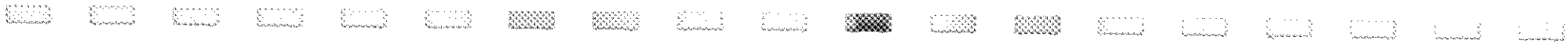
Appendix C

Sieve Analysis Reports



SIEVE ANALYSIS REPORT

AMEC Earth & Environmental Limited

To: Dillon Consulting Limited
303 4920 47 Street
Goga Cho Building
Yellowknife, Northwest Territories

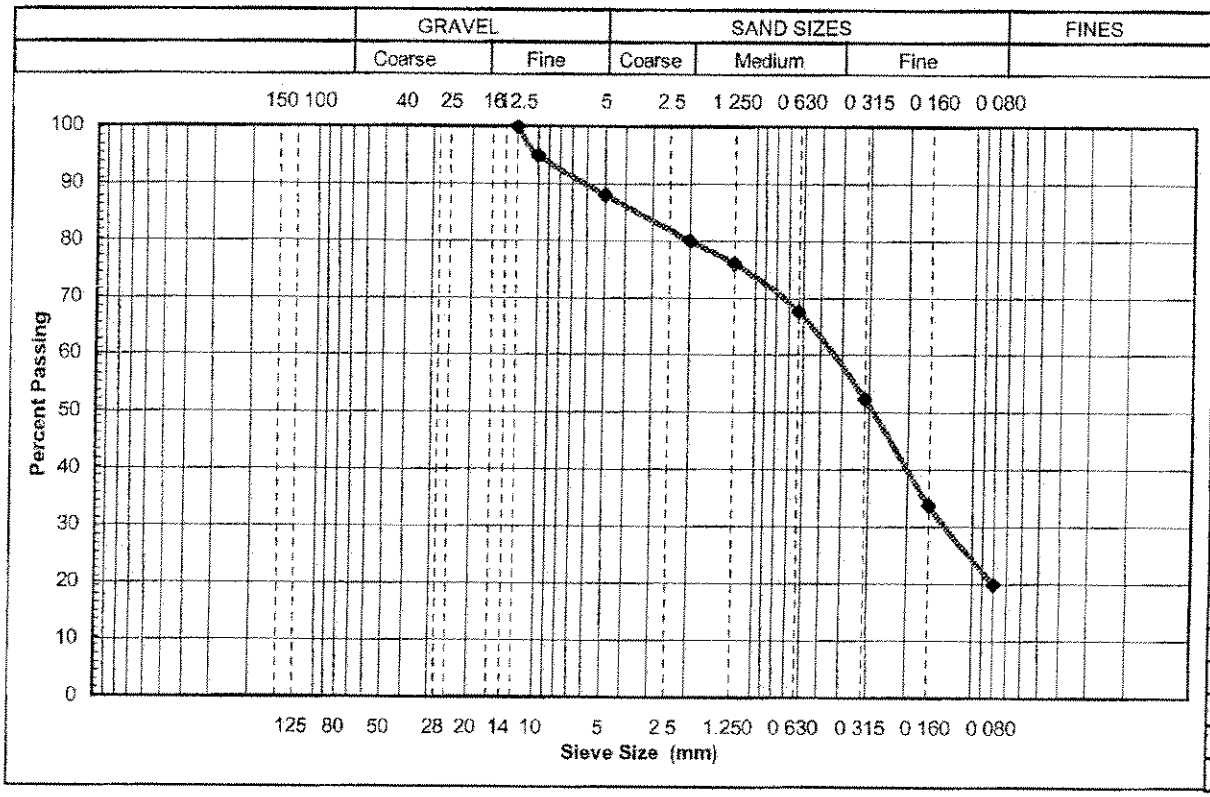
Office : Yellowknife
Project No: YX00748
Client : Dillon Consulting Limited
Copies to :

Attn: Mr. Gary Strong

Project: Investigation of borrow material

Sample ID: 748-02 **Sample Type:** Sandy Silty Clay **Sampled By:** AMEC

Date Sampled: Aug 10 2005 **Date Received:** Aug 15 2005 **Date Tested:** Aug 18 2005



Sieve Size	% Passing
150.0	
125.0	
100.0	
80.0	
50.0	
40.0	
28.0	
25.0	
20.0	
16.0	
14.0	
12.5	100
9.5	95
4.75	88
2.00	80
1.250	76
0.630	68
0.425	52
0.160	34
0.080	19.9

Source: Borrow Pit Cape Dorset, Near CG&S Building , near the airport
Sample Description: Sandy Silty Clay 18W 0425 451 N7 122 814
Comments : Moisture content 14.4%

AMEC Earth & Environmental Limited

Per: _____

Reporting of these test results constitutes a testing service only Engineering interpretation or evaluation of the test results is provided only on written request.

SIEVE ANALYSIS REPORT

AMEC Earth & Environmental Limited

To: Dillon Consulting Limited
303 4920 47 Street
Goga Cho Building
Yellowknife, Northwest Territories

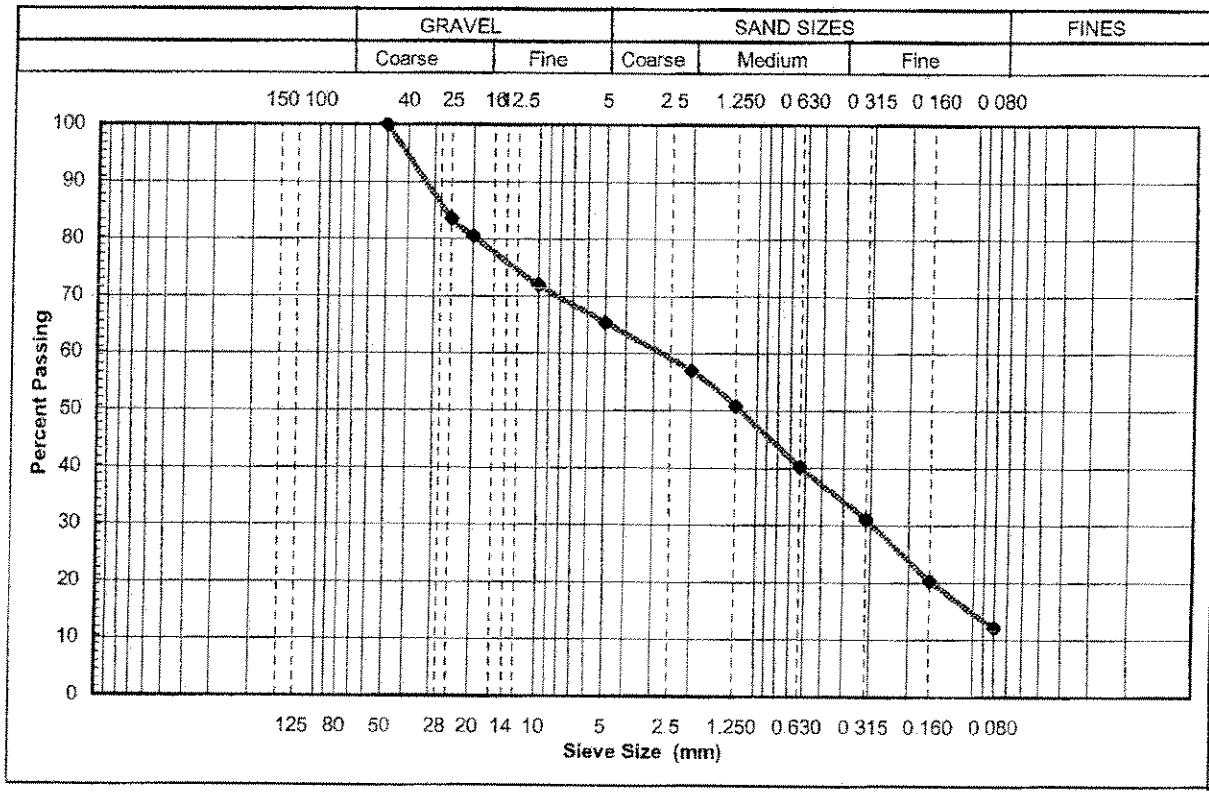
Office : Yellowknife
Project No: YX00748
Client : Dillon Consulting Limited
Copies to :

Attn: Mr. Gary Strong

Project: Investigation of borrow material

Sample ID: 748-01 **Sample Type:** Sandy Silty Clay **Sampled By:** AMEC

Date Sampled: Aug 10 2005 **Date Received:** Aug 15 2005 **Date Tested:** Aug 18 2005



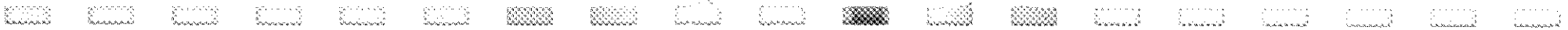
Sieve Size	% Passing
150.0	
125.0	
100.0	
80.0	
50.0	100
40.0	
28.0	
25.0	84
20.0	80
16.0	
14.0	
12.5	
9.5	72
4.75	65
2.00	57
1.250	51
0.630	40
0.425	31
0.160	20
0.080	12.1

Source: Borrow Pit Cape Dorset, Near Landfill 18W 0423 046 N7 122 801
Sample Description: Sandy Silty Clay
Comments : Moisture content 8.8%

AMEC Earth & Environmental Limited

Per: _____

SECTION 3 CONTENTS



1.0 General

.1 STANDARD

.1 Concrete materials and methods of construction: to CAN/CSA-A23.1 unless otherwise specified.

.2 INSPECTION

.1 Concrete testing: to CAN/CSA-A23.2 by testing laboratory designated and paid for by Engineer, including on site storage and shipping. Contractor to provide access to the site. Engineer will complete at least 1 set of 3 cylinders for each pour that they inspect. Cost associated with production of the concrete for testing will be the responsibility of the contractor.

.2 Give Engineer minimum 48 hours notice before each concrete pour.

.3 TESTING

.1 The contractor to complete 1 set of 3 cylinders for all concrete pours on the reservoir. This testing is in addition to the testing completed by the engineer.

.2 Concrete testing: to CAN/CSA-A23.2 by testing laboratory designated and paid for by contractor, including on site storage and shipping.

2.0 Products

.1 MATERIALS

.1 Portland cement: to CAN/CSA-A5, Type 50.

.2 Reinforcing bars: to CAN/CSA-G30.18, Grade 400.

.3 Waterstops: extruded ribbed PVC strips, 12 MPa tensile strength, minimum 350% elongation, minus 45 C to plus 80 C working temperature, sizes as indicated. Contractor to provide shop drawings for waterstop.

.4 All other concrete materials: to CAN/CSA-A23.1.

.5 Crystallization concrete waterproofing: Xypex Concentrate C-Series Admixture.

.2 MIX PROPORTIONS

.1 Method: Alternative (1) of CAN/CSA-A23.1, Table 11.

.2 Cement type: as specified under 2.1.

.3 Minimum 28 day compressive strength shall be 32 MPa and exposure classification S-2.

.4 Nominal size of coarse aggregate: Clause 14 of CAN/CSA-A23.1.

.5 Slump: to Table 6 of CAN/CSA-A23.1. Slump to be 80 mm +/- 20 mm

.6 Air content: all concrete to contain purposely entrained air in accordance with category 2, Table 9 of CAN/CSA-A23.1. Air Content to be 5 to 8 %

.7 Admixtures: to Clause 6 of CAN/CSA-A23.1.

3.0 Execution

.1 INSERTS

.1 Cast in sleeves, anchors, reinforcement, frames, conduit, bolts and other inserts required to be built-in.

.2 FINISHES

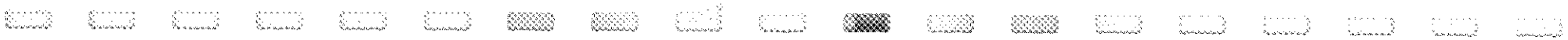
.1 Formed surfaces shall receive a rough-form finish in accordance with CAN/CSA-A23.1.

.3 CURING

.1 Cure and protect concrete in accordance with CAN/CSA-A23.1, except that curing compounds shall not be used.

END OF SECTION

SECTION 5 CONTENTS



.....2000-12-05

PART 1 GENERAL

1.1 Related Sections

.1 ..... Section 01330 - Submittal Procedures

.2 ..... Section 01610 - Basic Product Requirements

.3 ..... Section 03300 - Cast-in-Place Concrete: Installation of anchors.

1.2 References

.1 ..... American Society for Testing and Materials (ASTM)

- .1 ASTM A53/A53M-99b, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Steamless.
- .2 ASTM A269-98, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- .3 ASTM A307-97, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 ..... Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.
- .2 CAN/CGSB-1.108-M89, Bituminous Solvent Type Paint.
- .3 CAN/CGSB-1.181-92, Ready-Mixed, Organic Zinc-Rich Coating.

.3 ..... Canadian Standards Association (CSA)

- .1 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .2 CSA W59-M1998, Welded Steel Construction (Metal Arc Welding).

1.3 Shop Drawings

.1 ..... Submit shop drawings in accordance with Section 01330 - Submittal Procedures.

.2 ..... Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.4 Protection

.1 ..... Deliver, store, handle and protect materials in accordance with Section 01610 - Basic Product Requirements.

.2 ..... Cover exposed stainless steel surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping to job site.

.3 ..... Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.

PART 2 PRODUCTS

2.1 Materials

.1 ..... Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade[300W] [350W].

.2 ..... Steel pipe: to ASTM A53/A53M [standard weight] [extra strong] [double extra strong], black, galvanized finish.

.3 ..... Bolts and anchorbolts: to ASTM A307.

.4 ..... Stainless steel tubing: to ASTM A269, Type [302] [Commercial grade] [Seamless welded with AISI No[4] finish].

.5 ..... Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.2 Fabrication

.1 ..... Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 ..... Use self-tapping shake-proof round headed screws on items requiring assembly by screws or as indicated.

.3 ..... Where possible, fit and shop assemble work, ready for erection.

.4 ..... Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 Finishes

.1 ..... Galvanizing: hot dipped galvanizing with zinc coating 600 g/m2to CAN/CSA-G164.

.2 ..... Chromium plating: chrome on steel with plating sequence of 0.009 mm thickness of copper 0.010 mm thickness of nickel and 0.0025 mm thickness of chromium.

.3 ..... Shop coat primer: to CAN/CGSB-1.40.

.4 ..... Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.

.5 ..... Bituminous paint: to CAN/CGSB-1.108.

2.4 Isolation Coating

.1 ..... Isolate aluminum from following components, by means of bituminous paint:

.1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.

.2 Concrete, mortar and masonry.

.3 Wood.

2.5 Shop Painting

.1 ..... Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.

.2 ..... Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7°C.

.3 ..... Clean surfaces to be field welded; do not paint.

2.6 Access Ladders

.1 ..... Stringers: 75 x 75 x 4 mm thick, angle.

.2 ..... Steel Rungs: 50x 50 x 4 mm thick, angle, welded to stringers at 300 mm oc.

.3 ..... Brackets: sizes and shapes as indicated, weld to stringers at 1000 mm o.c., complete with fixing anchors.

.4 ..... Galvanize finish for exterior, prime paint for interior.

.5 ..... Galvanize exterior ladders after fabrication.

2.7 Trench Covers and Frames

.1 ..... Steel fabricate from 6 mm thick raised pattern plate set in L 55 x 55 x 6 frame. Include anchors at 1200 mm oc for embedding in concrete. Supply trench covers in 1200 mm removable lengths.

.2 ..... Finish: galvanized.

PART 3 EXECUTION

3.1 Erection

.1 ..... Do welding work in accordance with CSA W59 unless specified otherwise.

.2 ..... Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 ..... Provide suitable means of anchorage acceptable to Engineer such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 ..... Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 ..... Provide components for building by other sections in accordance with shop drawings and schedule.

.6 ..... Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

.7 ..... Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.

.8 ..... Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.2 Access Ladders

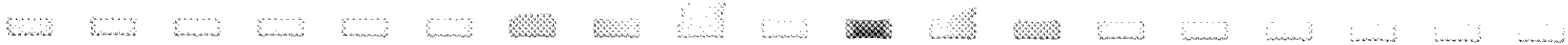
.1 ..... Install access ladders in locations as indicated.

3.3 Trench Covers

.1 ..... Install trench covers in locations as indicated.

END OF SECTION

SECTION 6 CONTENTS



.....1997-11-07

PART 1 GENERAL

1.1 References

.1 Canadian Standards Association (CSA)

- .1 CSA B111-1974, Wire Nails, Spikes and Staples.
- .2 CAN/CSA-G164-M92, Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CSA O121-M1978, Douglas Fir Plywood.
- .4 CAN/CSA-O141-91, Softwood Lumber.
- .5 CSA O151-M1978, Canadian Softwood Plywood.

.2 National Lumber Grades Authority (NLGA)

- .1 Standard Grading Rules for Canadian Lumber 1991.

1.2 Quality Assurance

.1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood identification: by grade mark in accordance with applicable CSA standards.

.3 Plywood, OSB and wood based composite panel construction sheathing identification: by grademark in accordance with applicable CSA standards.

PART 2 PRODUCTS

2.1 Lumber Material

.1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:

- .1 CAN/CSA-O141.
- .2 NLGA Standard Grading Rules for Canadian Lumber.

2.2 Accessories

.1 Nails, spikes and staples: to CSA B111.

.2 Bolts: [12.5] mm diameter unless indicated otherwise, complete with nuts and washers.

.3 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, [explosive actuated fastening devices], recommended for purpose by manufacturer.

2.3 Wood Preservative

.1 Surface-applied wood preservative: coloured or copper napthenate or 5% pentachlorophenol solution, water repellent preservative.

.2 Pentachlorophenol use is restricted to building components that are in ground contact and subject to decay or insect attack only. Where used, pentachlorophenol-treated wood must be covered with two coats of an appropriate sealer.

.3 .

PART 3 EXECUTION

3.1 Preparation

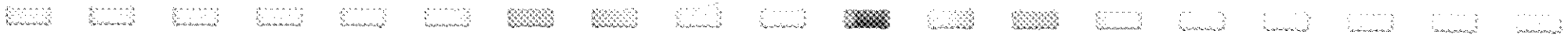
.1 Treat surfaces of material with wood preservative, before installation.

.2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber and one minute soak on plywood.

.3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

END OF SECTION

SECTION 15 CONTENTS



PART 1 GENERAL

1.1 Related Work

Section 02315 Excavating, Trenching and Backfilling

1.2 References

.1 ASTMC518- 91, Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

.2 ASTMD638M- 89, (D638-90), Test Method for Tensile Properties of Plastics.

.3 ASTMD1248- 84(1989), Specification for Polyethylene Plastics Molding and Extrusion Materials.

.4 ASTMD1505- 90, Test Method for Density of Plastics by the Density-Gradient Technique.

.5 ASTMD1621- 73(1979), Test Method for Compressive Properties of Rigid Cellular Plastics.

.6 ASTMD1622- 88, Test Method for Apparent Density of Rigid Cellular Plastics.

.7 ASTMD2657- 90, Practice for Heat Joining of Polyolefin Pipe and Fittings.

.8 ASTMD2837- 90, Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.

.9 ASTMD2856- 87, Test Method for Open Cell Content of Rigid Cellular Plastics by the air Pycnometer.

.10 ASTMF714- 90, Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

.11 ASTMG14- 83, Test Method for Impact Resistance of Pipeline Coatings (Falling Weight Test).

.12 CAN/CSA-B137.1- M89, Polyethylene Pipe, Tubing and Fittings for Cold Water Pressure Services.

1.3 Product Data

.1 Submit product data in accordance with Section 01330 - Submittal Procedures.

1.4 Material Certification

.1 At least 4 weeks prior to commencing work submit manufacturer's test data and certification that materials meet requirements of this section.

.2 Record Drawings

.3 Provide data necessary to produce record drawings on project completion in accordance with the following requirements:

.1 Give details of pipe material, location of fittings, maintenance and operating instructions.

PART 2 PRODUCTS

2.1 Carrier Core Pipe

.1 Polyethylene pressure pipes to CSAB137.1 ASTMF714:

.1 Type PE3408 for ASTMF714, DR 17.

.2 Pressure rating:

.1 DR 17 for ASTMF714.

.2 Polyethylene to polyethylene joints: thermal butt fusion joined to ASTMD2657.

.3 Polyethylene fittings: to AWWA C906 for pipe sizes NPS4 to NPS63.

2.2 Factory Applied Insulation

.1 Pipes to be cleaned of surface dust or dirt and treated if necessary to ensure positive bond of foam to entire pipe surface.

.2 Material: rigid polyurethane foam factory applied.

.3 Insulation thickness: 50 mm.

.4 Density: to ASTMD1622, 0.032 to 0.048g/cm^3.

.5 Closed cell content: to ASTMD2856, 90 % minimum.

.6 Water absorption: to ASTMD2842, 4.0 g/1000 cm^3, maximum 4.25% by volume.

.7 Compressive strength: to ASTMD1621, up to 240 kPa.

.8 Thermal conductivity: to ASTMC518, 0.022 to 4 W/m C°.

.9 Service Temperature: minus 45°C to plus 120°C.

.10 Centering of pipe within insulation: no more than plus or minus 6mm off center.

.11 Protect insulation on both ends of pipe from moisture and sunlight by 3mm thick continuous concentration of black asphalt mastic compound.

2.3 Outer Jacket for Buried Applications

.1 Material: factory applied high-density polyethylene jacket, black in colour (UV inhibited).

.2 Density of HDPE jacket: to ASTMD1505, 0.940 g/cm^3 minimum.

.3 Sealant: synthetic polymers or modified rubber mastic.

.4 Jacket thickness: 1.14 mm minimum.

.5 Elongation: to ASTMD638, 400 % maximum 6 month test.

.6 Service temperature: minus 45 °C to plus 120 °C maximum.

.7 Water vapour transmission rate: 3 g/m^2/24 h average.

.8 Tensile strength: 25 kg/cm width minimum.

.9 Impact strength: to ASTMG14, 7.79 N/m at minus 40 °C minimum.

2.4 Pipe Bedding and Surround Materials

.1 granular material to following requirements:

.1 Crushed or screened stone or sand consisting of hard, durable, particles, free from clay lumps, cementation, organic material and other deleterious materials to Section 02315.

.2 ASTMC136 and ASTMC117. Sieve sizes to CAN/CGSB-8.1.

2.5 Backfill Materials

.1 Backfill material in accordance with Section 02315 Excavating, Trenching and Backfilling.

PART 3 EXECUTION

3.1 Unloading and Handling of Polyethylene Pipe

.1 Unload from trucks or containers by hand or by lifting apparatus with fabric slings. Do not use cables or chains.

.2 Once removed, store on smooth surface. Lay pipes flat. Where sleepers are desired use several lengths of wide planks to provide broad bearing surface.

.3 Lift, do not drag, insulated pipes from storage area to job site.

.4 Follow manufacturer's recommendations.

3.2 Repairing Damaged Pipe

.1 Repair any damage to outer jacket by applying heat shrink sleeve to approval of Engineer or cover using heated HDPE UV resistant adhesive backed tape.

3.3 Trenching

.1 Do trenching work in accordance with Section 02315 - Excavating, Trenching and Backfilling.

.2 Trench depth to provide cover over pipe of not less than 1 m from finished grade.

.3 Trench alignment and depth require Engineer's approval prior to placing bedding material or pipe.

3.4 Granular Bedding and Surround

.1 Place bedding and surround material in unfrozen condition.

.2 Place materials in uniform layers not exceeding 150 mm compacted thickness up to 300 mm above top of pipe. Compact each layer before placing succeeding layer. Avoid compaction directly over pipe with less than 300 mm of cover.

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

.4 Shape transverse depressions in bedding as required to make joints.

.5 Compact each layer full width of bed to at least 90 % maximum density to ASTMD698.

.6 Fill authorized excavation or unauthorized over excavation below design elevation of bottom of specified bedding with compacted bedding material.

3.5 Pipe Installation

.1 On dry ground, assemble shipping lengths of pipe into suitable installation lengths by heat butt-fusion.

.2 Provide trained personnel and jointing machine approved by pipe manufacturer for butt-fusion jointing of polyethylene pipe. Obtain services of trained technician from pipe manufacturer to certify and/or train Contractor's personnel on jointing procedures and inspect jointing machine. Obtain letter from manufacturer certifying that Contractor's representative(s) who will perform jointing, is/are qualified and that jointing equipment has been inspected and is suitable for pipe supplied.

.3 Follow manufacturer's instructions in butt-fusion of joints.

.4 Join pipes at flanged ends in accordance with manufacturer's recommendations.

.5 Recheck pipe joints assembled above ground after placing in trench to ensure no movement of joints has taken place.

.6 Complete installation of rigid polyurethane halves on joints after laying pipe in trench and after successful pressure testing of pipe.

.7 Install heat shrink sleeves using large broad flame propane torch to produce 600 mm flame.

.1 Peel back release liner 12 cm from end, centre sleeve over joint and press firmly down. Wrap sleeve around pipe, removing release liner as it is wrapped. If corner on underlap is not precut, then cut off about 25 mm from each corner.

.2 Before completing overlap wrapping, warm underlap area approximately 12 cm until adhesive starts to appear at edge. Smooth out any wrinkles with gloved hand.

.3 Remove remaining release liner and complete wrapping.

.4 Remove release paper from closure seal, prewarm adhesive slightly, centre seal over overlap and press down until well bonded. Heat closure seal, and press down with gloved hand to remove any bubbles and wrinkles.

.5 With torch, start at centre of sleeve and shrink it all around joint. Keep torch moving using broad circumferential strokes to avoid burning. continue shrinking sleeve toward one end until about 50mm is left. Then aim torch inward towards centre and shrink edges. Repeat this operation on other end of sleeve. Finish off by applying long horizontal strokes of torch all around sleeve.

.6 Pay special attention to sleeve overlap area, ensuring no void remains along underlap edge. Use roller, or gloved hand to firmly and thoroughly press down along underlap edge. Start in centre and work outwards.

.7 Allow joint and sleeve to cool for at least 30 min before lowering pipe into trench.

.8 Lay pipes on prepared bed, true to line and grade as indicated. No deviations to be made without written approval of Engineer. Ensure barrel of each pipe is in contact with shaped bed throughout its full length. Take out and replace defective pipe. Correct pipe that is not in true alignment or grade, or pipe that shows undue settlement after installation. Change method or equipment for setting alignment or grade if requested by Engineer.

.9 Do not lay pipe on frozen bedding.

.10 Do not let rocks or other foreign material, which might damage insulation jacket, fall on pipe.

.11 Keep jointing materials and installed pipe free of dirt and water and other foreign materials. Install removable watertight bulkhead at open end of pipe to prevent entry of foreign materials.

3.6 Pipe Backfilling

.1 Do backfilling work in accordance with Section 02315 - Excavating Trenching and Backfilling.

.2 Lay continuous runs of warning tape on top of surround material 300 mm directly above water mains.

.3 Upon completion of pipe laying and after Engineer has inspected work in place, surround and cover pipes between joints.

.4 Protect pipe from freezing if temperatures lower than minus 5°C.

.5 When Engineer accepts testing results, surround and cover joints and fittings with surround material placed and compacted as specified.

.6 Place backfill material above pipe surround, in uniform layers not exceeding 150 mm compacted thickness.

.7 Mechanically compact each layer to at least 90 % maximum density to ASTMD698.

3.9 Testing

1. Give five (5) days written notice of date for tests.
2. Insulted or conceal work only after testing and approval by Engineer.
3. Engineer reserves the right to be present during testing.
4. Bear costs including retesting and making good.
5. Prior to tests, isolate all equipment or other parts which are not designed to withstand test pressures or test medium.
6. Hydrostatically test the high density polyethelene piping systems prior to installation in accordance with the following procedures, as recommended by the pipe manufacturer:

   .1 Over a period of three (3) hours, slowly raise the pressure in the pipe to 1.5 times the rated pressure of the pipe.

   .2 During the next 1 hour, maintain the required test pressure.

   .3 Start the test after the above described initial "pipe stretch" period.

   .4 Observe and record the hydrostatic pressure in the pipe over the next 3 hour period at ½ hour intervals.

   .5 At the end of the 3 hour test period, measure the amount of makeup water required to be added to the system to return the pipe to the test pressure.

   .6 An acceptable test is one for which the amount of makeup water does not exceed the following:

Nominal Pipe Size	Maximum Allowable Makeup Water @ 23°C.
100	5.0
250	7.8
300	12.6

Correction (Multiplication) factor to be applied to make up water.

Pipe Testing Temperature	Allowance in Table Above
23°C	1.0
22°C	0.875
20°C	0.75
18°C	0.66
16°C	0.60
14°C	0.53
12°C	0.47
10°C	0.42
8°C	0.36
6°C	0.325

For pipe testing temperatures between those listed above, interpolate correction factor.

For pipe testing temperatures above or below limits tabulated, contact Engineer.

.7 Allow a minimum of 8 hours between successive polyethelene pipe tests to allow pipe to "relax".

.8 Hydrostatically test steel piping system by pressurizing with water to 860kPa, and maintaining this pressure for a period of 4 hours without leakage.

.9 Flush out all new piping with fresh, clean water for a period of one (1) hour following final pressure test.

.10 Provide written documentation of all test results, for acknowledgement by Engineer.

3.10 Flushing and Disinfecting Water Lines

.1 Flushing and disinfection operations shall be carried out by the Contractor and must be witnessed by the Public Works Representative, or Engineer. Notify the Engineer at least five (5) days in advance of the proposed date when disinfecting operation will commence.

.2 Complete all leakage procedures, standards and tests before flushing and disinfection.

.3 Before being placed into service, all new process piping shall be flushed and disinfected.

.4 Flush all piping through available outlets with a sufficient flow to produce a velocity of 1.5 m/s, within the pipe for thirty (30) minutes, or until all foreign materials have been removed and the flushed water is clear. This includes the intake casings and is to be completed prior to final installation.

.5 Supply materials and test kits to carry out disinfection tests for total and fecal coliforms; and total and residual chlorine at no additional cost to the Owner.

.6 Disinfect immediately after flushing. Disinfect all potable water pipes. Use either Method A or B as indicated:

Method A

.1 Fill piping system with chlorine/water solution with a strength of at least 50mg/L. Ensure pipe is full and no air pockets remain.

.2 Leave solution in piping system for 24 hours, while maintaining a pressure of 175 kPa.

.3 After 24 hours sample and test the chlorine solution for total and fecal coliform (FC) levels. If the chlorine residual is at least 25 mg/L and the FC levels are within acceptable limits, the disinfection will be considered successful. Flush chlorine solution from the piping system. Protect against contamination of the disinfected system.

.4 If the chlorine residual is less than 25 mg/L or the total and FC levels are unacceptable, flush the piping system, clean any deleterious material, reflush and disinfect again. Repeat until satisfactory.

Method B

.1 Introduce chlorine solution into the intake casing to achieve a chlorine residual of 50 mg/L in the discharge pipe, which is to be recirculated back to the pump.

.2 Operate the pump and allow the chlorine solution in the intake casing. Operate continuously for 2 hours.

.3 After 2 hours sample and test the chlorine solution and the total and fecal coliform (FC) levels. If the chlorine residual is at least 25mg/L and the total and FC levels are within acceptable limits, the disinfection will be considered successful. Flush chlorine solution from the piping system. Protect against contamination of the disinfected system.

.4 If the chlorine residual is less than 25mg/L or the total and FC levels are unacceptable, flush the piping system, clean any deleterious material, reflush and disinfect again. Repeat until satisfactory.

.7 The Contractor shall collect two (2) samples of disinfectant solution for bacteriological testing. The Contractor is responsible for submitting the samples to an accredited laboratory for total and fecal coliform testing for verification of field tests. The results are to be sent to the Engineer for confirmation.

.8 If, in the opinion of the Engineer, any component of the potable water system becomes contaminated after disinfection, it shall be flushed and disinfected again at no additional cost to the Owner.

.9 Flush water is to be disposed of at the community sewage lagoon.

END OF SECTION