1. GENERAL

1.1 RELATED WORK

.1 Section 31 23 00 – Excavation, Trenching and Backfill.

.2 Section 31 32 19 – Geosynthetics.

.3 Section 33 14 13 – Watermains.

.4 Section 33 14 13.1 – Asbestos Cement Pipe.

.5 Section 33 31 11 – Sewer Mains.

1.2 DEFINITIONS

.1 Class B Bedding:
- .1 The pipe shall be bedded in compacted granular material which shall have a thickness as specified in the Standard Drawings.
- .2 The granular material shall be hand placed and compacted to a density of 95% Standard Proctor Density in 150mm layers for the full width of the trench up to 300mm above the crown of the pipe.

1.3 STANDARDS

.1 All references to AWWA standards shall reference the most recent edition of those standards.

1.4 SAMPLES

.1 At least two (2) weeks prior to commencing work, inform the Engineer of the proposed source of bedding and pipe zone materials.

.2 Provide a sieve analysis of the bedding and pipe zone materials, performed by a qualified materials testing laboratory, for the Engineer's review.

.3 Bedding and pipe zone materials shall be submitted to the Engineer before being used.

1.5 MATERIAL CERTIFICATION

.1 At least two (2) weeks prior to commencing work, submit the manufacturer’s test data and certification that the pipe materials, fittings, valves, and other materials meet the requirements of this Section. Include the manufacturer’s drawings, information and shop drawings, where pertinent.

1.6 SCHEDULING OF WORK

.1 Schedule work to minimize interruptions to existing services.

.2 Submit a schedule of expected service interruptions to the Engineer for approval, and adhere to the approved schedule.

1.7 REGULATIONS

.1 All building services installed shall conform with the relevant Municipal and Provincial regulations governing plumbing and drainage.

1.8 PROTECTION OF EXISTING FEATURES

.1 Obtain permission from the property owner before removing any fences, trees, hedges, shrubs, private walks or other private property. Where necessary, the Contractor shall remove fences and re-erect them immediately after backfilling and cleaning up, but it will not be required to replace fence material which is unsound. Where the Contractor believes the fence material is unsound, it must first reach a written agreement with the owner of the fence as to the method of removing and replacing it.

.2 Written permission from the Owner will be obtained before removing trees, hedges, shrubs or sidewalks within right-of-way limits. The Contractor shall replace or repair all sidewalks removed for excavation at its own expense.

.3 Where trees, hedges and shrubs must be removed, this shall be done in an approved manner, removing only a sufficient amount to make space for the excavating equipment. The Contractor shall not be expected to replace any trees, hedges or shrubs; provided no unnecessary damage has resulted from its operations. All trees, hedges and shrubs which have been dug up, and all surplus earth, shall be removed from the Site of the work and disposed of as directed by the Engineer.

.4 All unnecessary damage to the property of the Owner or to private property shall be repaired by the Contractor at its expense.

1.9 MEASUREMENT FOR PAYMENT

.1 Service Connection
  .1 Service connections will be measured in service connection units installed or per lineal metre of service piping installed as measured horizontally along the service connection line from the centreline of the water main, sanitary or storm sewer main to the property line or the end of the service line, as specified within the Bid Forms.
  .2 The unit price shall include all tools, materials, equipment, labour and supervision, excavation, trenching, backfilling, and compaction of native backfill, removal and disposal of existing service(s), if applicable, supply and installation of service piping, corporation main stop, curb stop c/w service box, gate valve and associated fittings and operating mechanisms (if applicable), tapping and connection to the main line, in-line tees, saddles, supply and placement of bedding, backfill and compaction, surface restoration, if applicable, testing and disinfecting, and all other work deemed incidental to the installation of a new service or replacement of an old service.

.2 Service Cleanouts
  .1 Service cleanouts will be measured in the number of units installed, as specified within the Bid Forms.
  .2 The unit price shall include the supply and installation of all materials regardless of depth, including bends, pipe, cleanout and the tee branch, locking covers, tools,

equipment, labour and supervision, and all other related items or tasks deemed incidental to the supply and installation of the service cleanout.

.3 Geotextile material used for wrapping trench stabilizing gravel will be measured in square metres in place, as specified with in the Bid Forms. Payment shall be compensation in full for all tools, materials, equipment, labour and supervision, supply and hauling the material to the site, placing, sewing, welding, cutting and all other incidentals necessary to complete the work prescribed.

2. PRODUCTS

2.1 WATER SERVICE PIPE

.1 All service connection materials shall be rated for a minimum operating pressure of 1035 kPa.

.2 Pipe Material:
- .1 20mm and25 mm size, Ipex Q-line water service piping, conforming to AWWA C903, ASTM F1282, CSA B137.9, and NSF 61.
- .2 25mm to 50mm size water service piping, Ipex Gold Stripe Polyethylene Series 200 pipe, conforming to NSF 61.
- .3 100mm and larger size, Ipex Blue Brute Polyvinyl Chloride (PVC) pipe, pressure class 150 (DR18), 1035kPa (150psi), conforming to NSF 61, AWWA C900 and CAN B137.3.

2.2 SEWER SERVICE PIPE

.1 Sanitary sewer service connection pipes shall be Type PSM Polyvinyl Chloride (PVC) SDR 35 pipe, conforming to ASTM D3034 and CSA – B182.2 with elastomeric ring gasket and integrated bell system joint.

.2 Sanitary inspection chambers as per Standard Drawing 7-202 – Multi-Family Sanitary Inspection Chamber are to be installed on all multifamily sanitary sewer connections, with the associated costs included in the unit prices provided within the Bid Forms. The Contractor shall also reference Standard Drawing 7-204 – Metal Driveway Box for inspection chambers located within sidewalks.

.3 Commercial/industrial sanitary inspection manholes as per Standard Drawing 7-203 – Commercial/Industrial Sanitary Inspection Manhole are to be installed on all commercial/industrial sanitary sewer connections, with the associated costs included in the unit prices provided within the Bid Forms.

2.3 MAIN STOPS

.1 Main stops shall be Cambridge Brass 301 Series or Mueller B5200 Series, conforming to AWWA C800. Service saddles shall be Robar 2616, 2626 or 2706 conforming to AWWA C800, to match main and service diameter and material.

2.4 CURB STOPS

.1 Curb stops shall be Cambridge Brass 202 Series or Mueller B-25209 Series for sizes 20mm to 50mm, conforming to AWWA C800 to match pipe material.

2.5 SERVICE CURB BOX

.1 Extension service boxes and rods shall be Norwood Foundry or Trojan Industries complete services boxes. Operating rods for 25mm and smaller curb stops shall be Type 304 stainless steel. Operating rods for 40mm and 50mm curb stops shall be steel. The rod shall be attached to a manganese bronze clevis with a brass or stainless steel rivet. The length shall permit a minimum 600mm adjustment at the top.

2.6 WOODEN MARKER STAKE

.1 The wooden marker stake shall be 38mm x 89mm x 1.2m timber extending 0.45m above the ground, placed behind the curb box in relation to the roadway. The exposed portion of the stake shall be painted red.

2.7 BEDDING MATERIAL

.1 Granular material:
  .1 Gradation to be within specified limits when tested to ASTM C136 and ASTM C117 (AASHTO T11 and T27) and giving a smooth curve without sharp breaks when plotted on a semi log grading chart.
  .2 Bedding Sand:
    .1 Natural sand or crushed rock screenings to follow grading requirements:

Sieve Designation	% Passing
10.0mm	100
5.0mm	50-100
2.5mm	30-90
0.315mm	10-50
0.08mm	0-10

    .2 Liquid limit: ASTM D4318 (AASHTO T89), maximum 25.
    .3 Plasticity index: ASTM D4318 (AASHTO T90), maximum 6.

  .3 Bedding Stone: crushed stone or crushed gravel to following grading requirements:

Sieve Designation	% Passing
20.0mm	100
16.0mm	75-100
12.5mm	65-90
5.0mm	35-55
2.5mm	0

.4 Washed Rock

Sieve Designation	% Passing
25mm	100
10mm	30-55
2.5mm	5-25
0.315mm	0-5

.2 Geotextile material shall be non-woven in accordance with Section 31 32 19 – Geosynthetics.

3. EXECUTION

3.1 PREPARATION

.1 Clean the pipes and fittings of debris and water before installation. Carefully inspect materials for defects before installing. Remove any defective materials from Site.

3.2 WATER SERVICE

.1 Tapping of main:

.1 Direct tapping of the PVC water main shall be in strict compliance with the procedures recommended by the Uni-Bell Plastic Pipe Association, AWWA C900 and AWWA C905. Use a tapping machine to drill, tap and thread the main stop into the main. Wherever possible, tap the main under pressure and use special care to prevent cuttings from falling into the main. Tapping a service line larger than 25mm into a water main requires the use of service clamps.

.2 Corporation stops shall be tapped into the upper half of the water main within 30 degrees of the crown of the pipe. All corporation stops shall be left open before backfilling.

.3 Where multiple connections to the water main are used, the tappings shall be spaced a minimum of 600mm apart and staggered around the upper half of the water main. No main stop shall be tapped within 300mm of a coupling or collar.

.2 Building service water pipe shall be connected to the main stop with a suitable goose neck. The pipe shall be laid sufficiently slack to allow for settlement. Provide additional goose necks, maintaining a minimum 300mm clearance, over storm and sanitary sewer pipes.

.3 Q-line services are to be one continuous piece from the union to the building. Use couplings only when the service pipe exceeds the length of a standard roll of Q-line. Locate double unions outside of paved areas if possible, usually close to the curb stop end of the service.

.4 Where the pipe is to be installed between the curb box and an existing or proposed building, the pipe shall be laid so that it will drain from the building to the curb stop. The building end of the pipe shall not be crimped. Secure permeable filter cloth over the end of the pipe to prevent the intrusion of debris, and to allow for flow testing.

.5 The building service water pipe shall be laid adjacent to the building service sewer pipe, when present.

.6 Curb stops and service:

.1 Curb stops shall be placed where designated by the Engineer and installed so as to drain water from the building when in the shut-off position. The curb stops shall be laid on a 38mm treated timber base with a CC chair attached. In fine grained or clay soils a drainage sump 0.5m³ in volume shall be placed below and around the curb stop. The curb extension rod shall be adequately secured to the curb stop.

.2 The service box shall be set plumb and the upper section of the service box adjusted to the final design grade elevation. The lower section of the service box and the extension rod shall be a minimum of 250mm below ground elevation to prevent heavy loads from being transmitted to the curb stop. Curb stops shall be left closed. Installation shall be in accordance with the Standard Drawings and shall be complete with a wooden marker stake.

3.3 SEWER SERVICE

.1 Connection to sewer main:

.1 The connection to new sewer main shall be made using prefabricated tee branches. Branches shall be installed during construction of the sewer main.

.2 Use in-line tees, saddles, or approved field connections for connecting pipes to existing sewer pipes. The joint of the saddle to the pipe shall be structurally sound and watertight. The sewer main shall be tapped in the upper half of the pipe. Care shall be taken while tapping so that the sewer main will not be fractured, and all broken pipe and mortar shall be removed from inside the sewer main. The tapping shall be only of sufficient size to permit the saddle to fit snugly into the hole. The saddle shall be properly secured to the sewer main. In no case shall the sewer service pipe protrude into the sewer main. Where directed by the Engineer, a riser shall be constructed.

.2 Pipe laying shall commence at the lowest point of the length being laid and the pipes shall be placed with the spigot ends pointing in the direction of the flow. Maintain minimum grade for 100mm and 150mm diameter sewer services at 2.0% and 1.0%, respectively, with a maximum grade of 10%. The end of the sewer service pipe shall be plugged or capped with a manufactured plug securely fastened in place. This cap shall be painted black for sanitary sewer services, and white for storm sewer services. Mark the location of the plug(s) with a wooden marker stake.

.3 Make up the required horizontal and vertical bends from 45° bends or less, separated by a straight section of pipe with a minimum length of four pipe diameters. Use long sweep bends where possible.

.4 Cleanouts shall be installed on all multifamily sanitary sewer services adjacent to the property line as per the Standard Drawing. Sanitary inspection manholes shall be installed on all industrial and commercial sanitary sewer services adjacent the property line as per the Standard Drawing.

3.4 TRENCH INSTALLATION

.1 Trenching and backfill:

.1 Do trenching and backfill work in accordance with Section 31 23 00 - Excavation, Trenching and Backfilling.

.2 Trench line and depth require approval prior to placing bedding material and pipe.

.3 Do not backfill trenches until the pipe grade and alignment have been checked and accepted.

.2 Pipe bedding:

.1 Pipe bedding shall be Class B as defined in Clause 1.2 – Definitions, unless otherwise directed by the Engineer. Bedding material shall be as specified in Clause 2.7 - Products.

.2 Granular bedding:

.1 Place the granular bedding material in uniform layers not exceeding 150mm compacted thickness for the full width of trench up to a level of 300mm above the crown of the pipe to at least 95% Standard Proctor Density.

.2 Shape the bed true to grade and to provide a continuous, uniform bearing surface for the barrel of the pipe. Do not use blocks when bedding the pipe.

.3 Shape transverse depressions as required to receive the bell if bell and spigot pipe is used.

.3 Installation

.1 The horizontal and vertical alignment of the centreline of the pipe shall not be more than 75mm and 20mm respectively off the given line.

.2 Install pipes in accordance with the manufacturer's recommendations. Lay pipes on a prepared bed, true to line and grade, free of sags or high points.

3.5 AUGER INSTALLATION

.1 When shown on the Drawings or when directed by the Engineer, building services under existing or future pavement or through private property shall be installed in an auger hole.

.2 The augering machine shall be aligned and set to the required grade. If the hole deflects from the desired course, another hole shall be bored in a location specified by the Engineer. The minimum allowable grades and maximum allowable bends shall be as specified for services laid in an open trench.

.3 The auger hole shall be of sufficient size to allow the sewer service and water service to pass through unrestricted. Wherever possible, sewer and water services shall be installed in the same auger hole. The leading end of the sewer pipe shall be adequately plugged to prevent the entry of foreign material during installation. Fill the auger or bore hole void with a dry or slurry mixture of sand.

3.6 LOCATION

.1 Sewer and water services shall be installed to 4.0m past the property line and marked accordingly. Curb stops shall be located 0.3m inside the right-of-way. The water service shall be installed closest to the adjacent property line, followed by the sanitary sewer service, with the storm sewer service closest to the centre of the lot, as per the standard drawings.

END OF SECTION