Test corporation stop, then leave fully open.

.7 Test operation of curb stop, then close curb stop and leave closed.

.8 When stubbing in Water Service Connections 1.5 metres inside the property line, place temporary marker stake at end of each capped Water Service Connection, extending from pipe end at pipe level to 600 mm above grade. Paint exposed portion of stake **BLUE** with designation "WATER" in **BLACK.**

.9 Do not backfill until advised by HRWC. Once directed, backfill with selected backfill.

.10 Pressure test and chlorinate all Water Service Connections 100 mm and larger up to the meter and BFP arrangement.

.11 If HRWC is required during the installation of Water Service Connections outside regular working hours, the customer is to pay the incurred costs of salaries and expenses for overtime hours required.

.5 Water Service Connection trenchless installation:

.1 Installation of Water Service Connections by trenchless methods may be approved by the Engineer upon review of a written installation procedure which addresses boring method, bore size, carrier piping (if any), bore end conditions, the subsoil environment and other factors as may be deemed relevant.

.2 Couplings are not permitted on the bored section of service connections.

3.15 Water Service Connections Abandonment

.1 HRWC requires the Water Service Connection to be abandoned at the water main for all HRM Demolition Permits. The method for abandonment is dependent on the site conditions specific to the Water Service Connection in question. HRWC Water Services will dictate the abandonment method to be used.

.2 19 mm to 50 mm Water Service Connections.

.1 Excavate at the water main, cut the Water Service Connection and the remove the mainstop. Plug the Water Service Connection and install a repair clamp to complete to the abandonment. This method requires that the water main be shut down in order to complete this work. HRWC Water Services will inspect all work, and operate all valves.

.2 Excavate and remove shut off valve (curb stop) and service box. HRWC Water Services will inspect all work, and operate all valves.

.3 100 mm and larger services

.1 Excavate at the water main connection, the water service connection fitting and all associated service valves removed from the water main. Repair the water main with a new section of pipe and repair couplings. Swab for disinfection. HRWC Water Services will inspect all work, and operate all valves.

.2 Excavate and remove all service valves and service boxes. HRWC Water Services will inspect all work, and operate all valves

3.16 Tapping Sleeve Installation

.1 Tapping sleeves for Water Service Connections are only permitted with the approval of the Engineer where the magnitude of a service disruption makes cutting in a new tee impractical. In this situation the use of a tapping sleeve will only be approved when the pipe to be tapped is a minimum of one size increment larger than the connecting pipe. Additionally, all mains are subjected to a visual inspection by HRWC Water Services prior to the proposed tap to confirm the structural condition of the pipe is adequate for tapping

.2 Tapping fees for Water Service Connections to be paid to HRWC are as follows:

.1 19 mm to 50 mm - $300.00.
.2 100 mm and greater - $100.00/ 25 mm. (100 mm Water Service Connection tap would be $400.00).

All materials and parts required for a Water Service Connection tap are the responsibility of the Applicant. Fees are not subject to HST.

.3 All tapping of HRWC owned mains and existing Water Service Connections upstream of the meter are to be performed by the HRWC Water Services at the Applicant's expense. Appointments for tapping must be made with HRWC Water Services a minimum of 24 hours' notice in advance.

.4 Provide a minimum 1.0 metre working space along the main and 150 mm clearance around the main for tapping. Clean the exterior of the main to be tapped. Grind or file any protrusions or irregularities on the pipe exterior which may interfere with uniform seating of gaskets or clamping bands. In accordance

with AWWA C651, dust interior surface of the tapping sleeve annulus with calcium hypochlorite powder before attaching to the main.

.5 Test the tapping valves and sleeves before tapping of main from both directions. HRWC Water Services must witness all tests prior to tapping.

.6 Tapping will not be performed within 1.0 metre of an adjacent Water Service Connections or pipe joints. Tap water main and install corporation stops at a position between 75° and 90° from the vertical (as detailed in HRWC STANDARD DETAILS) using type of connection and tapping method appropriate for type, size and pressure of water main. Tape a 150 mm wide continuous band around polyethylene encasement, centering on the area to be tapped.

3.17 Cleaning & Flushing

.1 Perform flushing of the new water main and appurtenances to AWWA C651.

.2 Provide, in writing to HRWC, the plan for pressure testing, flushing, disinfecting neutralizing, disposing and bacteria testing. The plan will indicate the areas to be tested, the sequence of testing and the sample locations for bacteria tests. The maximum length of new water main test is 450 metres.

.3 All pressure testing, flushing, disinfecting, neutralizing, disposing and bacteria testing to be witness by HRWC and the Applicant's Professional Engineer, or their representative. Provide HRWC 24 hours' notice to schedule the work.

.4 Isolation of existing HRWC Water System, where required, will be performed by HRWC Water Services. Do not operate any existing HRWC Water System valves.

.5 Water may be supplied from the existing HRWC Water System. This requires a hydrant or Water Service Connection at the opposite end of the new water main extension being open to release air and prevent backflow into the existing HRWC Water System.

.6 The new water main and appurtenances are to completely installed, with the exception of the tie-in to the existing HRWC Water System prior to flushing.

.7 Remove foreign material from new water main and appurtenances by flushing with water. New water main to be flushed with water velocities as high as can be obtained from available water source. Minimum velocity to be 0.91 m/s in accordance with AWWA C651. The size and number of taps should conform to Table 3 of AWWA C651.

Pipe Diameter	Flow Required to Produce 0.91 m/s (approx.) Velocity in Main		Size of Tap			Number 65 mm Hydrant Outlets
			25 mm	38 mm	50 mm	
mm	gpm	l/s	Number of Taps on Pipe			
100	120	7.4	1	-	-	1
150	260	16.7	-	1	-	1
200	470	29.7	-	2	-	1
250	730	46.3	-	3	2	1
300	1060	66.7	-	-	2	2
400	1880	118.6	-	-	5	2

.8 Slowly open and close new valves and hydrants to aid thorough flushing.

.9 Continue flushing at least until flow from most distant point reached discharging point and until particulates have been removed and water discharged is clean and clear.

.10 If satisfactory results cannot be achieved by flushing, swab pipe by approved methods and re-flush.

3.18 Pressure & Leakage Testing

.1 Perform pressure and leakage testing of ductile iron piping to AWWA C600 and AWWA M41.

.2 Perform pressure and leakage testing of PVC piping to AWWA C605 and AWWA M23.

.3 Provide, in writing to HRWC, the plan for pressure testing, flushing, disinfecting, neutralizing, disposing and bacteria testing. The plan will indicate the areas to be tested, the sequence of testing and the sample locations for bacteria tests. The maximum length of water main test is 450 metres.

.4 All pressure testing, flushing, disinfecting, neutralizing, disposing and bacteria testing to be witness by HRWC and the Applicant's Professional Engineer, or their representative. Provide HRWC 24 hours' notice to schedule the work.

.5 Isolation of existing HRWC Water System, where required, will be performed by HRWC Water Services. Do not operate any existing HRWC Water System valves.

.6 Water may be supplied from the existing HRWC Water System. This requires a hydrant or Water Service Connection at the opposite end of the new water main extension being open to release air and prevent backflow into the existing HRWC Water System.

.7 Include all new Water Service Connections, fire hydrants, valves, mains and other appurtenances in the pressure and leakage testing.

.8 Place and compact base lift of gravels prior to pressure and leakage testing.

.9 Provide labour, equipment and materials required to perform pressure and leakage testing. Provide a ¼ inch NPT connection at the appropriate location for the pressure gauge.

.10 Open all new valves in test section.

.11 Use chlorinated potable water for all testing.

.12 Expel air from the new water main and appurtenances by slowly filling with potable water. Install corporation stops at high points where no air vacuum release valves are installed. After testing, remove corporation stops and install plugs.

.13 Conduct test at a minimum pressure of 1035 kPa or 1.5 times the operating pressure at the lowest point of elevation of the new water main being tested. Test pressure not to exceed 1205 kPa.

.14 Conduct test over a full two (2) hour period, maintaining a constant test pressure. No leakage is permitted during the test period.

.15 If any test fails, repair or replace defect and retest section until specified testing requirement is achieved.

.16 Repair visible leaks regardless of test results.

.17 Flush the new water main and appurtenances as per 3.17 of this Specification.

3.19 Disinfecting, Neutralizing and Disposing

.1 Perform disinfection of the new water main and appurtenances to AWWA C651.

.2 Provide, in writing to HRWC, the plan for pressure testing, flushing, disinfecting, neutralizing, disposing and bacteria testing. The plan will indicate the areas to be tested, the sequence of testing and the sample locations for bacteria tests. The maximum length of water main test is 450 metres.

.3 All pressure testing, flushing, disinfecting, neutralizing, disposing and bacteria testing to be witness by HRWC and the Applicant's Professional Engineer, or their representative. Provide HRWC 24 hours' notice to schedule the work.

.4 Isolation of existing HRWC Water System, where required, will be performed by HRWC Water Services. Do not operate any existing HRWC Water System valves.

.5 Proceed with disinfecting after new water main and appurtenances have been successfully pressure tested.

.6 Water may be supplied from the existing HRWC Water System. This requires a hydrant or Water Service Connection at the opposite end of the new water main extension being open to release air and prevent backflow into the existing HRWC Water System.

.7 The continuous-feed method consist of completely filling the new water main and appurtenances with potable water, removing air pockets, then flushing the completed main to remove particulars, and refilling the main with potable water that has been chlorinated to between 25-50 mg/l. After a 24 hour holding period in the main, the acceptable minimum free chlorine residual is 10 mg/l.

.8 Use chlorinated potable water for all testing.

.9 Inject 1% chlorine solution through a corporation stop in the top of the new water main, at point close to where main is being filled and at rate proportioned to filling rate. Prepare stock chlorine with concentration of 1% free chlorine by volume as follows:

Product	Amount of Compound	Quantity of Water
100% Chlorine	1.0 kg	100 litres
Liquid Bleach 5.25% Cl	1.0 litre	3.5 litres
Liquid Bleach 10.5% Cl	1.0 litre	7.0 litres
Liquid Bleach 12.0% Cl	1.0 litre	8.0 litres

.10 The following table indicates the quantity of 1% chlorine stock solution required to produce an initial 25 mg/l concentration in 100 m of new water main by diameter.

Pipe Diameter	100% Chlorine	1% Chlorine Solution
mm	grams	litres
100	19.6	2.0
150	44.2	4.4
200	78.5	7.9
250	122.7	12.3
300	176.7	17.7
350	240.5	24.1
400	314.2	31.4
450	397.6	39.8
500	490.9	49.1
600	706.9	70.7
750	1104.5	110.4

.11 Operate new valves, hydrants, and appurtenances while the main contains chlorine solution.

.12 Take water samples at all hydrants and termination points, in suitable sequence, to test chlorine residual. When tests indicate minimum chlorine residual of 25 mg/L, leave Water System charged with disinfectant solution for 24 hours. At the end of this 24 hours period, the chlorinated water in all portions of the main cannot have a residual of not less than 10 mg/L. If the residual has fallen below 10 mg/L, repeat the disinfection of the new water main and appurtenances.

.13 Disposing of chlorinated water:

.1 In Halifax, Dartmouth, Eastern Passage, Mill Cove, Herring Cove wastewater sewersheds.

.1 Notify the Wastewater Treatment Facility and discharge chlorinated water directly into the HRWC Wastewater System.

Wastewater Treatment Facility	Plant Supervisor
Halifax	490-1882
Herring Cove	490-2474
Dartmouth	490-1316
Eastern Passage	465-6076
Mill Cove	832-5858

.2 In all other wastewater sewersheds.

.1 Neutralize the chlorinated water using calcium thiosulphate (CaS_2O_3) or ascorbic acid as outlined in AWWA C655. Once the chlorinated water is neutralized it can be discharged to an HRWC Wastewater or Stormwater System, or the environment. All discharges must comply with HRWC Regulations.

.2 When disposing neutralize solution to the environment, the disposal of the neutralized solution must be at least 100 m from the nearest watercourse.

.14 Flush the new water main and appurtenances as per 3.17 of this Specification.

3.20 Bacteria Testing

.1 Perform bacteria testing of the new water main and appurtenances in accordance with Appendix A of the *NSE Guidelines for Monitoring Public Drinking Water Supplies*. Analysis to be conducted by an independent lab in accordance with the NSE requirements.

.2 Provide, in writing to HRWC, the plan for pressure testing, flushing, disinfecting, neutralizing, disposing and bacteria testing. The plan will indicate the areas to be tested, the sequence of testing and the sample locations for bacteria tests. The maximum length of water main test is 450 metres.

.3 All pressure testing, flushing, disinfecting, neutralizing, disposing and bacteria testing to be witness by HRWC and the Applicant's Professional Engineer, or their representative. Provide HRWC 24 hours' notice to schedule the work.

.4 Isolation of existing HRWC Water System, where required, will be performed by HRWC Water Services. Do not operate any existing HRWC Water System valves.

.5 Water may be supplied from the existing HRWC Water System. This requires a hydrant or Water Service Connection at the opposite end of the new water main extension being open to release air and prevent backflow into the existing HRWC Water System.

.6 Fill the new water main and appurtenances with chlorinated potable water.

.7 Collect bacteria samples from a test sampling tap or a new Water Service Connection if available. Take bacteriological samples every 366 metres of new water main, plus one set from the end of the line and from every branch. If new Water Service Connections are not available consult HRWC. New hydrant leads may only be tapped when no other viable option exists.

.8 Repeat disinfecting, neutralizing, disposing (3.19), flushing (3.17) and bacteria testing if bacteria analysis does not meet NSE requirements.

.9 After testing and submission of the written results for the passing of the bacteria tests remove the corporation stops and install plugs. Check visually for leakage after plugs are installed with new water main and appurtenances under normal operating pressure.

3.21 Water Meters

The installation requirements for water meter arrangements can be found in the *HRWC Water Meter & Backflow Prevention Device Design & Installation Manual*.

3.22 Backflow Prevention Devices

The installation requirements for backflow prevention device arrangements can be found in the *HRWC Water Meter & Backflow Prevention Device Design & Installation Manual*.