DIVISION 2
SITEWORK

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DIVISION 2 – SITE WORK

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SOILS REPORT

1. GENERAL

1.1 Description

.1 The following soils investigation report has been used in the design and preparation of tender documents. (see Appendix A).

.2 Geotechnical Evaluation.

.3 The above report is based on investigations performed at project site.

1.2 Soils Report Status

.1 Soils report information is made available to the Contractor for information purposes only, solely for the purpose of placing Contractor in receipt of available data.

.2 Soils report information shall not be considered a representation or warranty as to actual subsurface conditions.

.3 Contractor will not be entitled to any extra payment nor extension of performance time for work which is, in the Consultant's opinion, required and reasonably inferable from soils report information.

1.3 Actual Subsurface Conditions

.1 Promptly notify the Consultant in writing if, upon excavation, subsurface conditions differ from conditions indicated by soils report information.

2. PRODUCTS

2.1 Not Used

.1 Not used

3. EXECUTION

3.1 Not Used

.1 Not used

END OF SECTION

DEMOLITION OF STRUCTURES – SHORT FORM

1. GENERAL

1.1 References

.1 Canadian Standards Association (CSA)

.1 CSA S350-M1980 (R1998), Code of Practice for Safety in Demolition of Structures.

.2 Comply with National Building Code of Canada, Part 8, "Safety Measures at Construction and Demolition Sites", and Provincial requirements.

1.2 Asbestos and Designated Substances

.1 Contractor to review designated substance report and take precautions to protect the environment.

.2 Demolition of spray or trowel applied asbestos can be hazardous to health. Should material resembling spray or trowel-applied asbestos not identified in designated substance report be encountered, stop work and notify the Owner immediately. Do not proceed until written instructions have been received from the Owner.

1.3 Protection

.1 Prevent movement, settlement, or other damage to adjacent structures, utilities, and parts of building to remain in place. Provide bracing and shoring as required.

.2 Keep noise, dust, and debris accumulation to a minimum.

.3 Protect building systems, services and equipment to remain.

.4 Provide temporary dust screens, covers, railings, supports and other protection as required.

1.4 Shop Drawings

.1 Submit shop drawings in accordance with Section 01300 – Submittals.

.2 Before proceeding with demolition of load bearing walls adjacent to foundations requiring shoring, provide to authority having jurisdiction shoring and underpinning drawings prepared by qualified professional engineer registered or licensed in the Northwest Territories and Nunavut showing proposed method.

1.5 Notice

.1 Notify Owner before disrupting building access or services.

2. PRODUCTS

2.1 Not Used

3. EXECUTION

3.1 Demolition Salvage and Disposal

.1 Remove parts of existing building and equipment to permit new construction.

.2 Refer to demolition drawings for items to be demolished and equipment to be salvaged for reuse.

.3 Remove items to be reused, store as directed by Owner and reinstall under appropriate section of specification.

.4 Trim edges of partially demolished building elements to suit future use.

.5 Do not over cut structural components designated for partial demolition or modification.

.6 Dispose of surplus removed materials, to landfill except where specified otherwise, in accordance with authority having jurisdiction and in accordance with local by laws and regulations.

3.2 Partial Demolition of Structures

.1 Refer to drawings S1-01, M1-01, P2-01 for outline of general demolition work. Note that other contract documents designate work that will require demolition, partial demolition, removal or modification.

END OF SECTION

SITE WORK

1. GENERAL

1.1 Work Included

.1 This section specifies requirements for excavation and for site work for buildings.

.2 Included in the work of this section are:

.1 Site preparation

.2 Structural excavation and backfill

.3 Miscellaneous sitework

1.2 Protection Of Existing Features

.1 Conduct with the Owner a condition survey of existing conditions, utilities, survey benchmarks and monuments which may be affected by the Work.

.2 Protect existing surface features, which may be affected by the Work from damage while work is in progress and repair damage resulting from the Work.

1.3 Job Conditions And Regulations

.1 Perform work under observation of applicable health and safety rules and regulations.

.2 Perform work in a manner that will cause minimal disruption to traffic in and out.

1.4 Quality Assurance

.1 Refer to Section 01400 Quality Control.

1.5 Disposal

.1 The Contractor shall dispose of all materials at sites to be located by the Contractor.

2. FILL

2.1 Materials

.1 Type 1 fill.

.1 Crushed, pit run or screened stone, gravel or sand consisting of hard durable particles free from clay clumps, cementation, organic material, frozen material and other deleterious materials.

.2 Gradations to be within limits specified when tested to ASTM C136-84a and ASTM C117-87. Sieve Sizes to CAN/CGSB-8.1-88.

Sieve Designation	% Passing
75 mm	100
50 mm	80 - 100
25 mm	60 - 100
12.5 mm	55 - 95
5 mm	30 - 65
2 mm	20 - 50
0.425 mm	9 - 35

.2 Surface Gravel

.1 25mm Crushed gravel consisting of hard durable particles free from clay clumps, cementation, organic material, frozen material, and other deleterious material.

.3 Native Excavated Material

.1 Unfrozen material excavated from site free of deleterious material, rocks larger than 200 mm, debris or organic soil.

.4 Excavated rock:

.1 Material removal as part of this rock clearing process and graded per re-use in designated areas, free of debris, organic soil and other deleterious materials.

.2 Clean coarse sand:

.1 Max aggregate size 12 mm, maximum 5% fines, well graded clean coarse sand.

2.2 Source

.1 If granular materials are required, the Contractor shall be responsible for obtaining a suitable source.

3. EXECUTION

3.1 Site Preparation

.1 Clearing

.1 Remove obstructions, ice and snow, from surfaces within limits indicated.

.2 Demolition

.1 Demolish and remove from the site all objects designated for removal as well as any obstructions or debris.

.2 Items which are hidden or buried, shall be removed if they are in the way of the structure.

.3 Dewatering

.1 Keep work areas above the lake shoreline free of water while work is in progress.

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

.3 Dispose of water in a manner not detrimental to public and private property, or any portion of work completed or under construction and is in accordance with local by-laws and no regulations.

.4 Handling

.1 Handle and transport aggregates to avoid segregation, contamination and degradation.

.5 Stockpiling

.1 If required, stockpile fill materials on site in locations designated by the Owner. Do not stockpile on existing surfaces where damage to permafrost may result.

.2 Stockpiling sites shall be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.

.3 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by the Owner within 48 hours of rejection.

.4 Stockpile materials in uniform layers of one (1) metre thickness.

.5 Coning of piles or spilling of material over edges of pile will not be permitted.

.6 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from the stockpile.

.6 Grading

.1 Dispose of surplus and unsuitable material off site in accordance with local bylaws and regulations.

.2 Areas to be filled to be free of debris, snow and ice.

.3 Do not use fill material which is frozen or contains ice, snow, or debris unless approved by the Owner.

.4 Do not obstruct flow of surface drainage or natural water courses

.5 Grade the top layer to a smooth regular surface

.6 If there are surplus materials after grading is complete, remove surplus materials from the site.

.7 Grade the site as necessary for graveled areas, parking lots and roadways

.8 Use Type 1 fill for roadwork and embankment construction.

.9 Place fill to lines, grades and elevations as indicated on the drawings.

3.2 Restoration

.1 Upon completion of the Work, remove surplus materials and debris, trim slopes, and correct defects as noted by the Owner.

.2 Clean and reinstate areas affected by the Work as directed by the Owner to original or better condition.

.3 Provide minimum 150mm thick 25mm crushed gravel for all roads, access and parking areas.

END OF SECTION

EXCAVATING, TRENCHING AND BACKFILLING

1. GENERAL

1.1 Related Sections

.1	Site Work	Section 02224
.2	Rock Removal	Section 02316

1.2 References

.1 American Society for Testing and Materials (ASTM)

.1 ASTM D 698- 91, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort 600 kN-m/m.

1.3 Definitions

.1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.

.1 Rock: any solid material in excess of 0.25 m and which cannot be removed by means of heavy duty mechanical excavating equipment having a 1.0 m bucket. Frozen material not classified as rock.

.2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.

.2 Waste material: excavated material unsuitable for use in work or surplus to requirements.

.3 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of work.

.4 Unsuitable materials:

.1 Weak and compressible materials under excavated areas.

.2 Frost susceptible materials under excavated areas.

.3 Frost susceptible materials:

.1 Fine grained soils with plasticity index less than 10 when tested to ASTM D 4318, and gradation within limits specified when tested to ASTM D 422 and ASTM C 136: Sieve sizes to CAN/CGSB-8.1.

.2 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.

1.4 Protection Of Existing Features

.1 Protect and safeguard existing structures and pipe. Repair any damage caused by the work of this contract at no cost to the Owner.

2. PRODUCTS

2.1 Materials

.1 Fill materials are defined in Section 02224.

3. EXECUTION

3.1 Excavation

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

.2 Remove obstructions encountered during excavation.

.3 Ensure excavation does not damage existing intake carrier pipe.

.4 Excavate trenches to provide uniform continuous bearing for new insulated 200 mm intake carrier pipe.

.5 Dispose of surplus and unsuitable excavated material off site.

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

.7 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.8 Remove unsuitable material from trench bottom to extent and depth as directed by Engineer.

.1 Correct unauthorized over-excavation with fill compacted to not less than 95 % of SPD.

.9 Hand trim, make firm and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

3.2 Fill Types And Compaction

.1 Under interior grade supported slabs: use Type 1 Gravel compact to 98% SPD with layers not exceeding 150 mm.

.2 Under interior and exterior structural slabs: use Native Excavated Materials, or excavated rock to within 250 mm of U/S slab. Compact to 95% SPD with layers not exceeding 300

mm. Fill next 150 mm with Type 1 fill compacted to 98% SPD. Use 100 mm void form and plywood for remaining 100 mm.

.3 Under exterior grades supported slabs: use Native excavated materials or excavated rock to within 500 mm of U/S slab and compact to 98% SPD in layers not exceeding 150 mm. Use Type 1 fill for remaining 500 mm. Compact to 98% SPD in layers not exceeding 150 mm.

.4 Under pipe beds. Fill bottom with clean coarse sand within 300 mm of surface. Compact to 95% SPD with layers not exceeding 150 mm. Use Type 1 fill for top 300 mm. Compact to 98% SPD in layers not exceeding 150 mm.

.5 Utilize excavated granular material for backfill only when approved by the Owner.

3.3 Backfilling

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

.2 Areas to be backfilled to be free from debris, snow, ice, frozen ground.

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

.4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

.5 Backfill around installations.

.6 Place layers simultaneously on both sides of installed work to equalize loading. Difference not to exceed 100 mm.

END OF SECTION

1. GENERAL

1.1 Work Included

.1 Removal of rock materials from site with the use of explosives.

.2 Security measures to prevent unauthorized persons from entering work area.

1.2 Related Work

.1	Allowances:	Section 01020
.2	Regulatory Reports	Section 01060
.3	Submittals:	Section 01300
.4	Construction Facility	Section 01500
.5	Sitework	Section 02224
.6	Excavating, Trenching & Backfilling	Section 02315

1.3 Definition

.1 Rock excavation: Excavation of material from solid mases of igneous, sedimentary or metamorphic rock which, prior to its removal, was integral with its parent mass, and boulders of rock fragments having individual volume in excess of 1.0 m^3.

1.4 Qualifications

.1 Retain licensed explosives expert to supervise and program work, and to determine precautions, preparation and blasting techniques.

.2 Conform with blasting requirements of Canadian Construction Safety Code 1977 and local and Territorial codes.

1.5 Protection

.1 Prevent damage to surroundings, nearby structures and injury to persons. Erect barriers, post guards, sound warnings and display signs when blasting is to take place.

1.6 Measurement of Payment

.1 Base bold on removal of ____ m3 of rock.

.2 Payment for rock removal at variance to the base bid will be made at the Contract unit price per cubic metre which shall be full compensation for all labour, materials and equipment

necessary to drill, blast cover, and additional costs of handling blasted material including hauling and disposal. Include all other work necessary and incidental thereto for which separate payment is not provided.

.3 Payment for one (1) preblast inspection for each project section shall be paid at the lump sum price quoted in the Tender. The lump sum price shall include all recording of existing conditions, including photographs where necessary, report preparation and defining changed conditions after blasting, if any.

.4 Payment for mobilization, demobilization and fixed costs associated with rock removal for each project section 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 and 50% of the lump sum price at Substantial Completion.

2. PRODUCTS

Not applicable to this section.

3. PRODUCTS

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 Engineer before construction is started. Take photographs inside basements if applicable.

.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 02315, utilizing 19 mm crushed granular material.

.4 Excavated rock bed to be maximum 10% slope at bearing surfaces, sound, free of loose rocks or fragments, earth or debris.

.5 Scale down all rock slopes immediately after rock removal operations. Scaling shall consist of the removal of all loose rock and debris by scaling bar or other means, including any required minor blasting.

.6 Prepare rock surfaces which are to bond to concrete by broom cleaning and pressure washing surfaces.

.7 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. Provide recesses for bell and spigot pipe to ensure bearing will occur along barrel of pipe.

.8 Cut trenches 400 mm wider than maximum pipe diameter, or as specified.

.9 If during excavation rock is encountered, remove overburden from rock and notify Engineer in sufficient time to take measurements to determine the volume of rock.

3.2 Surplus Material

.1 Re-use excavated rock for landscaping or engineered fill as designated in other sections.

.2 Dispose of surplus excavated rock offsite in accordance with local by laws and regulations.

3.3 Damaged Property

.1 Repair, to the satisfaction of the Owner, any material, equipment, work, or property unintentionally damaged as a result of the rock removal operation.

END OF SECTION

STEEL PIPE PILES

1. GENERAL

1.1 Work Included

.1 Excavate and grade for equipment support at pile locations.

.2 Excavate to cutoff elevations at pile locations.

.3 Predrill through obstructions and frost.

.4 Apply grease on piles.

.5 Place piles and fill with sand surry.

.6 Cut off pile tops at required elevations.

.7 Prepare piles for capping. Install steel cap plates.

.8 Remove all excavated materials from site or deposit on site where directed by Engineer.

1.2 References

.1 American Society for Testing and Materials (ASTM)

.1 ASTM A 252, Standard Specification for Welded and Seamless Steel Pipe Piles.

.2 Canadian Standards Association (CSA)

.1 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.2 CSA W47.1, Supplement No.1-M1989 to W47.1-1983, Certification of Companies for Fusion Welding of Steel Structures.

.3 CSA W59, Welded Steel Construction (Metal Arc Welding).

.4 CSA W59S1, Supplement No.1-M1989, Steel Fixed Offshore Structures, to W59-M1989, Welded Steel Construction, (Metal Arc Welding).

.5 CAN/CSA-G30.18, Billet-Steel Bars for Concrete Reinforcement.

.6 CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels.

1.3 Related Work

.1 Structural Steel: Section 05120

1.4 Test Reports

.1 Prior to construction and if requested, provide Engineer with two (2) copies of steel producer's certificate, in accordance with ASTM A252.

1.5 Qualifications

.1 If required by the Engineer, produce satisfactory proof of successful installation experience with this type of foundation, in similiar conditions and with piles of similar capacities.

1.6 Inspections

.1 Inspection of piling work is to be performed by the Engineer registered in Northwest Territories and Nunavut.

.2 Provide free access to all portions of the work and cooperate with the Engineer.

.3 Notify the Engineer before commencing pile driving in ample time to permit scheduling inspections.

.4 Pay costs for retesting required due to defective materials or workmanship.

1.7 Existing Subsurface Conditions

.1 Subsurface investigation report is appended to this specification.

2. PRODUCTS

2.1 Materials

.1 Piles: to grade, diameter and wall thickness as tabled on drawings or welded steel pipe with straight spiral lapped body; conforming to ASTM A252, Grade 2; plain ends; diameters and wall thickness as indicated on the Drawings.

.2 Splices: to CSA G40.21 or as indicated on drawings.

.3 Welding electrodes to CSA W48.

.4 Slurry Backfill: [ ]

.5 Embedment grout: Fast setting arctic grade grant (Sika Artic 100 or approved alternate)

.6 Grease heavy bituminous, low viscosity, lubricating grease.

.7 Polyethylene sheets to CAN/CGSB 51.34 – 6 mil thickness.

2.2 Fabrication

.1 Supply full length piles to reduce field splicing during installation wherever possible.

.2 Full length piles may be fabricated from piling material by splicing lengths together. Use complete joint penetration groove welds. Splice locations to be approved by the Engineer.

.3 Submit details of planned use of pile material stock to Engineer for approval prior to start of fabrication. Reuse cutoff lengths as directed by the Engineer.

.4 Allowable tolerance on axial alignment to be 0.25% as measured by a 3 m straight edge.

.5 Allowable deviation from a straight line over total length of fabricated pile to be 5 mm.

.6 Repair defective welds only on the authority of the Engineer. Welds which show evidence of having been repaired without authorization may be rejected. Do area being repaired to CSA W59A.

.7 Repair damaged exterior protective coating of piles.

.8 Welding to CSA W59.

.9 Field splices are not to be located within 2.5 metres of the underside of pile cap plate.

.10 Field splices are to be located so that no more than 50% occur at the same elevation.

2.3 Surface Treatment

.1 Pipe pile surfaces shall be prime painted. Surfaces to be painted shall be thoroughly cleaned in accordance with SSPCASP2, Hand Tool Cleaning. Surface shall be free of moisture and protected from adverse weather conditions until the paint is dry. Ambient temperatures shall not be less than 50°F (10°C).

.2 Shop paint shall conform with CGSBA1AGPA81, Air Drying Metal Primer, or shall be any other heavyÄduty shop primer approved by the Engineer. The dry film thickness shall be 5 mils, applied in two coats of 2.5 mils over peaks.

.3 Paint shall be kept stirred while being used, and shall be applied with brush or a suitable spray gun. Paint shall be well worked into all joints and open spaces.

3. EXECUTION

3.1 Preparation

.1 Ensure that the site conditions at each pile location are adequate to support driving equipment to properly install piles and permit load testing when required.

3.2 Pile Design

.1 Pile design is based on an allowable bearing stress on bed rock of 10 MPa.

3.3 Pipe Installation

.1 Apply grease to the top 2000 mm below finished grade.

.2 Completely clean out base of hole.

.3 Immediately after cleaning, fill hole in rock with embedment grout.

.4 Install pile, open ended, and vibrate into grout. Ensure pile is seated on bedrock and backfill around the piles above bed rock with sand or fine gravel slurry mixed with water.

.5 Set piles not more than 2% of out of plumb and not more than 40 mm out of location in any direction.

.6 Each pile shall be able to withstand the maximum working load as shown on the drawing without any detrimental settlement.

.7 Piles shall not be subjected to any load or disturbance until the grout has achieved 25 MPa compressive strength.

.8 Report any inconsistencies of soil condition to engineer before proceeding with the work.

.9 After erection, touch up abrasions and damage to shop primed surfaces.

.10 Excess water near the top of pile must be removed by pumping and replaced with sand and slurry mixture.

3.4 Welding

.1 Weld in accordance with CSA W59 and CSA W59S1.

.2 Welding certification of companies in accordance with CSA W47.1 and CSA W47.1S1.

3.5 Defective Piles

.1 The Owner, at his discretion, may reject any pile that is out of alignment or out of position, not at the correct elevation, or otherwise fails to meet specified requirements.

.2 Add new piles to replace rejected as directed by the Engineer at no additional cost to the Owner.

END OF SECTION

ROCK SOCKETS FOR PILES

1. GENERAL

1.1 Related Sections

.1 Section 01500 – Construction Facilities.

.2 Section 02362 – Steel Pipe Piles.

.3 Section 03300 – Cast-in-Place Concrete.

1.2 Measurement Procedures

.1 Measure removal of material from interior of pipe piles by number of piles cleaned out to tip of pile in final position.

.2 Measure drilling of sockets for rock dowels in metres from bottom of steel pipe pile to bottom of drilled hole. Consider socket clean-out, sounding and pile redriving incidental to work and will not be measured separately.

.3 Measure anchor [dowels] [rods] for rock sockets in tonnes of steel of anchors [dowels] [rods] acceptably placed and remaining in completed Work as indicated [and specified]. Consider spiders and spacers incidental to work and will not be measured separately.

.4 Measure Grout [for each pile socketed in rock] [in cubic metres properly placed in rock anchor] [for each rock anchor grouted] as indicated [and specified]. Consider sounding and diver inspection incidental to Work and will not be measured separately.

.5 Measure tests on socketed piles for each anchor [pile] actually tested in accordance with [plans and] specifications.

.6 Actual number of rock sockets installed will be established by [Engineer] [Owner].

.7 Base adjustments in Contract price due to changes in number and volume of rock sockets on unit prices established in Contract.

.8 Measure tests on socketed piles for each anchor [pile] actually tested in accordance with [plans and] specifications.

1.3 References

.1 American Society for Testing and Materials (ASTM)

.1 ASTM A 252-98(2002), Standard Specification for Welded and Seamless Steel Pipe Piles.

.2 Canadian Standards Association (CSA)

.1 CSA W47.1-92 (R2001)], Certification of Companies for Fusion Welding of Steel Structures.

.2 CSA W47.1S1-[M1989], Supplement No.1-M1989 to W47.1-1983, Certification of Companies for Fusion Welding of Steel Structures.

.3 CSA W59-M1989 (R2001)], Welded Steel Construction (Metal Arc Welding).

.4 CSA W59S1-[M1989], Supplement No.1-M1989, Steel Fixed Offshore Structures, to W59-M1989, Welded Steel Construction, (Metal Arc Welding).

.5 CAN/CSA-G30.18-M92 (R1998)], Billet-Steel Bars for Concrete Reinforcement.

.6 CSA G40.20/G40.21-98 2000)], General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels.

1.4 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section [01355 - Waste Management and Disposal].

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal [paper] [plastic] [polystyrene] [corrugated cardboard] packaging material [in appropriate on-site bins] for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility as approved by [Engineer] [Consultant].

.5 Divert unused concrete materials from landfill to local [quarry] [facility] as approved by [Engineer] [Consultant].

.6 Fold up metal banding, flatten and place in designated area for recycling.

2. PRODUCTS

2.1 Materials

.1 Grout: in accordance with [manufacturer's recommendations] [Section [03300 - Cast-in-Place Concrete]].

.2 Underwater concreting: in accordance with Section [03306 - Underwater Concreting].

.3 Material for anchor dowels: [of pipe sections to ASTM A 252-98(2002), Grade [_____]] [of [pipe sections] [bars] [structural shapes] to CSA G40.20/G40.21-98, type [_____]] [of deformed bars to CAN/CSA-G30.18-M92 (R1998)].

.4 Anchor dowels: as indicated.

.5 Additional material, including spiders, spacers and anchor dowels installation guides: to approval of [Engineer] [Consultant].

2.2 Equipment

.1 Submit to [Engineer] [Consultant], for approval, list of equipment for installation of anchor dowels before beginning work.

.1 Provide details sufficient to evaluate performance of equipment.

.2 Include details of equipment for excavating, drilling, cleaning out piles and rock sockets, installation of anchor dowels and grouting of sockets.

3. EXECUTION

3.1 Pile-Clean-Out

.1 After pile is driven to bedrock, remove overburden inside pile down to tip of pile. Thoroughly clean out material adhering to inside surface of pile [and surfaces of shear ring] by high pressure [water jets] [airlifts].

.2 Protect open piles from intrusion of foreign materials.

3.2 Sockets

.1 Secure equipment in position during drilling.

.2 Drill sockets into sound bedrock as indicated.

.3 [Engineer] [Consultant] will determine elevation of top of sound rock [and depth of socket required].

.4 Drill socket to minimum depth as indicated.

.5 After drilling is completed, clean out socket.

.6 After socket has been cleaned out and inspected, allow to stand for [24] h and inspect again for any intrusion of material. If necessary redrive pile to seal socket and repeat drilling, cleaning out and inspection process.

3.3 Anchor Dowel Installation

.1 Install fabricated anchor dowels in drilled socket and in pile. Locate relative to pile tip as indicated.

.2 Use locating devices [as indicated] for centering anchor dowels in pile and rock socket.

3.4 Welding

.1 Weld in accordance with CSA W59-1989 (R2001) and CSA W59S1.

.2 Welding certification of companies in accordance with CSA W47.1-92 (R2001) and CSA W47.1S1.

3.5 Grouting

.1 Grout in accordance with [manufacturers instructions and procedures] [Section [03300 - Cast-in-Place Concrete]].

.2 Grout anchor dowels inside pipe piles, in drilled socket and up to elevation as indicated, as soon as possible after installing anchor dowels.

.3 Use grout mix that has been demonstrated to produce required strength at temperature prevailing in socket and pile in specified time. Grout mix and grouting pressure to approval of [Engineer] [Consultant].

.4 Hold pile securely in position so that it does not move during grouting and until grout has attained specified strength.

.5 Place grout in one continuous operation to fill socket and pile up to specified level.

3.6 Inspection and Testing

.1 Provide method and equipment for inspection of each pile to ensure that pile and socket are properly cleaned out. Cooperate with and assist [Engineer] [Consultant] to inspect each pile and socket.

.2 Carry out load test in [tension of [_____] kN] [and] [compression of [_____] kN] on [_____] rock socketed piles.

.3 [Engineer] [Consultant] will select anchored piles to be tested.

.4 Test in accordance with Section 02362 – Steel Pipe Piles.

END OF SECTION

1. GENERAL

1.0 Related Work

.1 Excavating, Trenching and Backfilling and Compaction: Section 02315

1.1 Scheduling of Work

.1 Schedule work to minimize interruptions to existing service.

.2 Maintain existing sewage flows during construction

2. PRODUCTS

2.1 Pipes and Fittings

.1 The buried mains shall be DR 17 (700 kPa) high density polyethylene (HDPE) pipe with specified insulation. Pipe 50 mm and larger shall be iron pipe size.

.2 All polyethylene pipe and fittings shall be of the same manufacturer and the same grade of polyethylene. Standard of acceptance shall be KWH Pipe (Canada) or approved equal. Pipes to 150 mm shall conform to CSA B 137.1-1970, pipe over 150 mm shall conform to CGSB 41-GP-25 m.

.3 Polyethylene to polyethylene joints 75 mm or greater shall be thermal butt-fusion welded except for flange joints where detailed. 50 mm polyethylene to polyethylene joints shall the thermal socket fused. Alternatively, electro fusion coupling may be utilized on all sizes.

.4 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 ductile iron (to ASTM A 536-80) with a corrosion resistant coating as manufactured by KWH Pipe (Canada) Ltd. or approved equal.

.5 Bolts and nuts for underground use shall be cadmium plated.

.6 Fabricated fittings shall be manufactured of the same diameter and series pipe as specified for the piping system, flanged or plain ends as detailed. The fabricated fittings shall have a Fibre Reinforced Polyester (FRP) overwrap applied in accordance with KWH Pipe (Canada) Ltd. specifications.

.7 Blind flanges for use on polyethylene fittings 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 meter intervals along the length.

.10 Gaskets for flanged fittings shall be 3 mm heavy cloth insert black rubber compound. Red rubber sheet stock shall not be allowed. The interior and exterior diameters of the gaskets shall be within 1.5 mm of the interior and exterior diameters of the HDPE stub ends.

2.2 Urethane Insulation

.1 Insulation for pipe lines shall be rigid closed cell polyurethane insulation, Shaw Pipe Protection "Insul-8"ystem, Urecon UIP system, or Thermal Pipe Systems Inc. with specified outer jacket, or equal. The insulation system shall consist of the cleaning and surface treatment of the pipe, application of urethane, the installation of outer jacket an the supply for field installation of pre-formed urethane halves and polyethylene heat shrink sleeves.

.2 The application of the insulation to the pipe may be inspected by the Engineer. Five (5) days notice shall be given to the Engineer prior to commencement of this work.

.3 The properties of the insulation system components shall be as follows:

.1 The surface treatment of the polyethylene pipe shall consist of the removal of all contaminants from its outer surface and the texturing of the surface. This treatment is required to develop a shear bond capability between the pipe wall and the urethane.

.2 Urethane Properties:

Thickness	75 mm
Density (kg/m^3-core) ASTM D-1622	35-48
Compressive Strengths at 25° C, 10% Deflection ASTM D-1621	2.81 kg/cm^2
Thermal Conductivity @ 25° C ASTM D-2326	0.00225 w/cm°C
Operating Temperature range C	