of existing conditions, including photographs where necessary, report preparation and defining changed conditions after blasting, if any.

.3 Payment for mobilization, demobilization and fixed costs associated with rock removal shall be made at the lump sum price which shall be full and final compensation for all such mobilization, demobilization and fixed costs. Payment shall be made at 50% of the lump sum price on the first progress claim subsequent to mobilization of rock removal equipment and personnel and 50% of the lump sum price at Final Completion. Only one mobilization/demobilization will be paid under this clause. Payment shall be full compensation for all work necessary or incidental thereto for which separate payment is not elsewhere provided.

.4 Payment for rock locating/verification will be made at the Contract Unit Price per lineal metre of trench line, where ordered. Price shall include all drilling, logging and verification of rock depth along trench lines drilled and all other work necessary or incidental to for which separate payment is not elsewhere provided.

2.0 PRODUCTS Not applicable to work of this Section.

3.0 EXECUTION

3.1 Rock Removal

.1 If rock removal or blasting may interfere with foundations of adjacent buildings, roads and other structures, take photographs to record existing conditions and review with the Engineer before construction is started. Take photographs inside basements if applicable. Submit copies of all pre-blasting and post-blasting information and photographs to the Engineer.

.2 Excavate rock to alignments, profiles and cross sections as indicated.

.3 Correct unauthorized rock removal at no extra cost, in accordance with backfilling requirements specified in Section 02221, utilizing crushed granular material as approved by the Engineer.

.4 Excavate rock bed to be level, sound, free of loose rocks or fragments, earth or debris.

.5 Remove boulders and fragments which may slide or roll into excavated areas.

.6 Excavate trenches to lines and grades shown to minimum of 300 mm below pipe invert. Trim and shape trench bottom and leave free of irregularities.

.7 Cut trenches 400 mm wider than maximum pipe diameter.

.8 Upon mobilization of rock removal equipment and personnel to site for the first instance of rock removal, conduct probe hole testing to verify the areas that will require rock removal over the remainder of the site. Any subsequent mobilization/demobilization to remove rock will be at the Contractor's own expense.

3.3 Surplus Material

.1 Dispose of surplus excavated rock offsite, as directed by the Engineer. Freehaul distance equivalent to distance to town landfill.

.2 Surplus rock material remains the property of PW&S.

END OF SECTION

1.0 GENERAL

1.1 Related Work Specified Elsewhere

.1	Rock Removal:	Section 02211
.2	Access Vaults:	Section 02725
.3	Service Connections:	Section 02665
.4	Water Mains:	Section 02666
.5	Sewer Mains:	Section 02667

1.2 Definitions

.1 Solid Rock:

.1 Material excavated from solid masses of igneous, sedimentary or metamorphic rock which, prior to its removal, was integral with its parent mass and cannot be removed by means of heavy duty mechanical excavation equipment.

.2 Boulders or rock fragments or concrete having individual volume in excess of 1 m^3.

.2 Common material:

.1 Materials of whatever nature, which are not included under the definition of solid rock, including dense tills, hardpan, frozen materials and partially cemented materials which can be ripped and excavated with heavy construction equipment.

.3 Top soil:

.1 Material capable of supporting good vegetation growth and suitable for use in top dressing, landscaping and seeding.

1.3 Protection

.1 Existing Buried Utilities:

.1 Size, depth and location of existing utilities as indicated are for guidance only; completeness and accuracy are not guaranteed.

.2 Prior to commencing any excavation work, notify applicable utility authorities, establish location and state of use of buried services. Clearly mark such locations to prevent disturbance during work.

.3 Confirm locations of buried utilities if necessary, or where directed, by careful test excavations.

.4 Maintain and protect from damage, water, sewer, electric, telephone and other utilities encountered.

.5 Obtain direction of owner of utility and Engineer before moving or otherwise disturbing utility.

.6 Remove abandoned utility service lines encountered from areas of construction. Method of removal, capping, plugging or sealing such lines shall be approved by the Engineer.

.7 Accurately locate and record abandoned and active utility lines re-routed or extended and provide information to the Engineer.

.2 Existing Surface Features:

.1 Protect existing buildings, fencing, poles, wires, bench marks, paving and other surface features located within right-of-way or adjoining properties from damage while work is in progress and repair damage resulting from work. Excavations are not to encroach on normal 45° bearing support under any foundation.

.3 Existing Culverts:

.1 Protect existing culverts from damage while work is in progress, or remove and replace culverts as required. Repair damage resulting from work.

.4 Shoring, Bracing and Underpinning:

.1 Whenever underpinning, shoring, sheeting, timbering and bracing of excavations is required engage services of a professional engineer to design and assume responsibility for adequacy of shoring, bracing and underpinning. Professional Engineer shall be registered in the Northwest Territories.

.2 Prefabricated cages or shields may be used to supplement or replace conventional shoring, provided they comply with all applicable safety regulations and permit placing and tamping of bedding material under and around utility piping.

.3 When requested submit for review drawings and calculations signed and stamped by professional engineer responsible for their preparation.

.4 Shoring, bracing and underpinning shall be inspected by the professional Engineer responsible for their preparation.

.5 Close sheeting, when required, shall be designed and constructed to prevent adjacent soil from entering excavation and to control water infiltration

.6 Underpin and support structures, service lines and piping which will, or may be damaged by excavation work.

.4 Maintain unobstructed access to fire and police appurtenances, telephone, electric, water, sewer, gas and other public utilities and private properties.

.5 Make good all damage occurring as a result of inadequate, unauthorized or defective methods of protection.

1.4 **Measurement for Payment**

.1 Work performed under this Section will be incidental to work involved in Sections 02725 Access Vaults, 02666 Water Mains and 02667 Sewer Mains, and 02665 Service Connections, unless otherwise noted.

.2 Over-excavation, where ordered, will be paid for at the Contract Unit Price per cubic metre in place in trenches. Price will include the cost of over-excavation and disposal, the supply/load/haul/place and compaction of the replacement material (granular backfill). Measurement will be taken as the length ordered, times the depth ordered to be excavated (below bedding material), times the width of the trench as indicated on the drawings.

.3 Where excavation is made below depth shown, through **error**, fill to required depth with excavated earth or granular backfill as directed by the Engineer at no additional cost to Owner. Compact to 98% of Standard Proctor Density.

.4 Suitable trench material:

.1 Any material excavated from trench which is suitable for backfill, as determined by the Engineer, but in excess of requirements for that trench backfill shall be available for use in backfilling or replacing any unsuitable materials in other trenches. No extra payment shall be made for moving this site material from one location to another.

.2 Any suitable excess material from trench excavations shall be removed to stockpile sites designated by the Engineer. These costs shall be considered incidental to work.

.5 Granular Backfill:

.1 Granular backfill to replace unsuitable material or bedding material in utility trenches or for creating new road base shall be paid for, when ordered by the Engineer in writing, by cubic metre in-place, which shall be full compensation for supplying, hauling, placing, compacting and all other work necessary to install the material. Volume installed shall be calculated by average end area method from cross-sections taken before and after placement.

.2 Payment under this clause shall be made only when the Engineer has ordered imported gravel in writing. Price will include supply and installation of material. If in the opinion of the Engineer excess site material is available at the time that it is required, from elsewhere in the Contract, the Engineer will have the right to instruct the Contractor to haul that excess material to replace unsuitable material in trenches or for creating new road base without any additional compensation.

.6 Crushed Road Gravel:

.1 Crushed road gravel to replace road surface material at road crossings or on new road base shall be paid for by cubic metre in-place, which shall be full compensation for supplying, hauling, placing, compacting and all other work necessary to install the material. Volume installed for replacement of road surfaces from trenching shall be calculated by the width of the trench (see below), times the thickness of the material placed, times the length of trench. Volume installed as new road base shall be calculated based on the dimensions of the area requested by the Engineer, times the depth of material requested.

The maximum width of the trench used to calculate volume will be two times the depth from the original surface to the top of the installed pipe (lowest pipe in trench). If due to safety requirements, the actual width of the trench is wider than calculated above, the width will be measured by the Engineer and the actual width will be used for calculating the volume for payment.

2.0 PRODUCTS

2.1 Materials

2.1.1 Crushed Road Gravel:

.1 Clean, unfrozen, hard, durable, uncoated particles, free from clay lumps, cementation, organic and other objectionable material, meeting the following gradation limits:
25 mm crushed granular.

Sieve Size	% Passed by Weight
25 mm	100
19 mm	90 - 100
12.4 mm	70 - 90
4.75 mm	40 - 70
2.00 mm	23 - 50
.425 mm	7 - 25
.75 mm	3 - 8

.2 All crushed road gravel shall be subject to the Engineer's approval.

.3 The supply of the crushed granular material is the responsibility of the Contractor.

.4 No oversize material will be allowed. Grading of aggregate shall not show marked fluctuations from opposite extremes of limiting gradations.

2.1.2 **Granular Backfill**

.1 Clean, unfrozen, hard, durable, uncoated particles, free from clay lumps, cementation, organic and other objectionable material.

.2 All granular backfill shall be subject to the Engineer's approval.

.3 No oversize (>75 mm) material will be allowed.

.4 Granular backfill is available from local stockpiles at no cost to the Contractor.

2.1.3 **Bedding Material**

.1 Clean, unfrozen, hard, durable, uncoated particles, free from clay lumps, cementation, organic and other deleterious material.

.2 All bedding material shall be subject to the Engineer's approval.

.3 Bedding material is available from local stockpiles at no cost to the Contractor.

.4 Natural sand to the following gradations:

Sieve Size	% Passing by Weight
9.5 mm	100
4.75 mm	97 - 100
2.0 mm	20 - 50
0.425 mm	5 - 20
0.075 mm	0 - 3

2.1.4 **Native Material Backfill**

.1 Native material from trench excavations may be approved for use as trench backfill and shall be free of frozen material, organics, rock and other deleterious material, and with natural water content within 2% of the optimum value for the Proctor compaction specified, based on the native soil which is being used for backfill.

2.2 **Warning Tape**

.1 To be Brady Identoline Tape (W.H. Brady, Inc., Rexdale, Ontario) or Allen Markline (Allen Systems, Houston, Texas), polyethylene with a 4-mil minimum thickness, or equal.

.1 Water: Safety Precaution Blue

.2 Sewer: Safety Green

.3 Imprint: Black letters, one side only, repeated continuously:

.1 Water: "Caution Buried Water Line Below"

.2 Sewer: "Caution Buried Sewer Line Below"

.4 Width: 150 mm

.5 Warning tape required for each main and service. (One for each water and sewer service pipe.)

2.3 **Inspection and Testing of the Work**

.1 Independent Inspection/Testing Agencies will be engaged by the Engineer for the purpose of inspecting and/or testing portions of the Work. All costs of such services will be borne by the Engineer.

.2 All equipment required for carrying out inspection and/or testing will be provided by the respective Agencies.

.3 Employment of Inspection/Testing Agencies in no way relieves the Contractor of responsibility to perform the Work in accordance with the Contract Documents.

.4 Allow the Inspection/Testing Agencies access to all portions of the Work on site and manufacturing or fabrication plants, as may be necessary. Provide facilities for such access.

3.0 EXECUTION

3.1 Site Preparation

.1 Remove fences and other obstructions, ice and snow, from surfaces to be excavated within limits indicated.

.2 Strip topsoil, if any, from within limits of excavation and spoil pile and stockpile as directed. Re-spread after backfilling.

.3 Remove frost, if required, in areas to be excavated. Comply with local regulations when burning.

3.2 Stockpiling

.1 Stockpile fill materials in areas designated. Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from contamination.

3.3 Shoring, Bracing and Underpinning

.1 Construct temporary works to depths, heights and locations as approved by the Engineer.

.2 During backfill operations:

.1 Unless otherwise indicated or directed from the Engineer, remove sheeting and shoring from excavations.

.2 Do not remove bracing until backfilling has reached respective levels of such bracing.

.3 When sheeting is required to remain in place, cut off tops at elevations indicated or directed by the Engineer.

.4 Upon completion of substructure construction:

.1 Remove shoring and bracing.

.2 Remove excess materials from site.

3.4 Dewatering

.1 Keep excavations dry while work is in progress.

.2 Protect open excavations against flooding and damage due to surface run-off.

.3 Dispose of water in a manner not detrimental to public health, environment, public and private property, or any portion of work completed or under construction.

.4 Do not discharge drainage water lines into municipal sewers without approval from the Owner. Ensure water discharge does not contain silt held in suspension.

.5 Control grading in and adjacent to excavations to prevent water running into excavated areas or onto adjacent properties or public thoroughfares.

3.5 Excavation

.1 Excavate to lines, grades, elevations and dimensions indicated or as directed.

.2 Remove and dispose of concrete, masonry, paving, walks, demolished foundations and rubble and other obstructions encountered during excavation. Do not use these materials in backfill.

.3 Minimum trench width to be 500 mm greater than outside pipe diameter for single pipe trench. For multiple pipe trench, refer to detail drawing 49609-206.

.4 Maximum trench width at top of pipe to be not greater than outside pipe diameter plus 900 mm for single pipe trench.

.5 If maximum trench width is exceeded through error, rectify to satisfaction of Engineer, at no additional cost to Owner.

.6 Remove boulders and large stones to provide 150 mm minimum clearance under and on sides of pipe.

.7 Notify Engineer when soil at proposed elevation of trench bottom appears unsuitable for foundation of installation. Remove unsuitable material from trench bottom to extent and depth directed by Engineer.

.8 Unless otherwise authorized by Engineer in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation. **No amount of trench will be left open if permafrost is excavated.** Refer to Clause 3.9, page 8 of 9, Section 02221.

.9 Stockpile suitable excavated materials required for trench backfill in approved location.

.10 Dispose of surplus and unsuitable excavated material in approved location off site.

.11 Do not obstruct flow of surface drainage or natural watercourses.

3.6 Trench Bottom Preparation

.1 Hand trim, make firm and remove loose material and debris from excavations.

.2 Where required due to removal of unsuitable material or unauthorized over-excavation, bring bottom of excavation to design grade with approved material. Compact material to a minimum 98% Standard Proctor Density.

3.7 Pre-installation Inspection

.1 Excavations require inspection and approval prior to commencement of installation operations.

3.8 Backfilling

.1 Do not proceed with trench backfilling operations until Engineer has inspected and approved installations.

.2 Ensure bedding of pipes and utilities and backfill to 300 mm above top of pipes and utilities specified in other Sections is satisfactorily completed.

.3 Ensure trenches are free from debris, snow, ice and water and that ground surfaces are not in a frozen condition.

.4 Do not use backfill material which is frozen or contains ice, snow or debris.

.5 Use approved common or granular backfill material as indicated or directed.

.6 Do not backfill around or over cast-in- place concrete within 24 h after placing.

.7 Place layers simultaneously on both sides of installed work to equalize loading.

.8 Place material by hand under, around and over installations until 600 mm of cover is provided. **Dumping material directly on installations will not be permitted.**

.9 Do not place backfill in freezing weather without written permission of Engineer.

.10 Place backfill material in uniform layers not exceeding 300 mm in thickness up to subgrade elevation or top of trench. Compact each layer before placing succeeding layer.

.11 Compaction of backfill:

.1 In all areas, compact pipe zone (bottom of trench to 300 mm above top of pipe), a minimum density of 95% Standard Proctor Density.

.2 In areas other than pipe zone where pavement, structures and graveled roadway areas exist, place in maximum lifts of 200mm thick prior to compaction, and compact to a minimum of 98% (for cohesive soils) and 95% (for cohesion-less soils) of Standard Proctor Density.

.3 In areas other than pipe zone, where no roadways or pathways exist, compact to a minimum of 90% of Standard Proctor Density.

.4 Compact using approved mechanical tamping devices, or by hand tamping to achieve specified compaction.

3.9 Permafrost Protection

.1 Permafrost may exist in the project area. Every effort must be made to minimize thermal degradation of existing permafrost due to trenching operation.

.2 If permafrost is found, the Contractor must backfill the trench to bottom of road base elevation within 48 hours of initial excavation or as approved by the Engineer. In addition, trench must be backfilled to a minimum of 0.5 m, or as directed by the Engineer, above the top elevation of permafrost at the end of the working day

.3 Install any over-excavation or bedding within 1 hour of trenching.

3.10 Existing Pipe Crossings

.1 Adequately support all existing pipes crossing trenches. Repair any damage to existing pipes (water and sewer, including heat tracing) to original condition or better as approved by the Engineer.

.2 Re-bed exposed pipes with approved granular material.

.3 Install appropriate warning tape over replaced bedding material.

3.11 Restoration

.1 Prior to application for Certificate of Substantial Completion, remove surplus materials and debris, trim slopes, and correct defects noted by Engineer.

.2 Reinstate surfaces to original grade and condition as directed by the Engineer and to the Engineer's satisfaction.

3.12 Clean-Up

.1 Clean and reinstate areas affected by work as directed.

.2 As backfilling proceeds, keep streets clean of dirt and excavated material.

.3 Clean up and remove all dirt and excavated materials caused by work of this Section.

3.13 Settlement

.1 Promptly repair any settlement of backfill which occurs prior to the end of the warranty period. Check for settlement in fall before snow fall and in spring just after spring melt, during the warranty period.

.2 Re-compact defective areas and place and compact additional backfill up to grade. Use material matching adjacent surface and compact to specified density.

.3 Pay all costs to repair damages to other work caused by such settlement.

END OF SECTION

1.0 GENERAL

1.1 Related Work

.1	Trenching, Backfilling and Compaction	Section 02221
.2	Water Mains and Fittings	Section 02666
.3	Sewer Mains and Fittings	Section 02667
.4	Thermal Insulation for Underground Piping System	Section 02668
.5	Relay Panels	Section 16940

1.2 Scheduling of Work

.1 Schedule work to minimize interruptions to existing services.

2 Submit schedule of expected interruptions for approval by Engineer and adhere to interruption schedule as approved by Engineer.

.3 Notify building occupants or owners a minimum of 24 h in advance of any interruption of service.

.4 Do not interrupt water service for more than 3 h and confine this period between 10:00 and 16:00 h local time unless otherwise authorized.

.5 Notify fire department of any planned or accidental interruption of water supply to hydrants.

1.3 Service Connections

.1 Contractor must provide continuity of water supply to all buildings by means of temporary water line hook-ups. Sewer service discharges must be accommodated and re-directed to live sanitary sewers to minimize contamination.

.2 Where sprinkler systems exist in affected buildings, the Contractor shall provide temporary water service to the satisfaction of the Fire Marshall.

.3 Disinfect all temporary water lines in accordance with these Specifications prior to placing in service.

.4 Prior to connecting any building to a temporary water line, ensure the circulation pump, if present, is turned off and that no damage will occur to the hot water tank. Replace or repair any damage to pump or hot water tank at no additional cost to the Government of Nunavut.

1.4 Measurement and Payment

.1 Installation of Service Pipes, Water Carrier Pipes and Sanitary Pipe in a Common Trench.

.1 Installation of Services

Installation of water carrier and sanitary sewer service pipes in a common trench, will be measured along centre line of each pipe, from the mains to the connection/tie-in point, and shall be paid for at the

Contract Unit Price per lineal metre of each type and size of pipe installed, and shall be full compensation for trenching, laying, joining, warning tape, bedding, moving and relocating existing culverts, backfilling, compaction, flushing, testing, and all other labour material, equipment and sundry items necessary to complete the Work. Hand excavated trenches are considered incidental to the Work of this Section.

.2 Installation of either water carrier or sanitary sewer service pipes in a single trench, will be measured along the centreline of the pipe, from the mains to the connection/tie-in point, and shall be paid for at the Contract Unit Price per lineal metre of each type and size of pipe installed, and shall be full compensation for trenching, laying, joining, warning tape, bedding, moving and relocating existing culverts, backfilling, compaction, flushing, testing, and all other labour material, equipment and sundry items necessary to complete the Work. Hand excavated trenches are considered incidental to the Work of this Section.

.2 Supply HDPE Service Pipe, Water Carrier and Sanitary

.1 Pipe will be measured by the meter supplied to the site and incorporated into the work. Payment will be at the Contract Unit Price per lineal metre for each size and class of pipe which shall be full compensation for pipe, including all transportation and delivery to the site, storage and all other work and materials necessary or incidental thereto for which separate payment is not elsewhere provided.

.3 Supply and installation of recirculation system Type A (refer to Water Service Recirculation Schematic on Drawing 204) in houses will be measured per house completed, where ordered by the Engineer. Payment will be at the Contract Unit Price per type of system installed, and shall be full compensation for all, but not limited to, labour, materials, equipment, tools and sundries, and items required to satisfactorily complete the work, including connection of 100 mm carrier pipe to building.

.4 Supply and installation of recirculation system Type B (refer to Water Service Recirculation Schematic on Drawing 204) in houses will be measured per house completed, where ordered by the Engineer. Payment will be at the Contract Unit Price per type of system installed, and shall be full compensation for all, labour, materials, equipment, tools and sundries, and items required to satisfactorily complete the work.

.5 Installation of either 2-25 mm or 1-25 and 1-50 mm water service line combinations will be measured as a single length, and shall be paid for at the Contractor Unit Price for each combination which shall be full compensation for laying, joining, complete connections at the mains including corporation stops, service cans, flushing, testing, chlorination, bacteriological tests and all labour, materials, equipment and other sundry items required to complete the work.

.6 Video inspection of sewer services, where ordered, will be paid for at the Contract Unit Price per inspection. The owner has video inspection equipment and will make this equipment available for use on this project. The Unit Price shall be full compensation for undertaking an interior video inspection from the main to the building, and reporting on the pipe conditions to the Engineer. Copies of each video ordered are to be supplied to the Engineer, these copies are considered incidental to this work.

.7 Removal and Disposal of Existing Service Lines

Removal and disposal of existing service lines will not be measured: but will be considered incidental to the Work of Section 02665, unless specified otherwise.

.8 Service Connections Outside Residential Buildings

Connections to the existing pipes outside the buildings will be measured in units constructed and shall be paid for at the Contract Unit Price for each connection, which shall be full compensation for trenching, laying, jointing, bedding, backfilling, insulation, compaction, and all other labour, materials, equipment and sundry items necessary to complete the Work.

.9 Service Connection Inside Residential Buildings

Connection of new piping to existing pipes inside existing buildings shall be measured in units constructed and paid at the Contract Unit Price for each connection. The Unit Price shall include all labour materials, equipment necessary to complete the work, including, where necessary, removal and disposal of existing sewage holding tanks.

.10 Not Used.

.11 Service Connections to Water and Sewer Mains

.1 Supply of all materials required to completely connect the water or sewer service to the main shall be measured in units supplied and paid at the contract unit price per service connection. The unit price shall include all saddles, valves, valve operators, couplings, insulation and protective metal jackets as detailed on Drawings 204 and 205 and other materials as may be required to complete the connection whether or not specifically itemized.

.2 Installation of all materials required to completely connect the water or sewer service to the main shall be measured in units installed and paid at the contract unit price per service connection. The unit price shall include installing all saddles, valves, valve operators, couplings, insulation and protective metal jackets as detailed on Drawings 204 and 205 and other materials as may be required to complete the connection whether or not specifically itemized.

2.0 PRODUCTS

2.1 Materials - General

.1 All materials in this section are indicated on the drawings and or specified herein. Substitution shall not be made without written approval of the Engineer.

2.2 HDPE Pressure Pipe

.1 Sewer Service and Water Service carrier pipes to be HDPE DR11 to CSA 137.1, c/w factory applied insulation to Section 02668 to be 50 mm nominal thickness.

.2 Joints: Thermal butt fusion welded

.3 Water service pipes to be installed inside 100mm (or 150 mm as required) carrier pipe, HDPE DR13.5 (series 125).

.4 Tees – 200 mm x 150 mm HDPE, DR rating to match main line pipe into which the Tee is being installed. To be used for 150 mm sewer service pipe to 200 mm sewer main connections.

2.3 **Corporation Stops**

.1 Corporation Stops: to ASTM B62-86, red brass, Ford F1100

.2 Inlet threads: Iron pipe threads.

.3 Outlet: Pack joint for plastic tubing c/w stainless steel insert.

2.4 **Ball Valves**

.1 Ball Valve: to ASTM B62-86, red brass, Ford B44-444 for 25 mm and B66-777 (160 psi) for 50 mm valves.

.2 Inlet and Outlet: Pack joint for plastic tubing c/w stainless steel insert.

2.5 **Water Service Saddles**

.1 Service Saddle: waterworks bronze saddle body tapped for iron pipe thread, double T304 stainless steel straps, bolts and nuts, and neoprene gasket under saddle body, Robar 2706.

2.6 **Sewer Service Pipe**

.1 HDPE DR 13.5 series 125 to CSA 137.1.

.2 Sewer service pipe c/w 50 mm insulation to Section 02668

2.7 **Sewer Saddles**

.1 T304 Stainless steel body, fully passivated, ½" x ½" square section closed cell neoprene gaskets, ½" NC T304 Stainless Steel studs and washers, Robar 6628 or approved equal. For 200 mm main, order part no 6626-8x4x8.80 (100 mm service) or part no 6626-8x6x8.80 (150 mm service) For 150 mm main, order part no. 6626-6x4x6.80 m)100 mm service) or partn no 6626-6x6x6.8 (150 m service)

2.8 **Pipe Bedding Materials**

.1 Granular Backfill: Refer to Section 02221.

2.9 **Valve Operating Rod**

.1 Rod shall be field fabricated. Zinc rich paint coated after fabrication.

.2 Rod shall be made of sufficient length to extend from thermal break to top of HDPE pipe, but shall not extend above existing ground surface.

.3 Top section of rod to be 32mm long by 19mm wide by 6mm thick with 5mm long top bevel. (similar to top of Crane McAvity w-6221 rod)

2.10 **Sewer Cleanouts**

.1 Where sewer services exceed 30m, cleanouts must be installed as per Canadian Plumbing Code: Subsection 4.7

2.11 **Pipe fittings**

.1 Valve adaptors and couplings shall be compression type fittings suitable for HDPE, supplied with 75mm long tight fitting solid stainless steel inserts.

2.12 **Recirculation Pump**

.1 Grundfos UP 15-18 SF, 115 v, 2050 rpm, stainless steel body, flange mount.

3.0 **EXECUTION**

3.1 **Preparation**

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

3.2 **Trenching and Backfill**

.1 Do trenching and backfill work to Section 02221.

.2 Install service lines as detailed, at locations and to grades designated by grade sheet provided in field.

.3 Install services at right angle to main, unless otherwise specified or shown.

.4 Excavate trench for 230 mm free space between pipes.

.5 Sewer and water pipes shall not cross in trench.

.6 Shape bed true to grade to provide continuous uniform bearing surface for pipe exterior. Do not use blocks when bedding pipe.

.7 Bench trench when one service pipe is lower than the other. Support higher service pipe(s) with compacted backfill or granular backfill if benching not possible to prevent settlement or dislocation.

.8 Do not backfill trenches until installed work has been checked by Engineer and hydrostatic and leakage test results are within limits specified.

.9 **In any location where the use of trench digging machinery might cause property or utility damage the Contractor shall carry out the trenching by hand. Hand Excavation shall not be measured for payment, and is incidental to the Work of this Section.**

3.3 **Bedding**

.1 Refer to Section 02666, Item 3.3 on Page 3 of 8 and Section 02667.

3.4 **Water Service Pipe Installation**

Water Service Installation to Tie-in

.1 Drill and tap mains with main under operating pressure, after main has been pressure tested, flushed and chlorinated, with a tapping machine capable of inserting corporation stops into main or saddle. Alternately, the Contractor may dry tap the service connections provided flushing, pressure testing and chlorination of the services occurs with the main as one system.

.2 Tap main at 3:00 o'clock or 9:00 o'clock position. Service tapping shall be a minimum of 150 mm apart or from any fused connection in the mains. Install

saddle using a torque wrench as per manufacturer's instructions, including re-torquing after set time.

.3 Construct service connection as shown on drawings.

.4 All exposed surfaces including factory coated surfaces of polyurethane are to be coated with mastic.

.5 Flush each service line for a minimum of 5 minutes.

.6 Pressure test the services in coordination with section 2666 - 3.10. Initial pressure test on service is not required.

.7 Joints must be left exposed during pressure test to allow visual inspection.

.8 Installation to Tie-in Point

.1 Splices in 25 mm and/or 50 mm line water service line will not be permitted. Existing water service line(s) to be replaced with new continuous line from main to above floor connection point in the house.

.2 Water service carrier pipe to be extended from tie-in point to mains using same diameter and DR rating pipe and insulation thickness (or better) as existing.

.3 Foam and seal joints in accordance with these specifications.

New Water Service Installation to House

.1 Drill and tap mains with main under operating pressure, after main has been pressure tested, flushed and chlorinated, with a tapping machine capable of inserting corporation stops into main or saddle. Alternately, the Contractor may dry tap the service connections provided flushing, pressure testing and chlorination of the services occurs with the main as one system.

.2 Tap main at 3:00 o'clock or 9:00 o'clock position. Service tapping shall be a minimum of 150 mm apart or from any fused connection in the mains. Install saddle using a torque wrench as per manufacturer's instructions, including re-torquing after set time.

.3 Construct service connection as shown on drawings.

.4 All exposed surfaces including factory coated surfaces of polyurethane are to be coated with mastic.

.5 Flush each service line for a minimum of 5 minutes.

.6 Pressure test the services in coordination with section 2666 - 3.10. Initial pressure test on service is not required.

.7 Joints must be left exposed during pressure test to allow visual inspection.

.8 Installation to House

.1 Splices in 25 mm and/or 50 mm line water service line will not be permitted. Existing water service line(s) to be replaced with new continuous line from main to above floor connection point in the house.

.2 New water service carrier pipe to run from the mains to the house using same diameter and DR rating pipe and insulation thickness (or better) as existing, or as shown on the drawings..

.3 Foam and seal joints in accordance with these specifications.

3.5 Sewer Service Pipe Installation

Sewer Service Installation to Tie-in

.1 Sewer service pipes shall cross under the watermain, not over, unless authorized by the Engineer.

.2 Connect service lines to mains as shown on drawings with a machine tapped (cored) hole and a Robar 6626 stainless steel tapping sleeve.

.3 Core hole and install tapping sleeve at greater than or equal to 45° to horizontal. Use coring equipment suitable for use with HDPE pipe. Remove cuttings from main. Install saddle using a torque wrench as per manufacturer's instructions, including re-torquing after set time.

.4 Connect service line to tapping sleeve with a 45° fused bend and a short spool piece (length to suit).

.5 Maintain grade for sewers at 1 vertical to 50 horizontal unless otherwise directed.

.6 Place and compact granular backfill around connection to adequately support the main, saddle service. Support risers.

.7 Install service pipes to tie-in as shown on the drawings, or ordered by the Engineer.

.8 Sewer service pipe is to be extended from the mains to the tie-in point using same diameter and DR rating pipe and insulation thickness as existing, or better.

.9 Expose sewer service pipe sufficiently to provide for smooth grade transitions, to permit horizontal connection at mains. See Detail 10-207

New Sewer Service Installation to House

.1 Sewer service pipes shall cross under the watermain, not over, unless authorized by the Engineer.

.2 Connect service lines to mains as shown on drawings with a machine tapped (cored) hole and a Robar 6626 stainless steel tapping sleeve.

.3 Core hole and install tapping sleeve at greater than or equal to 45° to horizontal. Use coring equipment suitable for use with HDPE pipe. Remove cuttings from main. Install saddle using a torque wrench as per manufacturer's instructions, including re-torquing after set time.

.4 Connect service line to tapping sleeve with a 45° fused bend and a short spool piece (length to suit).

.5 Maintain grade for sewers at 1 vertical to 50 horizontal unless otherwise directed.

.6 Place and compact granular backfill around connection to adequately support the main, saddle service. Support risers.

.7 Install service pipes to existing homes as shown on the drawings.

.8 Sewer service pipe is to be run from the to mains to the house using same diameter and DR rating pipe and insulation thickness (better) as existing, or as shown on the drawings.

.9 Expose sewer service pipe sufficiently to provide for smooth grade transitions, to permit horizontal connection at mains. See Detail 10-207.

3.6 **Service Line Markers**

.1 Install marker at ends of unconnected service lines. Each marker shall consist of a 38 mm x 89 mm stake extending from pipe level at end of pipe to 0.6 m above grade.

END OF SECTION

1.0 GENERAL

1.1 Related Work

.1	Trenching, Backfilling and Compaction:	Section 02221
.2	Service Connections	Section 02665
.3	Sewer Mains	Section 02667
.4	Access Vaults:	Section 02725

1.2 Scheduling of Work

.1 Schedule work to minimize interruptions to existing services.

.2 Submit schedule of expected interruptions for approval by Engineer and adhere to interruption schedule as approved by Engineer.

.3 Notify building occupants a minimum of 24 h in advance of any interruption in service.

.4 Do not interrupt water service for more than 3 h and confine this period between 10:00 and 16:00 h local time unless otherwise authorized.

.5 Notify fire department, Public Works and Services, Hamlet office and the Engineer of any planned or accidental interruption of water supply to hydrants.

1.3 Measurement and Payment

.1 Supply HDPE Pipe:

Pipe will be measured by the metre supplied to the site and incorporated into the work. Payment will be made at the contract Unit Price per lineal metre for each size and class of pipe which shall be full compensation for pipe, including all transportation and delivery to the site, storage, and all other work and materials necessary or incidental thereto for which separate payment is not elsewhere provided.

.2 Install Watermains - Two or More Mains in Common Trench:

Will be measured along the center line of EACH HDPE water main, including the length of any fittings, but excluding access vaults. Length shall be horizontal measurement with no allowance for slope. Payment shall be made at the Contract Unit Price per lineal metre for each size and class of pipe, which shall be full compensation for trenching, laying, jointing, warning tape, bedding, moving and relocating existing culverts, backfilling, compaction, flushing, testing, chlorination, bacteriological tests and all materials including fittings, plugs, and all other work necessary or incidental thereto for which separate payment is not elsewhere provided.

3 Install Watermains - Single Main:

Will be measured along the center line of the HDPE water main, including the length of fittings but excluding access vaults. Length shall be horizontal measurement with no allowance for slope. Payment shall be made at the Contract Unit Price per lineal metre for each size and class of pipe, which shall be full

compensation for trenching, laying, jointing, warning tape, bedding, moving and relocating existing culverts, backfilling, compaction, flushing, testing, chlorination, bacteriological tests and all materials including fittings, plugs, and all other work necessary or incidental thereto for which separate payment is not elsewhere provided.

.4 Removal and Disposal of Existing

Removal and disposal of existing watermains will not be measured; but will be considered incidental to the Work of Section 02666 unless specified otherwise.

.5 Connections to the Existing System

Connections to existing system will be measured in units constructed and shall be paid for at the Contract Unit Price for each connection, which shall be full compensation for manhole modifications, trenching laying, jointing, bedding, backfilling, insulation, thrust restraints, compaction, and all labour, materials, equipment and sundry items necessary to complete the work.

2.0 PRODUCTS

2.1 Polyethylene Pipe and Fittings

.1 High density polyethylene pipe: to CSA B1371-M for 50 mm pipe or smaller pipe and ASTM F714 for pipe sizes larger than 50 mm diameter, DR11.

.2 Polyethylene to polyethylene joints: to be thermal butt fusion welded. Connect with steel backing flanges to ASTM A536 with corrosion resistant coating as manufactured by KWH ort approved equal.

.3 Gaskets for flanged fittings shall be 3 mm full face neoprene gaskets: **red rubber, red rubber sheet stock and heavy cloth insert gaskets shall not be allowed.** The inside and outside diameters of the gaskets shall be within 1.5 mm of the inside and outside diameters of the HDPE stub ends.

.4 All polyethylene pipe and fittings shall be of the same manufacturer and the same grade of polyethylene. Standard of acceptance shall be KWH Sclairpipe or approved equal. Pipes to 150 mm shall conform to CSA B137.1-1970, pipes over 150 mm shall conform to CGSB-41-GP-25Mi.

.5 Polyethylene stub ends for flange joints shall be the same series rating as the pipe and shall be butt fused to the pipe. Back-up rings shall be steel (to ASTM A 536-80) with corrosion resistant coating as manufactured by KWH *or approved equal*. Metal flanges drilled to ANSI B16.5 bolt circles.

6 All bolts and nuts for underground use shall be cadmium plated.

.7 Blind flanges for use where indicated on drawings shall be flat faced, cast or malleable iron, 125 lb. standard, ITT Grinnel or equal.

.8 No joints shall be allowed in piping covered with shop applied insulation.

.9 All jacketed pipe and fittings shall have a permanent factory applied marking indicating manufacturer, size and series identification at no greater than one (1) metre intervals along the length.