

STURGEON LAKE CFS TEMPORARY MODULAR OFFICE COMPLEX

**STURGEON LAKE CREE NATION
CHILD AND FAMILY SERVICES SOCIETY
STURGEON LAKE, ALBERTA**

CONTRACT DOCUMENTS



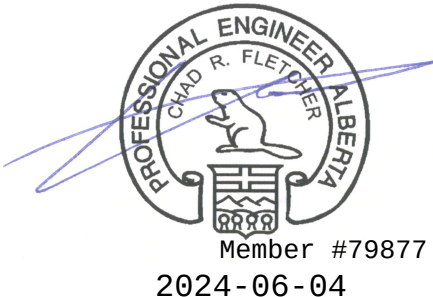
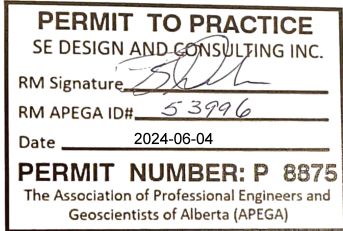
SE DESIGN AND CONSULTING INC.

PART 1 GENERAL

- 1.1** SEALS AND SIGNATURES: SEALS AND SIGNATURES ATTACHED TO THIS SECTION AUTHENTICATE THAT PROJECT SPECIFICATIONS PREPARED AND DELIVERED BY THE LISTED REGISTERED PROFESSIONALS ARE APPROPRIATE FOR PROPER USE AND CAN BE RELIED UPON FOR THE DELIVERY OF SERVICES DESCRIBED BY THE SPECIFICATIONS, AND AS FOLLOWS:
- .1 Seals and Signatures do not represent a warranty nor create a guarantee of accuracy for the information contained in the Specifications.
 - .2 Seals and Signatures are provided by the listed Registered Professionals according to provincial legislation and standards of conduct described by regulatory bodies.
 - .3 Information contained in the document set was created by or under the direct supervision of Registered Professionals licensed for the discipline and extent of Work associated with the Seals and Signatures applied to this Section. Status of Drawings: Seals and Signatures attached to Drawings have the same status as Seals and Signatures attached to Specifications as described in this Section and as follows:
 - .4 Drawings and Specifications are complementary, and what is required by one document is required by all documents.
 - .5 Consultant will interpret any request for interpretation of the Drawings and Specifications in accordance with the Contract. Document Set: Seals and Signatures attached to this Section authenticate use of the Specifications only for the document set described below:
 - .6 Project Name: Sturgeon Lake CFS Temporary Modular Office Complex
 - .7 Client Name: Sturgeon Lake Cree Nation Child and Family Services Society
 - .8 Project No.: MISC-0396
 - .9 Date: 2024-06-04
 - .10 Purpose: Issued for Tender

PART 2 REGISTERED PROFESSIONAL OF RECORD

- 2.1** DISCIPLINE: CIVIL ENGINEERING
NAME AND TITLE: CHAD FLETCHER, P.ENG
COMPANY: SE DESIGN AND CONSULTING INC.

<p>Stamp:</p> 	<p>Permit to Practice:</p> 
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Authentication applies to Documentation and Specification Sections listed below.

2.2 AUTHENTICATED DOCUMENTS

Section No.	Title:
	INVITATION TO TENDER
	TABLE OF CONTENTS
	INSTRUCTIONS TO TENDERERS – TABLE OF CONTENTS
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	CONTRACT TENDER FORM
	GENERAL CONDITIONS – TABLE OF CONTENTS
	GENERAL CONDITIONS
	SPECIFICATIONS
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01005	GENERAL INSTRUCTIONS
01290	MEASUREMENT AND PAYMENT
01501	GENERAL PROJECT REQUIREMENTS
01502	TRAFFIC ACCOMODATION
01503	SAFEGUARDING UTILITY INSTALLATIONS
01545	SAFETY REQUIREMENTS
01560	ENVIRONMENTAL PROTECTION
02000	SPECIAL PROVISIONS
02070	PROTECTION AND REMOVALS
02072	GEOTEXTILE
02232	CEMENT MODIFIED SUBGRADE
02233	TOPSOIL STRIPPING
02315	TRENCHING AND BACKFILLING
02340	SUBGRADE CONSTRUCTION
02371	RIPRAP
02372	EROSION AND SEDIMENT CONTROL
02434	PIPE CULVERTS
02511	WATER MAIN
02585	BUILDING SERVICES
02630	SEWER MAINS
02721	GRANULAR BASE COURSE
02911	TOPSOIL REPLACEMENT AND SEEDING
18976	PARKING BUMPERS
260534	CONDUITS

INVITATION TO TENDER

Sturgeon Lake CFS Temporary Modular Office Complex Sturgeon Lake Cree Nation Child and Family Services Society

Sealed tenders marked "**Sturgeon Lake Cree Nation Child and Family Services Society – Sturgeon Lake CFS Temporary Modular Office Complex**" will be received at the office of SE Design and Consulting Inc. (SE Design) in Cold Lake up to **2:00 PM, June 18th, 2023**. Electronically submitted tenders **will be** accepted. In the case of email submission, a hard copy via mail, postmarked prior to the cutoff time will be required.

The Tender opening will not be public. SE Design will issue the unofficial tender results to all bidders who submit within two hours of the tender close. As an alternative, Contractors may contact SE Design and Consulting at 780-594-5380 two hours after the tender closing to receive the unofficial tender results from the opening.

The work generally involves the construction of:

Temporary Modular Office Complex – Site Preparation

1. Waste stripping to Common	775m ³
2. Trenching and Backfilling	36 l.m.
3. Supply and install 100mm sanitary service	20 l.m.
4. Supply and install 50mm water service	21 l.m.
5. Supply and place water cistern complete with pump	Lump Sum
6. Supply and place sanitary holding tank	Lump Sum
7. Common excavation of embankment	3,600 m ³
8. Waste exaction of unsuitable material to Common	3,320 m ³
9. Supply and place borrow in road and parking areas	3,660 m ³
10. Supply and place engineered fill under building	3,010 m ³
11. Subgrade preparation	4,500 m ²
12. Supply, place, and compact gravel at 150mm depth	975 m ²
13. Supply, place, and compact gravel at 450mm depth	1,355 m ²
14. Supply, place, and compact gravel at 300mm depth	1,660 m ²
15. Shaping and grading of drainage ditch and swale	175 l.m.
16. Place topsoil from the on-site stockpile	3,000 m ²
17. Broadcast seeding	4,475 m ²
18. Supply and install CSP	2 ea.
19. Supply and install concrete parking bumper	11 ea.
20. Provisional: Supply and install Geogrid	850 m ²
21. Provisional: 20kg cement stabilization	850 m ²

Tender documents can be downloaded from the sedesign.ca website on or after **2:00 PM, June 4th, 2024.**

Tenders must be accompanied by a Bid Bond or Certified Cheque in the amount of 10% of the tender amount and made payable to Sturgeon Lake Cree Nation Child and Family Services Society.

A mandatory site visit will be held on **June 11th, 2024, at 1:00 PM MST** at the proposed project location. See ***Mandatory Site Visit Location Map*** in ***Appendix A*** for details.

All questions must be submitted to the Engineer in writing prior to **5:00 PM MST June 12th, 2024.**

The lowest or any tender will not necessarily be accepted. The prices tendered will not be the only consideration in evaluating whether to accept the tender from a qualified tenderer. Commitment to use of local forces, local economic impact, experience of personnel, nature of equipment used, proposed construction scheduling and references on previous work undertaken by the tenderer will also be considerations.

Chad Fletcher, P.Eng.



Chad
Fletcher

Digitally signed by Chad Fletcher
DN: cn=Chad Fletcher, c=CA, o=CENTRE
DE CERTIFICATION DU QUEBEC, ou=P.
Eng.,
email=chadfletcher@roninconsultinggroup.ca
Reason: I am approving this document
Date: 2024.06.04 12:36:34 -06'00'

SE Design and Consulting Inc.
713 Lakeshore Drive
Cold Lake, Alberta
T9M 0C4

PHONE: 780-594-5380
FAX: 780-594-4486

STURGEON LAKE CFS TEMPORARY MODULAR OFFICE COMPLEX

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02371	RIPRAP	3
02372	EROSION AND SEDIMENT CONTROL	3
02434	PIPE CULVERTS	5
02511	WATER MAIN	16
02585	BUILDING SERVICES	6
02630	SEWER MAINS	10
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APPENDIX A

MANDATORY SITE VISIT LOCATION MAP

PRIME CONTRACTOR AGREEMENT

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FAMILY SERVICES (CFS) TEMPORARY HOUSING – STURGEON LAKE CREE NATION
RESERVE #154, ALBERTA - ENC TESTING INC.

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1.0 Tender Submission

.1 The Tenderer is required to investigate and satisfy themselves of everything and every condition affecting the work to be performed and the labour, material, and equipment to be provided, and it is mutually agreed that submission of a tender shall be conclusive evidence that the bidder has made such an investigation. Tenderer, having carefully examined the Contract Documents (IT BEING UNDERSTOOD AND AGREED THAT FAILURE TO HAVE DONE SO WILL NOT RELIEVE US OF OUR OBLIGATION TO ENTER INTO A CONTRACT AND CARRY OUT THE WORK FOR THE CONSIDERATION SET OUT HEREFTER) and the locality of the proposed work, and having full knowledge of the work required and of the materials to be furnished and used, hereby agrees to provide all necessary materials, supervision, labour and equipment and perform and complete all work and fulfill everything as set forth and in strict accordance with the Contract Documents.

.2 Tenders can be submitted in PDF format by way of email to SE Design and Consulting Inc. and/or by hard copy to SE Design and Consulting Inc. Cold Lake office. Where tenderers choose to submit electronically, the original hard copy is to be sent by regular mail or courier postmarked prior to the cutoff time. The tenderer is to submit the tender in a sealed, clearly marked envelope. The tenderer is to provide their name and address on the envelope. The envelope is to be addressed as follows:

**Sturgeon Lake Cree Nation Child and Family Services Society
Sturgeon Lake CFS Temporary Modular Office Complex
SE Design and Consulting Inc. Offices
712 Lakeshore Dr,
Cold Lake, Alberta
T9M 0C4**

Attention: Chad Fletcher

For email submission, the tenderer is to send to engineering@sedesign.ca with a subject line as follows:

**Sturgeon Lake Cree Nation Child and Family Services Society –
Sturgeon Lake CFS Temporary Modular Office Complex**

.3 Submit on Contract Tender Forms provided.

.4 All bid prices and other information required in the Tender Forms to be completed.

.5 Alterations to the Tender Forms or conditional letters may make tender submission liable to rejection.

.6 Sign Tender Forms and provide business address and telephone number.

- .7 Sign the Compliance with Specifications form.
- .8 Only duly authorized officials may sign Tender Forms.
- .9 Tenders of corporations must be sealed with the corporate seal.
- .10 Photocopy of the sealed tender will not be accepted and will be disqualified. Only the original sealed tender with the corporate seal will be accepted.

2.0 Examination of Documents and Site

- .1 Carefully examine the Contract Documents and the site of the works prior to submitting the Tender.
- .2 No claims for misunderstanding with respect to the conditions imposed by the Contract will be considered.
- .3 The Contract Documents contain a section referred to as Special Provisions, which contain any changes or modifications to any specific sections of the Contract Documents.
- .4 Changes to the Contract Documents during the tender period will be made by issuing an Addenda.
- .5 Report any discrepancies in or omissions from the drawings and other documents to the Engineer.
- .6 No verbal agreement or conversation with any officer, agent or employee of the Owner or the Engineer shall affect or modify any of the terms or obligations herein stated.

3.0 Tenderer's Questionnaire

- .1 Complete the questionnaire provided with Tender Documents identifying the necessary equipment and personnel to complete the work satisfactorily within the time stated in the Tender Form.
- .2 Failure to complete this questionnaire may result in tender rejection.

4.0 Subcontractors

- .1 Submit names of all subcontractors that will be employed on the work.
- .2 Changes in subcontractors will not be permitted without the written consent of the Engineer.

5.0 Materials

- .1 Submit names of materials suppliers, as well as trade and brand names of materials.
- .2 Changes will not be permitted without written consent of the Engineer.

6.0 Tender Price

- .1 Complete unit prices where required on the Tender Form.
- .2 Extend product of unit prices and tender quantities and provide a total tender amount.
- .3 Unit prices will govern where there is a discrepancy between unit prices and extended totals.
- .4 Engineer will correct errors in extended totals where these occur.

7.0 Bid Bond or Certified Cheque

- .1 Provide with tender submission a Bid Bond or Certified Cheque in the amount of 10% of the tender prices.
- .2 Bid Bond must be issued by a Surety company licensed to conduct business in Alberta.
- .3 A portion of or the entire amount of the Bid Bond or certified cheque will be forfeited to the Owner in the event the Tenderer fails to execute the Contract agreement or to provide the stipulated Surety Bonds.
- .4 The amount retained by the Owner will be equal to the difference between the Tenderer's price and that price that the Owner may legally contract with another party to perform the work.
- .5 Bid Bonds and certified cheques furnished by unsuccessful tenderers will not be returned after the Contract is awarded or as otherwise determined.
- .6 Bid will be disqualified if Bid Bond is not submitted by the close of the tender period.
- .7 The Contractor must provide proof of consent of surety by a Surety company licensed to conduct business in Alberta with the bid in the event they are the successful bidder.

8.0 Surety Bonding and Insurance

- .1 To ensure the faithful execution and proper fulfillment of this Contract, the Contractor shall provide the Owner with the following bonds at the time of their execution of the Contract Agreement:
 - .1 A Performance Bond in the amount of fifty percent (50%) of the Contract Price covering the faithful performance of the Contract, including the corrections after completion provided for in Article 27 hereof, and the payment of all obligations arising under the Contract.
 - .2 A Labour and Material Payment Bond in the amount of fifty percent (50%) of the Contract Price covering the payment of all labour and material used or reasonably required in the performance of the Contract.
- .2 These bonds must be issued by a surety company licensed to conduct business in the province or territory wherein the Work is located and shall be provided on forms acceptable to the Engineer and compatible with the forms contained within the Contract Documents.
- .3 If awarded Contract, provide certification of insurance coverage as required by General Conditions.
- .4 Provide bonding and certification of insurance coverage with the executed Contract Agreement within ten (10) days after being notified of the award of the Contract.

9.0 Revision of Tender

- .1 Revisions to the tender by FAX to 780-594-4486 will be accepted if received prior to the specified closing time to the office of SE Design and Consulting on the date the tender closes.
- .2 Faxed tenders will be accepted only if the original of the tender security is delivered to the office of SE Design and Consulting prior to the specified closing time on the date the tenders close.

10.0 Withdrawal of Tender

- .1 Tenders may be withdrawn by the Tenderer any time prior to one (1) hour of the time set for the closing of the tenders.

11.0 Tender Rejection

- .1 The Owner reserves the right to reject any or all tenders.
- .2 The lowest tender will not necessarily be accepted.
- .3 Any tender that is incomplete, obscure, or irregular, which has erasures or corrections in the Tender Form, in which prices are omitted or are unbalanced, or which has insufficient or irregular surety, may be rejected.

12.0 Alternative Materials and Equipment

- .1 The Contractor must construct the work using the product type and brand specified unless the Engineer approves alternative products.
- .2 Contractor will submit alternate products seven (7) days before tender closing for engineer review. Alternate products submitted for engineer review six (6) days before tender closing will not be accepted.
- .3 The Engineer will evaluate alternative products and issue an addendum if the alternate product is approved.

13.0 Safety Prequalification

1. Contracts will only be awarded to tenderers who, prior to the time fixed for receiving tenders, possess a valid Certificate of Recognition (COR) or a valid Temporary Letter of Certification (TLC) for a standard COR or a COR Equivalency Letter (COREL) for out of province Bidders, as issued by the Alberta Construction Safety Association (ACSA) or another certifying partner authorized by the Alberta Ministry of Labour to issue CORs, TLCs or CORELs.
2. The COR, TLC or COREL must be relevant to the work.
3. Possession of a Certificate of Recognition other than a standard COR, TCL or COREL, such as a Small Employer Certificate of Recognition (SECOR), is not acceptable.
4. Prospective Bidders who do not possess a standard COR, a TLC for a standard COR, or a COREL and wish to obtain information about obtaining one are advised to contact:

The Alberta Construction Safety Association
225 Parsons Rd, SW
Edmonton, Alberta T6X 0W6
Telephone: (780) 453-3311 or 1-800-661-2272
Fax: (780) 455-1120
Email: support@youracsa.ca

<https://www.youracsa.ca>

5. or another certifying partner authorized by the Alberta Ministry of Labour.
6. It is the Bidder's responsibility to ensure their registration in the program is properly documented with the issuing certifying partner; the Owner will assume no liability for errors or omissions in this regard.

14.0 Tender Evaluation

- .1 The Sturgeon Lake Cree Nation's tendering processes aim is to ensure that the most suitable contractor is selected for each project.
- .2 A tender evaluation process using weighted criteria is adopted to determine the tender that offers the best value. This process is utilized where the performance of the contractor is of crucial importance to achieving the required outcome.
- .3 The method of tender evaluation requires that selection criteria, in addition to price, are included in tender documents and form part of the tender assessment process. A system of selection criteria is used to compare tenders and identify the tenderer with the best performance, experience, cost, and value for money.
- .4 The selection criteria are as follows:
 1. Socio-economic community impact (maximum 15 points): The Nation is looking to award the work to a contractor that will work with the community to see a positive socio-economic impact from the construction works.

Tenderers are required to commit to the number of hours of work they intend to provide to self-identifying indigenous workers with a focus on Sturgeon Lake Cree Nation Members. The evaluation will also take into consideration work completed by other Indigenous workers, including members of other First Nations, Inuit, and Metis.

a. Point will be awarded as:

- i. Maximum 5 points for hours expected to be worked by Sturgeon Lake Cree Nation members.
- ii. Maximum 5 points for hours expected to be worked by other self-identified First Nations, Metis or Inuit workers.
- iii. Maximum 5 Points for value of expected contracts with subcontractors and/or vendors based in the Nation.

- b. The points will be awarded in each category by the following formula:

$$\text{Socio-Economic Community Impact Points} = (H/H_A) \times 5$$

Where H is the comparative hours/value for the category, and H_A is the average of the total work hours/value submitted by all tenderers. If the calculated value is negative, the allocated score shall be 0.

2. Relevant Experience (maximum 10 points): Previous experience of the tenderer needs to be assessed in relation to the fields of expertise required to achieve the project's intended outcomes. Recent experience is more valuable than historical experience. The company's previous experience in technical areas comparable to the tendered project, the scale of past projects, the role undertaken within those projects will be considered, and the company's overall safety record.

The Contractor must fill in the "Relevant Experience" form for three (3) projects included with the tender form. Failure to provide the information on three projects will result in a score of zero. For example, if the Contractor provides information on two projects, they will get 2/3 of the points.

2. Past Performance (maximum 9 points): The tendering organization's performance in completing past projects to the quality standards required, time performance, within budget, claims history, and project management will be assessed. The Contractor must fill in the form titled "Past Performance" for three (3) projects included with the tender form.

The Contractor must fill in the form titled "Past Performance" for three (3) projects included with the tender form. Failure to provide the information on all three projects will result in a score of zero. For example, if the Contractor provides information on two projects, they are eligible for 2/3 of the points.

3. Safety (maximum 6 points): The tendering organization's safety record for the past three years, including the latest WCB premium statement that details if your company paid a surcharge or discount. Failure to provide the information will result in a score of zero.

4. Price (maximum 60 points): The price is the sum that the Owner would be required to pay to the tenderer for the work or service provided. This must include all costs over the duration of the contract. The tenderer's Bid Price Rating will be determined with the following formula:

$$\text{Tender Bid Price Rating} = (1 - (P - P_m) / P_m) \times 60$$

Where P is the comparative offer of the tender offer under consideration, and P_m is the comparative offer of the lowest price received. In the event that the calculated value is negative, the allocated score shall be 0.

The following table is an example of a tender evaluation:

Scoring Price

Tenderer	Tenders (in ascending order)	Scoring Price
Tenderer #1	\$1,282,000.00	60
Tenderer #2	\$1,333,000.00	57.6
Tenderer #3	\$1,925,000.00	29.9

Total Scores

	Tenderer #1	Tenderer #2	Tenderer #3
Non-Price Points			
Socio-economic community impact (max 15 pts)	12.53	11.05	8.72
Relevant Experience (max 10 pts)	9.33	8.17	7.50
Past Performance (max 9 pts)	8.50	8.13	6.88
Safety (max 6 pts)	5	4	6
Total Non-Price Points (max 40 pts)	35.36	31.35	29.10
Price Points (max 60 pts)	60	57.6	29.9
Totals (max 100 pts)	95.36	88.95	59.00

15.0 **Award**

- .1 The Owner, or the Consultant, on behalf of the Owner, will issue a Notice of Award in writing to the successful Tenderer.
- .2 Notice will be given not later than sixty (60) days following the closing of tenders.

THIS CONTRACT AGREEMENT made in triplicate on the _____ day of
_____ 2024 by and between:

Sturgeon Lake Cree Nation Child and Family Services Society
Hereinafter called the "Owner" and

Hereinafter called the "Contractor"

The Owner and the Contractor agree as follows:

1. SCOPE OF THE WORK

The Contractor agrees to furnish all the material (except as otherwise specified to be supplied by others) together with all of the equipment and labour and transportation necessary to perform the entire Work described in the Contract Documents for the entire project entitled:

Sturgeon Lake CFS Temporary Modular Office Complex

Sturgeon Lake Cree Nation #154, AB

which Contract Documents have been prepared by SE Design and Consulting Inc. The Invitation to Tender, Tender Form, and drawings incorporated herein are included therein. The Contract Documents are an integral part of this Contract Agreement.

2. CONFLICTS AND PRECEDENCE OF DOCUMENTS

In the case of any inconsistency or conflict between the provisions of the separate parts of the Contract Documents, the separate parts shall take precedence and govern in accordance with the following order:

1. Contract Agreement
2. Invitation to Tender - SE Design and Consulting Inc.
3. Specifications - SE Design and Consulting Inc.
4. Drawings - SE Design and Consulting Inc.
5. Tender Form - SE Design and Consulting Inc.

3. TIME OF COMPLETION

The work to be performed under this Contract shall be completed by the 16th day of August 2024.

The contractor will perform their work faithfully and diligently to complete the project within this timeframe.

4. PAYMENT

The Owner shall pay the Contractor for the performance of the Contract in Canadian currency, at the prices named in the Contract Tender Form. A proper invoice must be submitted to the engineer at least every 31 days and not more than 60 days from the payment cut-off period, or payment will not be made to the contractor. The payment cutoff period will be at the end of every month during which the Work was performed. Payment will be made within 28 days of receipt of a proper invoice unless notice of dispute has been issued in writing by the Consultant.

A Proper Invoice must include:

- a. Identify the document as a "Proper Invoice" and the invoice number.
- b. The Contractor's name and business address.
- c. The Date of the proper invoice and the period during which the work was completed, or materials were provided.
- d. Identification of this contract as the authority for the work or Identification of the change order under which the work was completed.
- e. A description of the work done, or materials furnished.
- f. The amount requested for payment and the contract line item under which it is to be paid.
- g. The name, title and contact information of the SE design Project Manager.
- h. The name, title and contact information of the Owners Project Manager.

Ten percent (10%) of the value of work performed will be withheld from payment to the Contractor in accordance with the Prompt Payment and Builders' Lien Act and will be released to the Contractor in accordance with the provisions of the Act, upon completion of the entire project including correction of deficiencies and upon submission by the Contractor of the following documentation:

1. Letter from the Contractor stating that they have submitted all claims for payment related to the contract and paid all subcontractors and suppliers for work relating to the project.
2. Letter of Clearance from the Workers' Compensation Board. Statutory Declaration from the Contractor stating that there are no outstanding claims for payment related to the project from suppliers, subcontractors, labourers or any other parties affected by the work.

5. INSURANCE

Prior to commencing construction provide certification of insurance coverage for personal injury and property damage (minimum \$2,000,000.00).

6. WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, or to a member of the firm, or to an officer of the corporation for which it is intended, or if delivered or sent prepaid registered mail to its business address, and it shall be deemed received on the day next following the day of mailing.

CONTRACT AGREEMENT

IN WITNESS WHEREOF the Parties have executed this Contract Agreement, on the day and year first above written.

SIGNED, SEALED AND DELIVERED
in the presence of:

Witness to the Signature of
Sturgeon Lake Cree Nation
Child and Family Services Society

Name: _____

Signature: _____

Name: _____

Signature: _____

Witness to the Signature of
the Contractor

Name: _____

Signature: _____

Name: _____

Signature: _____

**Sturgeon Lake Cree Nation
Child and Family Services Society**

Name: _____

Signature: _____

Title: _____

Name: _____

Signature: _____

Title: _____

CONTRACTOR

Name: _____

Signature: _____

Title: _____

SEAL

Name: _____

Signature: _____

Title: _____

TENDER OF:

NAME

ADDRESS

TO: STURGEON LAKE CREE NATION

CHILD AND FAMILY SERVICES SOCIETY

PO BOX 60

VALLEYVIEW, ALBERTA

T0H 3N0

The undersigned Tenderer is required to investigate and satisfy themselves of everything and every condition affecting the work to be performed and the labour, material and equipment to be provided, and it is mutually agreed that submission of tender shall be conclusive evidence that the bidder has made such an investigation. Tenderer, having carefully examined the Contract Documents (IT BEING UNDERSTOOD AND AGREED THAT FAILURE TO HAVE DONE SO WILL NOT RELIEVE US OF OUR OBLIGATION TO ENTER INTO A CONTRACT AND CARRY OUT THE WORK FOR THE CONSIDERATION SET OUT HEREFTER) and the locality of the proposed work, and having full knowledge of the work required and of the materials to be furnished and used, hereby agrees to provide all necessary materials, supervision, labour and equipment and perform and complete all work and fulfill everything as set forth and in strict accordance with the Contract Documents and Addenda numbered ____ for the prices stated in the Tender Form Schedule of Quantities and Prices.

The undersigned agree also:

1. That the Owner is not obligated to accept this tender.
2. That this tender is made without any connection, knowledge, comparison of figures or arrangements with any other company, firm, or person making a tender for the same work.
3. That no person or firm other than the Tenderer whose signature is affixed below has any interest in this tender or in the proposed Contract.

4. That this tender is irrevocable for **sixty (60)** days after tender submission or closing time.
5. To execute the Contract Agreement within ten (10) days of the date of the Notice of Award of the Contract, such time limit being extended only on the Owner's written approval.
6. To commence and actively proceed with the work within seven (7) days of the date of the Notice to Proceed and to complete all work under the Contract within the period indicated in the Contract Agreement subject to the provisions of Article 41 of the General Conditions for extension of Contract time.
7. The work to be performed under this contract shall be completed by the **16th day of August 2024.**
8. Should they fail to complete the work within the contract time, they shall be required to compensate the Owner in accordance with the Contract Documents.
9. That no bonus will be allowed for completion in less time than the date stated in the Contract Agreement.
10. To do all extra work not reasonable inferable from the specifications or drawings but called for in writing by the Engineer and to accept as full compensation therefore payment in accordance with the provisions as stated in the General Conditions.
11. That the estimate of quantities shown in the Tender Form serves only to provide a basis for comparing tenders and that the actual job quantities will not necessarily correspond with the quantities shown in the Tender Form, and further, that the Owner has the right to increase or decrease the quantities in any or all items and to eliminate schedules or items entirely from the work. If the quantity is reduced or deleted from the work, the Contractor will not be financially compensated for any types of cost incurred. If the quantity is increased, the Contractor will be paid as per their unit price in the contract.
12. That payment for the work done will be made on the basis of the quantities measured by the Engineer and at the prices shown in the Tender Form which shall be compensation in full for the work done under the terms of the Contract.
13. That the Bidder has drawn their conclusions from the data provided in the geotechnical coring results within the Contract and has not relied on the opinions or recommendations provided.
14. That payment of the Contingency Allowance or portions thereof shall only be made in the event that the Engineer authorizes additional work, in which case the amount of the payment shall be determined as specified in the general Conditions.

This tender is executed under seal at _____, this _____

day of _____, 20____.

NAME OF FIRM: _____

ADDRESS: _____

FOR INDIVIDUAL OR PARTNERSHIP:

SIGNED, SEALED AND DELIVERED BY

(TENDERER - PLEASE PRINT)

(SIGNATURE OF TENDERER)

in the presence of:

NAME: _____

ADDRESS: _____

OCCUPATION: _____

SEAL

FOR LIMITED COMPANY:

The Corporate Seal of:

(TENDERER - PLEASE PRINT)

(SIGNATURE OF TENDERER)

was hereto affixed in the presence _____

(APPOINTMENT)

SEAL

(APPOINTMENT)

NOTE: If the Tenderer is by a joint venture, add additional forms of execution for each member of the joint venture in the appropriate form or forms as above.

STURGEON LAKE CREE NATION
TEMPORARY MODULAR OFFICE COMPLEX
STURGEON LAKE CREE NATION CHILD AND FAMILY SERVICES SOCIETY

SCHEDULE OF QUANTITIES

NOTE: The specification number refers to specification covering measurements and payment of the respective item						
Item	Spec. No.	Measurement and Payment Article	Description	Quantity and/or unit	Unit Price \$	Value \$
SCHEDULE 1.0 - GENERAL PROJECT REQUIREMENTS						
1.1	1501	6.1	General project requirements	1 l.s.		
TOTAL FOR SCHEDULE 1.0						
SCHEDULE 2.0 - REMOVALS						
2.1	2070	7.1	Remove existing 15m 500mm diameter CSP and dispose of offsite	1 ea.		
2.2	2000/2070 /2233	7.2	Waste stripping to Common (100mm depth) and compaction to 98% Standard Proctor Density	775 m³		
TOTAL FOR SCHEDULE 2.0						
SCHEDULE 3.0 - BUILDING SERVICES						
3.1	2315	8.1	Trenching & Backfilling to 98% Standard Proctor Density including disposal of surplus trench excavation	36 l.m.		
3.2	2630	8.2	Supply and install 100 mm Ø DR 35 PVC sanitary service	20 l.m.		
3.3	2630	8.3	Supply and install sanitary service riser	1 l.s.		
3.4	2000/2585	8.4	Supply and install 50mm Polyethylene Pressure Tubing water service line	21 l.m.		
3.5	2000/2511	8.5	Supply and install 50mm water service riser	1 l.s.		
3.6	2511	8.6	Supply and install CC valve c/w 20mm stop and drain, cast iron valve box, and cathodic protection	1 l.s.		
3.7	2000	8.7	Supply and install 3000 gallon water cistern and Webrol WT1005 water pump	1 l.s.		
3.8	2000	8.8	Supply and install 3700 gallon concrete sanitary holding tank	1 l.s.		
TOTAL FOR SCHEDULE 3.0						
SCHEDULE 4.0 - EARTH WORKS						
4.1	2000	9.1	Common excavation of embankment to a depth of 600mm and compaction to 98% Standard Proctor Density (150mm lifts)	3,600 m³		
4.2	2000	9.2	Waste excavation of unsuitable material to Common and compaction to 98% Standard Proctor Density (under proposed road, building pad and tank servicing access area)	3320 m³		
4.3	2000	9.3	Supply and place borrow material under road and parking areas c/w compaction to 98% Standard Proctor Density	3650 m³		
4.4	2000	9.3	Supply and place engineered fill under building c/w compaction to 98% Standard Proctor Density	3010 m³		
TOTAL FOR SCHEDULE 4.0						

STURGEON LAKE CREE NATION
TEMPORARY MODULAR OFFICE COMPLEX
STURGEON LAKE CREE NATION CHILD AND FAMILY SERVICES SOCIETY

SCHEDULE OF QUANTITIES

Item	Spec. No.	Measurement and Payment Article	Description	Quantity and/or unit		Unit Price \$	Value \$
			SCHEDULE 5.0 - SURFACE WORKS				
5.1	2340	10.1	Subgrade preparation to 300 mm depth c/w compaction to 100% Standard Proctor Density	4500	m²		
			Gravel Building Pad Structure				
5.2	2721	10.2	Supply, place and compact 150 mm depth minus 20 mm gravel c/w compaction to 100% Standard Proctor Density	975	m²		
			Gravel Drive Structure				
5.3	2721	10.2	Supply, place and compact 450 mm depth minus 20 mm gravel c/w compaction to 100% Standard Proctor Density	1355	m²		
			Gravel Parking Structure				
5.4	2721	10.2	Supply, place and compact 300 mm depth minus 20 mm gravel c/w compaction to 100% Standard Proctor Density	1660	m²		
			Provisional				
5.5	2072	10.3	Supply and install geogrid	850	m²		
5.6	2340/2232	10.4	20 kg cement stabilization	850	m²		
			TOTAL FOR SCHEDULE 5.0				
			SCHEDULE 6.0 - LANDSCAPING				
6.1	2000	11.1	Shaping and grading of 1.2m wide bottom drainage ditch	125	l.m.		
6.2	2000	11.2	Shaping and grading of grass swale	50	l.m.		
6.3	2911	11.3	Place topsoil from stockpile for landscape restoration (100mm depth)	3,000	m²		
6.4	2911	11.4	Supply and place roadside seed mixture by means of broadcast seeding c/w fertilizer and harrowing	4,475	m²		
			TOTAL FOR SCHEDULE 6.0				
			SCHEDULE 7.0 - MISCELLANEOUS				
7.1	2434/2371	12.1	Supply and install 500mm CSP 25m in legth c/w non-woven geotextile fabric, rip rap, and culvert markers	1	ea.		
7.2	2434/2371	12.1	Supply and install 400mm CSP 21m in legth c/w non-woven geotextile fabric, rip rap, and culvert markers	1	ea.		
7.3	18976	12.2	Supply and install concrete parking bumper	11	ea.		
7.4	2372	12.3	Supply and install 7.2m wide straw wattle	6	ea.		
7.5	2372	12.4	Supply and install silt fence	23	l.m.		
7.6	2315	8.1	Trenching for power conduit installation & Backfilling to 98% Standard Proctor Density including disposal of surplus trench excavation	95	l.m.		
7.7	260534	12.5	Supply and install 4in conduit c/w fish cord and plugs	95	l.m.		
			Provisional				
7.8	2000	12.6	Supply and install erosion control matting	350	m²		
			TOTAL FOR SCHEDULE 7.0				

STURGEON LAKE CREE NATION
TEMPORARY MODULAR OFFICE COMPLEX
STURGEON LAKE CREE NATION CHILD AND FAMILY SERVICES SOCIETY

SCHEDULE OF QUANTITIES

Item	Spec. No.	Measurement and Payment Article	Description	Quantity and/or unit	Unit Price \$	Value \$
TENDER SUMMARY						
SCHEDULE 1.0 - GENERAL PROJECT REQUIREMENTS				\$		
SCHEDULE 2.0 - REMOVALS				\$		
SCHEDULE 3.0 - BUILDING SERVICES				\$		
SCHEDULE 4.0 - EARTH WORKS				\$		
SCHEDULE 5.0 - SURFACE WORKS				\$		
SCHEDULE 6.0 - LANDSCAPING				\$		
SCHEDULE 7.0 - MISCELLANEOUS				\$		
TOTAL PROJECT COST				\$		

SOCIO-ECONOMIC COMMUNITY IMPACT

Tenderers are required to complete the table below, outlining their commitment to the socio-economic impact in the community.

1.0	Socio-Economic Community Impact Commitment	
1.1	Total Worker Hours Expected for the Project:	
	Number of Hours Expected to be completed by:	
1.2	Sturgeon Lake Cree Nation Members:	
1.3	Other self-identified First Nations, Metis or Inuit Workers:	
1.4	Value of expected contracts with subcontractors and/or vendors based in the Nation:	\$

RELEVANT EXPERIENCE

Previous experience of the tenderers will be assessed in relation to the fields of expertise required to achieve the intended outcomes of the project. Recent experience is more valuable than historic experience. The company's experience in technical areas comparable to the tendered project, the scale of past projects and the role undertaken within those projects will be considered. Projects must be relevant in scope and cost to this project. Tenderers are to include a list of 3 relevant projects starting with the most recent project. Tenderers are to provide the following information for each project:

Project #1

Project Name: _____

Project Sponsor (Nation, Town, City, Province etc): _____

Client's Project Manager (name and phone number):

- Name of Project Manager: _____
- Phone number: _____

Project Description (Project Scope):

Relevance to the tendered Project:

Role of the Tenderer (Prime, sub-contractor, other). If sub-contractor, indicate percentage of the work of the overall project you did as a sub-contractor _____%:

Indicate total Project Cost: _____

If Sub-Contractor on this project Indicate your Project Cost: _____

Duration of Project: _____

RELEVANT EXPERIENCE

Project #2

Project Name: _____

Project Sponsor (Nation, Town, City, Province etc): _____

Client's Project Manager (name and phone number):

- Name of Project Manager: _____
- Phone number: _____

Project Description (Project Scope):

Relevance to the tendered Project:

Role of the Tenderer (Prime, sub-contractor, other). If sub-contractor, indicate percentage of the work of the overall project you did as a sub-contractor _____%:

Indicate total Project Cost: _____

If Sub-Contractor on this project Indicate your Project Cost: _____

Duration of Project: _____

RELEVANT EXPERIENCE

Project #3

Project Name: _____

Project Sponsor (Nation, Town, City, Province etc): _____

Client's Project Manager (name and phone number):

- Name of Project Manager: _____
- Phone number: _____

Project Description (Project Scope):

Relevance to the tendered Project:

Role of the Tenderer (Prime, sub-contractor, other). If sub-contractor, indicate percentage of the work of the overall project you did as a sub-contractor _____%:

Indicate total Project Cost: _____

If Sub-Contractor on this project Indicate your Project Cost: _____

Duration of Project: _____

PAST PERFORMANCE

The tendering organization's performance in completing past projects to the quality standards required, time performance, within budget, claims history, project management, and product value will be assessed. Tenderers are to include a list of 3 past performance project starting with the most recent project. Projects must be relevant in scope and cost to this project. Tenderers are to provide the following information for each project:

Project #1

1) Project Name: _____

2) Project Description (Scope):

3) Project Sponsor (Nation, Town, City, Province etc): _____

4) Client's Project Manager (name and phone number):

- Name of Project Manager: _____
- Phone Number: _____

5) Tender Price: _____

6) Final cost: _____

7) If Final cost Higher than Tender price, explain:

8) Contract Completion date: _____

9) Actual Completion date: _____

10) If Actual Completion date after Contract Completion date, explain:

11) Claim History (Yes/No) (state if Yes):

PAST PERFORMANCE

Project #2

1) Project Name: _____

2) Project Description (Scope):

3) Project Sponsor (Nation, Town, City, Province etc): _____

4) Client's Project Manager (name and phone number):

- Name of Project Manager: _____
- Phone Number: _____

5) Tender Price: _____

6) Final cost: _____

7) If Final cost Higher than Tender price, explain:

8) Contract Completion date: _____

9) Actual Completion date: _____

10) If Actual Completion date after Contract Completion date, explain:

11) Claim History (Yes/No) (state if Yes):

PAST PERFORMANCE

Project #3

1) Project Name: _____

2) Project Description (Scope):

3) Project Sponsor (Nation, Town, City, Province etc): _____

4) Client's Project Manager (name and phone number):

- Name of Project Manager: _____
- Phone Number: _____

5) Tender Price: _____

6) Final cost: _____

7) If Final cost Higher than Tender price, explain:

8) Contract Completion date: _____

9) Actual Completion date: _____

10) If Actual Completion date after Contract Completion date, explain:

11) Claim History (Yes/No) (state if Yes):

SAFETY

Contractor Health and Safety Pre-Qualification Evaluation

1. Company Information:

Company Name: _____
Company address: _____
City: _____ Province: _____
Postal Code: _____
Telephone Number: _____ Fax: _____
Company Representative:
Name: _____
Position: _____
Phone Number: _____ E-Mail: _____

2. Questions:

Yes

No

- Have you had any fatalities occurred within the last 3 years?
• If so, submit your corrective action plan.
- Have you been on site where a fatality has occurred within the last 3 years?
• If so, submit your corrective action plan (as appropriate)
- Have you had any OHS Orders issued within the last 3 years?
• If so, submit your corrective action plan.
- Have you had any Environmental Orders issued from Alberta Environment and Parks?
• If so, submit your corrective action plan.

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3. Supporting Documents:

Yes

No

- Certificate of Recognition (COR, MECOR, SECOR, TLC)
- WCB Premium Statement
- WCB Clearance Letter issued within the last 30 days
- Health, Safety and Environmental Manual
- Emergency Response Plan Manual
- Hazard Assessments appropriate for the project
- Safety Work Procedures appropriate for the project
- Copy of Safety Certificates for all employees on-site (First Aid, WHMIS etc..)
- Insurance Certificate(s) that include:
 - Minimum limit of \$5,000,000 Umbrella Liability
 - Builder's Risk Course of Construction Insurance
 - Public and Property Damage
 - Coverage for owned and hired motor vehicles
 - Professional Liability Insurance
 - Contractor's Equipment Insurance

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The signatory of this document guarantee's the trust and accuracy of all responses given herein, and is an authorized officer or agent of the company. I understand that a false statement or fictitious documentation may disqualify the bid.

Print Name:

Signature:

Date:

4. Sturgeon Lake Cree Nation Child and Family Services Society Review

☐ Acceptable

☐ Conditional (attach action plan)

☐ Unacceptable

Print Name:

Signature:

Date:

TENDERER'S QUESTIONNAIRE

The Tenderer shall provide the following information in order that the Owner may judge their ability to fulfill the Contract requirements.

1. The size, model, and make of the equipment which the Tenderer will place on the project and use during the course of the work is as follows:

Equipment	Size	Model	Make
<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>

2. The average number of workers the Tenderer will employ and maintain on the project is

3. The name of the superintendent that the Tenderer will place on the project and their previous experience on this type of construction is as follows:

4. It is the intention of the Tenderer that the following work will, on approval of the Engineer, be subcontracted to the firms indicated below:

Trade	Subcontractor
<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>

ADDENDA RECEIVED

The Tenderer shall provide information pertaining to any addenda received during the tender period.

Addendum No.	Indicate Time and Date Received

Signed:

Contractor (Tenderer):

Address:

Date:

COMPLIANCE WITH SPECIFICATIONS

This form must be completed and signed to constitute a formal tender.

We have examined these specifications thoroughly and fully understand all conditions that do or can affect the work to be done under these specifications. We hereby certify that the work offered in our tender complies in every aspect to the Owner's specifications.

We understand the requirements set out by Alberta Environment and Parks that do or can affect the work to be performed. We hereby certify that the work offered in our tender complies with the guidelines of Alberta Environment and Parks.

(Contractors Representative: Print Name and Title)

(Signature)

(Date)

(Witness Signature)

(Date)

TENDERER'S INDICATIVE PROGRAM

The tenderer shall attach an indicative program, reflecting the following:

- Contract period,
- Proposed sequence or order of execution of the work,
- Resources anticipated,
- Tempo of execution of the various activities comprising the work for this contract.

Signed by the Tenderer:

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1. DEFINITION OF TERMS

- .1 "OWNER" is the Owner named in the Contract Agreement.
- .2 "CONTRACTOR" is the Contractor named in the Contract Agreement.
- .3 "ENGINEER" is SE DESIGN AND CONSULTING INC., or such other Engineer as may from time to time be duly authorized and appointed in writing by the Owner.
- .4 "SUBCONTRACTOR" shall mean any person, firm, or corporation having a contract for the execution of a part or parts of the work included in this Contract, and a person, firm, or corporation furnishing material called for in this Contract and worked to a special design according to the drawings or specifications but does not include one who merely furnishes material not so worked.
- .5 "OTHER CONTRACTOR" wherever used in these documents means any person or firm or corporation employed by or having a Contract directly or indirectly with the Owner other than through the Contractor.
- .6 "CONTRACT" shall be the executed Contract Agreement between the Owner and the Contractor.
- .7 "CONTRACT DOCUMENTS" shall mean and include the complete set of documents, specifications, drawings, and addenda incorporated therein, as listed in the Index of Contract Documents.
- .8 "CONTRACT PRICE" shall mean the amount of the Contract as shown in the Contract Tender Form.
- .9 "WORK" wherever used in these documents shall mean the entire Work, including materials, labour, equipment, transportation or other facilities or items ancillary to the foregoing, required to be done, furnished and performed by the Contractor to complete the Contract in accordance with the Contract Documents.
- .10 "UNCLASSIFIED WORK" shall mean work not covered in unit prices or lump sum amounts in the Tender Form.
- .11 "GUARANTEE PERIOD" shall be a specified period of time beginning on the date stated in the "Notice of Acceptance".
- .12 "GUARANTEE FUND" is an amount held by the Owner during the Guarantee Period to ensure correction of deficiencies.

.13 "CERTIFICATES"

- .1 Monthly Progress Certificate shall mean a certificate issued by the Engineer periodically, based on which payments on account are made.
 - .2 Construction Completion Certificate shall mean a certificate issued by the Engineer and approved by the Owner upon substantial completion of the Work including clean-up and rectification of all deficiencies and setting the commencement of Guarantee Periods.
 - .3 Release of Holdback Certificate shall mean a certificate issued by the Engineer upon expiration of the 45 day Statutory Limitation period authorizing the payment of Holdback.
 - .4 Final Acceptance Certificate shall mean a certificate issued by the Engineer within 14 days after the end of the period of guarantee provided that the Conditions of the Contract have been met.
- .14 "FIELD ORDER" is a written communication from the Engineer, at the site, to the Contractor, ordering changes in the Work, clarifying the Contract Documents, issuing instructions or requesting information.
- .15 "NOTICE OF PROPOSED CHANGE" is a written communication issued from the Office of the Engineer during the course of the Work informing of the changes to be made in the Work.
- .16 "CHANGE ORDER" is a written communication issued by the Owner, setting forth the authorized amount by which the Contract Price is to be altered as a result of changes in the Work ordered by a Notice of Proposed Change.
- .17 "FORCE MAJEURE" means any act of God, epidemic, pandemic, disease, government intervention, act of government, major storms, civil disturbance or any similar major event or occurrence not within the control of a party and which, by the exercise of due diligence by such party, could not have been prevented, but lack of funds on the part of such party shall be deemed not to be a Force Majeure.

2. INTENT OF CONTRACT DOCUMENTS

- .1 The intent of the Contract Documents is that the Contractor shall provide all necessary materials, supervision, labour, equipment, and all else necessary for the proper execution of the Work unless specifically noted otherwise.
- .2 The Contractor shall do all the Work shown on the drawings and described in the specifications and all incidental Work necessary to complete the project.
- .3 Any representations in the tender documents were furnished merely for the general information of bidders and were not in any way warranted or guaranteed

by or on behalf of the Owner or the Owner's consultants' and it's sub-consultants employees, and neither the Owner nor it's consultants or its employees shall be liable for any representations, negligent or otherwise contained in the documents.

3. DRAWINGS AND SPECIFICATIONS

- .1 Except as provided for otherwise, a maximum of one (1) copy of drawings and specifications for the execution of the Work shall be furnished to the Contractor without charge.
- .2 Additional instructions may be issued by the Engineer during the progress of the Work by means of drawings or otherwise for clarification of the drawings and specifications, or as may be necessary to explain or illustrate changes in the Work to be done.
- .3 One (1) complete set of all drawings and specifications shall be maintained at the job site and shall be available to the Engineer at all times.

4. DOCUMENT CONFLICT

- .1 In case of any inconsistency or conflict between the provisions of the Contract Documents, the provisions of such documents and addenda thereto shall take precedence and govern in the following order:
 - .1 Contract Agreement
 - .2 Tender Form
 - .3 Special Provisions
 - .4 General Conditions
 - .5 Specifications
 - .6 Drawings
 - .7 Instructions to Tenderers
 - .8 Invitation to Tender
 - .9 All other Documents
- .2 Figured dimensions on a drawing take precedence over measurements scaled from the drawing, and large-scale drawings take precedence over those of smaller scale.
- .3 Supplementary drawings and specifications supersede their antecedents.
- .4 In case of conflict between figured dimensions on a drawing and the dimensions of a specified product, the dimensions of the specified product shall govern.
- .5 In case of conflict in materials and methods, the specifications govern.
- .6 The drawings and specifications complement each other and anything called for by one shall be as binding as if called for by both.

- .7 The apparent generality of the drawings and specifications as to any detail or the apparent omission from them of a detailed description concerning any point, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the first quality are to be used.

5. DISCREPANCIES

- .1 Any discrepancies found between the drawings and specifications or any errors or omissions in the drawings or specifications shall immediately be reported to the Engineer, who shall promptly correct such error or omission in writing.
- .2 Any Work done after discovery of such discrepancies, errors, or omissions shall be done at the Contractor's risk.

6. SHOP DRAWINGS

- .1 The Contractor shall arrange for the preparation of a minimum of 2 sets of clearly identified shop drawings, 1 of which will be retained by the Engineer.
- .2 The Contractor shall ensure that the drawings conform to the following standards:
 - .1 All drawings are to be metric.
 - .2 All dimensions are to be in metres or millimetres.
 - .3 Drawings are to be done to one of the following scales:
 - 1:20 - Small Intricate Details
 - 1:50 - General Details
 - 1:500 - Overall Layout and Large Plans
 - 1:1000 - Key Plans
 - .4 Sheet sizes are to be one of the following:
 - 216 X 280
 - 280 X 432
 - 432 X 559
 - 559 X 864
 - 864 X 1118
 - .5 Imperial catalogue sheets will be accepted if the dimensions given are converted to metric.
- .3 Prior to submission to the Engineer the Contractor shall review all shop drawings.
- .4 By this review the Contractor represents that he has determined and verified all field measurements, field construction criteria, materials, catalogue numbers and similar data or will do so and that he has checked and coordinated each shop drawing with the requirements of the Work and of the Contract Documents.

- .5 The Contractor's review of each shop drawing shall be indicated by stamp, date and signature of a responsible person.
- .6 The Contractor shall submit shop drawings to the Engineer for his review with reasonable promptness and in orderly sequence so as to cause no delay in the Work or in the Work of Other Contractors.
- .7 If either the Contractor or the Engineer so requests they shall jointly prepare a schedule fixing the dates for submission and return of shop drawings.
- .8 Shop drawings shall be submitted in the form of a reproducible transparency or prints as the Engineer may direct or electronically as PDF documents.
- .9 At the time of submission the Contractor shall notify the Engineer in writing of any deviations in the shop drawings from the requirements of the Contract Documents.
- .10 The Engineer will review and return shop drawings in accordance with any schedule agreed upon, or otherwise with reasonable promptness and in no case will the period between receipt of shop drawings and return of the submissions exceed 14 days.
- .11 The Contractor's shop drawings will be reviewed by the Engineer only for the limited purpose of checking for general conformance with information given and the design concept expressed in the Construction Contract documents. The Engineer's review of shop drawings is not for the purpose of determining the feasibility of constructability of the Work detailed within the Shop drawings. Such review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the Contract Documents unless a specific deviation on the shop drawings has been approved in writing by the Engineer.
- .12 The Contractor shall make any changes in shop drawings which the Engineer may require consistent with the Contract Documents and re-submit unless otherwise directed by the Engineer.
- .13 When re-submitting, the Contractor shall notify the Engineer in writing of any revisions other than those requested by the Engineer.

7. REFERENCE POINTS AND LAYOUT

- .1 The Engineer shall establish base lines and reference points, for the location of principal components of the Work, as well as bench marks in reasonable proximity to the Work.
- .2 The Contractor shall carefully preserve bench marks, reference points and stakes, and legal survey pins, and in case of willful or careless destruction, the

Contractor will be charged with the resulting expense and shall be responsible for any mistakes that may be caused by their loss or disturbance.

- .3 The Contractor shall provide all detailed layout of dimensions, locations, and elevations of the Work from the base lines, reference points, and bench marks set by the Engineer.
- .4 The Contractor shall not proceed with the Work until he has made timely demands upon the Engineer for, and has received from the Engineer, such base lines, reference points, elevations and other points and instructions required for the execution of the Work.
- .5 In some cases, if so specified in the Special Provisions, the Engineer will provide detailed layout of the Work. When it is the Engineer's responsibility to lay out the Work, the Contractor shall provide reasonable and necessary opportunity and facilities for setting points and making measurements. The Work shall be done in strict conformity with such points and instructions.
- .6 Unless otherwise specified in the Special Conditions, the Contractor shall furnish all assistants necessary to measure in and drive stakes and shall furnish such lines, straight edges and stakes as the Engineer may direct for setting line and grade, and other detailed layout.
- .7 The Contractor, shall, before commencing Work at any point, satisfy himself as to the meaning and correctness of all stakes and Works and no claims shall be considered for any allowance based on alleged inaccuracies or for alternatives on account of his failure to read same correctly.
- .8 If the Contractor, in the course of the Work, finds any discrepancy between the drawings and the physical conditions of the locality or any errors or omissions in drawings or in the layout as given by points and instruction, it shall be his duty to immediately inform the Engineer in writing, and the Engineer shall promptly verify the same and issue appropriate instructions. Any Work done after such discovery, before further Work is authorized, will be done at the Contractor's risk.

8. ENGINEER'S STATUS

- .1 The Engineer is not responsible to the Client, the Contractor or any Consultant of the Client for the means, methods, techniques, sequences, procedures and use of equipment for the project, whether or not reviewed by the Engineer, which are employed by the Contractor or by a Consultant of the Client in executing, designing or administering the Work; for the services of a Consultant of the client; or for the commissioning and start-up of any facility or equipment; or for health and safety precautions and programs incidental to the project or to the commissioning and start-up of any facility or equipment.
- .2 He shall have the authority to stop the Work whenever such stoppage may be necessary, in his reasonable opinion, to ensure the proper execution of the

Contract.

- .3 The Engineer is, in the first instance, the sole interpreter of the Contract and the sole judge of the performance thereunder by both parties to the Contract.
- .4 The Contract shall obey, perform, and comply with the Engineer's orders or instructions with respect to the Work, or concerning the conduct thereof, promptly, efficiently, and to the satisfaction of the Engineer.
- .5 The contractor shall not enter into any contractual discussion and or contractual changes with the owner without the presence of the engineer.
- .6 However, should the Contractor hold such orders or instructions to be at variance with the Contract Documents or to involve changes in Work already done, ordered, or underway in excess of the Contract, he shall notify the Engineer accordingly in writing within seven (7) days of the receipt of such orders or instructions and before proceeding to carry them out.
- .7 Nothing contained in the Contract Documents shall create any contractual relationship between the Engineer and the Contractor.

9. ARBITRATION

- .1 The Engineer shall, in the first instance, be the sole interpreter of the Contract in the event of any dispute or misunderstanding between the Owner and the Contractor in relation to the stipulation and provisions of this Contract, or to the manner and performance of the whole or any part of the Contract by either of the parties.
- .2 Should either party not agree with the decisions of the Engineer in any such dispute, the matter shall be submitted to arbitration as provided for by the "Arbitration Act" of the Province or Territory wherein the Work is situated, and amendments thereto.
- .3 No action at law shall be commenced by either the Contractor or the Owner until the arbitration proceedings have been completed.
- .4 The Contractor shall not cause a delay of the Work while the arbitration proceedings are pending or in progress.
- .5 Parties must expressly agree to arbitrate in writing. If one or both party do not want to proceed with the Arbitration process, the dispute may be brought forward to the Judicial system.

10. INSPECTION OF WORK

- .1 The Contractor shall allow the Engineer and/or Owner access and provide adequate facilities for access to any part of the Works at all times.

- .2 If the specifications, Engineer's instruction, laws, ordinances, or any public authority requires any Work to be specially tested or approved, the Contractor shall give the Engineer advance notice of his preparedness for such inspection, and if the inspection is by an authority other than the Engineer, of the date fixed for such inspection.
- .3 The Engineer shall inspect the Work promptly and without causing unreasonable delay to the Contractor.
- .4 Extra payment will not be made to the Contractor for delay occasioned by any inspection, and extension of the completion time will not be allowed for delay resulting therefrom.
- .5 On request by the Engineer, the Contractor shall open for inspection any part of the Work that has been covered up. If the Contractor refuses to comply with such request, the Owner may employ other persons to uncover the Work.
- .6 If the Work is found to be in accordance with the Contract requirements, then the cost of uncovering and recovering the Work shall be borne by the Owner.
- .7 If the Contractor covered any of the Work in contravention of the Engineer's instruction, or if the uncovered Work is found not to be in accordance with the Contract requirements, then the cost of uncovering the Work and re-doing the work according to the Contract Requirements shall be charged to the Contractor.
- .8 The acceptance, or the lack of comment on the part of the Engineer, of the methods, techniques or sequence of construction employed by the Contractor shall not relieve the Contractor of his responsibility for the Work.
- .9 At any time during the warranty period, if the underground piping (Storm & sanitary) system experiences failure, blockages, etc., under the direction of the Engineer, the contractor will have to CCTV the pipes to determine the reason for failure and then carry out the necessary repairs under the supervision of the Engineer. Once the repairs are completed, the contractor will have to CCTV the pipe to confirm the repairs are satisfactory. The Contractor is to pay for the CCTV and the repairs.

11. SUPERVISION AND LABOUR

- .1 The Contractor shall keep on the Work at all times during its progress a competent superintendent who is acceptable to the Engineer.
- .2 The superintendent shall represent the Contractor in his absence, and directions given to him shall be held to be given to the Contractor.
- .3 The superintendent shall give sufficient supervision to the Work until its completion.

- .4 The Contractor shall comply with the requirements of the Worker's Compensation Act of the Province or Territory in which the Work is carried out, and all other federal and provincial legislation regarding wages and labour regulations.
- .5 All workmen must have sufficient knowledge, skill and experience to perform properly the Work assigned to them.
- .6 Any foreman or workman employed by the Contractor or Subcontractor who, in the opinion of the Engineer, does not perform his Work in a skillful manner, or appears to be incompetent or to act in a disorderly or intemperate manner shall, at the written request of the Engineer, be discharged immediately and shall not be employed again in any portion of the Work without the approval of the Engineer.

12. LANDS BY OWNER

- .1 The Owner shall provide the lands upon which the Work is to be performed. Where Work is to be performed on lands owned by others, the Owner shall obtain the necessary easements or rights-of-way.
- .2 Delay in providing these lands or obtaining easements or rights-of-way shall not be deemed proper cause for Compensation by the Contractor.

13. LANDS BY CONTRACTOR

- .1 Any lands other than those upon which the Work is to be performed which may be required for temporary facilities, storage purposes, or access to the Work site, other than those provided by the Owner, shall be provided by the Contractor with no liability to the Owner.

14. PRIVATE LAND

- .1 It shall be the Contractor's responsibility to ascertain the boundaries within which the Work must be confined. The Contractor shall not enter upon lands other than those provided by the Owner for any purpose without obtaining prior written permission of the property Owner.
- .2 The Contractor shall not enter upon lands owned by others on which the Owner has easements or right-of-entry without having received the written authorization of the Owner for such entry.
- .3 It shall be the Contractor's responsibility to ascertain from the Owner the conditions on which easements or rights-of-entry have been granted on private lands and to abide by these condition throughout the course of construction.
- .4 Contractor is to be notified that if he/she makes a contractual arrangement with the client without the presence of the Engineer who is the contractual authority, the contractor may not be financially compensated for his/her effort.
- .5 If the Contractor requires access to private land to conduct his/her activity, (for example using land as laydown area, or spill pile dirt from excavation), contractor is to make sure the terms are made clear in writing and signed by the land owner and the contractor. Terms of the agreement must indicate what is agreed upon between both parties (whether financial or work in kind) and/or land restauration if any is required after Contractor no longer requires the private land for his operation. A copy of this agreement must be provided to the Engineer and the Owner. A template for this agreement can be found in the Appendix (Permission for Land Use). Contractor to note that the Owner will be absolved of any responsibility towards potential claim that may occur between the land owner and the contractor. Contractor must provide written acknowledgement from the Private Land Owner to the Engineer that all the terms of the agreement have been met by the Contractor before Construction Completion Certificate can be issued.
- .6 If the Contractor fails to meet the terms of the agreement, the Owner may, without prejudice to any other right or remedy he may have, correct such default and may deduct the cost thereof from the payment then or thereafter due the Contractor.

15. OWNER'S RIGHT TO DO WORK

- .1 The Owner, subject to the approval of the Engineer, may notify the Contractor and his surety, in writing, that the Contractor is in default of his contractual obligations and instruct him to correct the default within five (5) working days, if the Contractor should:
 - .1 Refuse or fail to supply sufficient properly skilled workmanship, products, or construction machinery and equipment for the scheduled performance of the Work.
 - .2 Neglect to prosecute the Work properly, or fail to perform any of the provisions of the Contract.
- .2 If the correction of the default cannot be completed within the five (5) working days specified, the Contractor shall be considered to be in compliance with the Owner's instruction if he:
 - .1 Commences the correction of the default within the specified time.
 - .2 Provides the Owner with an acceptable schedule for such correction.
 - .3 Completes the correction in accordance with such schedule.
- .3 If the Contractor fails to comply with these provisions, the Owner may, without prejudice to any other right or remedy he may have, correct such default and may deduct the cost thereof from the payment then or thereafter due the Contractor, provided however, that the Engineer shall approve both the action and the amount subsequently charged to the Contractor.

16. OWNER'S TERMINATION OF THE CONTRACT

- .1 The Owner shall have the right to terminate the Contractor for any of the following reasons:
 - .1 If the Contractor at any time becomes bankrupt, makes an assignment of his property for the benefit of his creditors, or if a receiver should be appointed. Such termination shall be effective upon the Owner giving notice thereof.
 - .2 If the Contractor should default in any of the following ways and fail to remedy such default within the ten (10) days of notice to do so. Such termination shall be effective upon the Owner giving notice thereof:
 - .1 Fail to commence Work within the time specified in the Contract Agreement.

- .2 Fail to use diligence or to make such progress with the Work as, in the opinion of the Engineer, is necessary to ensure the completion of the Work in the time specified in the Contract Agreement.
 - .3 Fail, in the opinion of the Engineer, to supply enough competent workmen, management, and suitable equipment.
 - .4 Become, in any way, in the opinion of the Engineer, unable to carry on the construction of the Works.
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- .2 Upon termination of the Contract, the Owner may take all the Work out of the Contractor's hands and employ such means as he may see fit to complete the Works.
 - .3 Upon termination of the Contract, the Contractor shall have no claim for any further payment in respect of Work performed, but shall be liable for all loss of profits, damages, and expenses which may be suffered by the Owner by reason of such default or delay, or the non-completion by the Contractor of the Works.
 - .4 Upon termination of the Contract, no objection or claim shall be raised or made by the Contractor by reason or on account of the ultimate cost of the Works so taken over for any reason proving greater than, in the opinion of the Contractor, it should have been.
 - .5 Upon termination of the Contract, all materials, articles and things whatsoever, and all equipment and all rights, proprietary or otherwise, licenses, powers and privileges, whether relating to or affecting real estate or personal property, acquired, possessed, or provided by the Contractor for the purposes of the Work under the provisions of this Contract shall remain and be the property of the Owner for all purposes incidental to the completion of the Works and may be used, exercised, and enjoyed by the Owner as fully to all intents and purposes connected with the Works as they might therefore have been used, exercised, and enjoyed by the Contractor.

17. CONTRACTOR'S TERMINATION OF THE CONTRACT

- .1 The Contractor shall have the right to terminate the Contract for any of the following reasons:
 - .1 In the event of an order of any court or other public authority, other than the Owner, causing the Work to be stopped or suspended, and when the period of such stoppage or suspension exceeds ninety (90) days, and when such stoppage or suspension occurs through no act or fault of the Contractor, his agents, or servants. In such event, the Contractor shall receive from the Owner payment for the Work performed in respect of materials. The Owner shall not be liable for any loss of profits, damages or expenses incurred by the Contractor as a result of such stoppage or

suspension. Such termination shall be effective upon the Contractor giving notice thereof.

- .2 In the event the Owner fails to pay, except as provided in Article 42 of the General Conditions, any sum certified by the Engineer within twenty (20) days from the specified date of payment and fails to remedy such default within ten (10) days of the Contractor's written notice to do so. In such event, the Contractor shall receive from the Owner payment for the Work performed in respect of any materials and payment for damages, and expenses. Such termination shall be effective upon the Contractor giving notice thereof.

18. ASSIGNMENT OF CONTRACT

- .1 The Contractor shall not assign the Contract or any part thereof or any benefit or interest therein or thereunder without the prior written consent of the Owner.
- .2 This shall not exclude a charge in favour of the Contractor's bankers of any monies due or to become due under this Contract.
- .3 Such assignment shall be promptly notified in writing to the Owner.

19. SEPARATE CONTRACTS

- .1 The Owner reserves the right to let other contracts in connection with the Work.
- .2 The Contractor shall afford Other Contractors reasonable opportunity for the introduction and storage of their materials and the execution of their Work and shall properly connect and co-ordinate his Work with theirs.
- .3 If any of the Contractor's Work as specified herein and shown on the drawings depends upon the Work of any Other Contractor, the Contractor shall inspect and measure the Work in place and determine whether anything in such Work renders it unsuitable for proper execution of his Work.
- .4 He shall promptly report the results of such inspection and measurement to the Engineer if anything in such Work renders it unsuitable for proper execution of his Work.
- .5 His failure to inspect and report promptly shall constitute an acceptance of the Other Contractor's Work and he shall have no claim against the Owner by reason of anything in such Work rendering the same unsuitable for proper execution of his Work.

20. SUBCONTRACTS

- .1 The Subcontractors named in the Tenderer's Questionnaire, and others as may be approved by the Engineer following execution of the Contract Agreement shall

not be changed nor shall additional Subcontractors be employed except with the written approval of the Engineer.

- .2 The Contractor is responsible to the Owner for the acts and omissions of his Subcontractors and of their employees, to the same extent that he is responsible for the acts or omissions of persons employed by himself.
- .3 Nothing in the Contract Documents shall create any contractual relation between any Subcontractor and the Owner.
- .4 The Contractor shall bind every Subcontractor by the terms of the Contract Documents.

21. ORAL AGREEMENTS

- .1 No oral instruction, objection, claim or notice by any party to the others shall affect or modify any of the terms or obligations contained in any of the Contract Documents.
- .2 None of the provisions of the Contract Documents shall be held to be waived or modified by reason of any act whatsoever, other than by an agreed waiver or modification thereof in writing.
- .3 Under no circumstances is the contractor allowed to enter into a separate contract with other parties that may impact the signed contract with the owner. If contractor requires permission from the land owner to use as a laydown area or any other general purpose during construction, contractor is to get the permission in writing from the owner and provide a copy to the Engineer.

22. MATERIALS BY CONTRACTOR

- .1 The Contractor shall supply materials to construct the Work unless it is expressly stipulated to the contrary.
- .2 Materials used in the Work shall meet the requirements of the specifications, or where not detailed in the specifications, shall be approved by the Engineer.
- .3 Unless otherwise specified, all materials shall be new.
- .4 Unless otherwise stipulated, the Contractor shall provide all water, light and power necessary for the execution of the Work.
- .5 Schedules of piping, fittings, reinforcing, or other materials indicating quantity and/or dimension, which are shown on the drawings or in the applicable sections of the specifications, are intended only to assist the Contractor in his quantity takeoff. Quantities and dimensions shown therein are not guaranteed to be accurate and shall be checked by the Contractor prior to placing an order for such materials.

23. MATERIALS BY OWNER

- .1 The Owner will provide only such materials as are specifically listed as being supplied by the Owner.
- .2 Materials supplied by the Owner already on the site or other designated location at the time of Contract execution, and materials delivered following execution of the Contract, shall be examined by the Contractor for quantity and defects, and the Contractor shall sign a statement of materials acceptance specifically listing materials and quantities thereof, and noting all defective material. In so accepting these materials, the Contractor shall assume responsibility for their protection and, except for latent defects not reasonably noticeable at the time of examination, for their quality.
- .3 Unless otherwise specified, the Contractor shall take delivery of materials supplied by the Owner at the point of delivery nearest to the Works and shall, at his own cost, pay all demurrage, insurance, standby charges, wharfage, and other unloading costs, and costs of transporting such materials from the point of delivery to the job site.
- .4 The Contractor shall verify the delivery dates of materials provided by the Owner and shall arrange Work schedules to comply therewith.

24. MATERIALS STORAGE

- .1 The Contractor, at his own cost, shall store all materials provided for the Work either by himself or the Owner until they have been incorporated into the completed Works.
- .2 Materials shall be so stored as to ensure the preservation of their quality and fitness for the Work, and shall be protected from vandalism and theft.
- .3 Stored materials shall be located so as to facilitate prompt inspection.
- .4 Faulty materials shall not be stored on the site.

25. REJECTED WORK OR MATERIALS

- .1 All materials which do not conform to the requirements of the Contract Documents, or not approved by the Engineer, or are in any way unsatisfactory or unsuited to the purpose for which they are intended, will be rejected.
- .2 Any defective Work, which shall include materials, whatever the cause thereof, and without limiting the generality of the foregoing, whether the result of poor workmanship or use of defective materials shall be removed within five (5) days after written notice is given by the Engineer, and the Work shall be re-executed by the Contractor.

- .3 The fact that the Engineer may have previously overlooked such defective Work shall not constitute an acceptance.
- .4 The removal of Work and the re-execution thereof shall be at the expense of the Contractor, and he shall pay the cost of replacing the Work which shall include materials of Other Contractors destroyed or damaged by the removal of the rejected Work or materials and the subsequent replacement with acceptable Work.
- .5 If the Contractor is not expedient to re-execute defective Work, the Owner may deduct from the Contract price the difference in value between the Work as done and the Work called for by the Contract.

26. CORRECTION OF DEFICIENCIES

- .1 Upon failure of the Contractor to perform the Work in accordance with the Contract Documents, and after five (5) days written notice to the Contractor, or without notice if an emergency or danger to the Work or public exists, the Owner may, without prejudice to any other remedy he may have, correct such deficiencies.
- .2 The cost of Work performed by the Owner in correcting deficiencies shall be paid by the Contractor.

27. GUARANTEE PERIOD

- .1 Neither the final progress payment nor the Construction Completion Certificate shall relieve the Contractor of responsibility for faulty materials or defective workmanship.
- .2 The Contractor, unless expressly stated otherwise herein, guarantees all materials furnished and Work performed by them during construction and warranty period. The guarantee period includes the construction period and the one (1) year warranty period following the Interim Construction Completion Certificate (CCC) until Final Acceptance Certificate (FAC).
- .3 Faulty materials shall be replaced and defects discovered and failures which occur during the one (1) year Guarantee Period shall be rectified and approved by the Engineer and in accordance with the Contract Documents, including, if deemed necessary by the Engineer, replacement of all or a portion of the Work.
- .4 If the Owner observes through use of the Works, or if it is discovered by tests or inspection of the Works prior to the end of the Guarantee Period, that a deficiency or defect exists in the materials or workmanship in respect to the specified Works, the Owner shall immediately notify the Contractor, by whatever means are available, of the defect or deficiency and instruct him to rectify the

fault. Such notification shall be confirmed by the Owner in writing to the Contractor.

- .5 In the event that this Work, in the opinion of the Owner, must be done immediately to prevent serious damage, injury, or loss of life, the Owner may perform or cause to be performed the necessary Work and shall notify the Contractor accordingly. In this case, the Owner may recover the costs from the Contractor without prejudice to any other right or remedy he may have.
- .6 Work required under guarantee shall, except as otherwise provided herein for emergencies, be carried out by the Contractor or his representative within ten (10) days of the Owner's written instruction to perform the Work.
- .7 If the Contractor does not initiate this Work within ten (10) days, the Owner may take whatever action is necessary to complete the Work. The Owner may, without prejudice to any other right or remedy he may have, correct such default and recover the costs from the Contractor.
- .8 All costs resulting from the necessity to do Work under the guarantee requirement, whether done by the Contractor, his representative, or the Owner, as provided herein, shall be borne by the Contractor.
- .9 The Contractor shall, in addition, be liable to the Owner for all expenses, losses, or damages incurred by the Owner as a result of such faulty materials and defective workmanship or as a result of the Contractor's failure to meet the guarantee requirements as specified herein.
- .10 This Article shall not restrict the Contractor's liability in any way.

28. GUARANTEE FUND

- .1 To ensure the correction of all deficiencies or defects occurring during the Guarantee Period, the Owner shall be entitled to retain from the 10% Holdback Payment an amount deemed appropriate by the Engineer for any outstanding deficiencies or defects as noted by the Engineer unless otherwise specified in the Special Provisions hereinafter referred to as the "Guarantee Fund."
- .2 The Owner shall retain the Guarantee Fund until any deficiencies or defects have been corrected and approved by the Engineer.
- .3 Should the Contractor fail to correct all deficiencies and defects occurring in the Work during the Guarantee Period, the Owner shall be entitled to withdraw from the Guarantee Fund sufficient to correct all such deficiencies and defects.
- .4 If the Contractor proceeds to correct all deficiencies and defects in the Work occurring during the Guarantee Period, the Owner shall pay the Contractor all monies remaining in the Guarantee Fund.

- .5 No interest will be paid on the Guarantee Fund.

~~29. FAC HOLBACK~~

- ~~.1 See Special Provisions Section 01000.~~

30. INSURANCE

- .1 The Contractor shall, at his own expense, provide the insurance coverage as identified in this article.
- .2 Each policy shall contain a clause stating that "This policy shall not be cancelled or materially changed without the Insurance Company giving at least fifteen (15) days notice by registered mail to the Owner".
- .3 Certified copies of these policies shall be filed by the Contractor with the Owner prior to the commencement of the Work.
- .4 Wherever the word Owner or Engineer is to appear in these policies, the legal name shall be inserted.
- .5 The Contractor shall be solely responsible for all deductible amounts under the Insurance Policies.
- .6 Builder's Risk Course of Construction Insurance
- .1 The Contractor shall at all times during construction and until all conditions of this Contract (except guarantee provisions) have been fully complied with, keep all buildings, structures, Works, Roads, equipment (other than Contractor's mobile equipment) and supplies, including materials which will form part of such building, Works, Roads or structure, which is the subject matter of this Contract, insured in the joint name of the Owner, Engineer and the Contractor for an amount not less than the Contract Price against the following perils: "All risks of direct physical loss or damage from any cause whatsoever, including flood and earthquake, and subject to a maximum deductible of three percent (3%) of the Contract Price".
- .2 Such insurance shall be with Insurers and on forms acceptable to the Owner and shall contain the following clause: "It is agreed that the right to subrogation against the Owner and the Engineer or any of their parent, subsidiary, affiliated, or associated companies or corporations is hereby waived."
- .3 The following exclusions shall be deemed permissible (additional or modified exclusions subject to permission of the Owner).

- .1 Any loss of use or occupancy however caused.
 - .2 Penalties for non-completion of or delay in completion of Contract or non-compliance with Contract conditions.
 - .3 Cost of making good faulty workmanship, construction, or design, but this exclusion shall not be deemed to exclude loss or damage arising as a consequence of faulty workmanship, construction or design.
 - .4 Wear, tear, normal upkeep, and normal making good, but this exclusion shall not be deemed to exclude loss or damage arising as a consequence of wear, tear, normal upkeep and normal making good.
 - .5 Loss, damage, or liability occasioned by, happening through or in consequence of war, invasion, hostilities, acts of foreign enemies, civil war, rebellion, insurrection, military or usurped power or martial law or confiscation by order of any government or public authority.
 - .6 Any weapon of war employing atomic fission or radioactive force whether in time of peace or war.
 - .7 Claims or liability arising directly or indirectly from nuclear fission, nuclear fusion or radioactive contamination.
 - .8 Loss or damage caused by frost or freezing unless resulting from damage occasioned by fire and/or lightning and/or windstorm and/or hail and/or riot attending a strike and/or civil commotion and/or vehicles and/or smoke.
 - .9 Loss due to disappearance or revealed by inventory shortage.
 - .10 Mechanical breakdown, but this exclusion shall not be deemed to exclude loss or damage arising as a consequence of mechanical breakdown.
 - .11 Infidelity of the Assured's employees.
 - .12 Loss or damage to material and/or equipment while in the course of ocean marine shipment, but this exclusion shall not apply to shipments by regular coastwise vessels, regular ferry lines or railway car transfer barges.
 13. Automobiles or Contractor's equipment of every description.
- .7 Liability Insurance

- .1 The Contractor shall buy and keep in force until twelve (12) months after the date of acceptance, Personal Injury and Property Damage Liability Insurance.
- .2 Such insurance shall be in the name of the Contractor and the Owner, and shall include a Cross Liability or Severability of Interests clause.
- .3 Such insurance shall be on a form and with an Insurer acceptable to the Owner.
- .4 Both Personal Injury and Property Damage sections are to provide coverage on an "Occurrence Basis".
- .5 Exclusions pertaining to the following operations are to be deleted, if such operations are to be performed by the Contractor or anyone on his behalf.
 - .1 Blasting or use of explosives
 - .2 Pile driving
 - .3 Excavation
 - .4 Underpinning, shoring or removal or rebuilding of support
 - .5 Demolition
- .6 Such insurance shall indemnify the Contractor, Owner and Engineer for claims arising out of all premises, operations, subcontracted operations, elevators (if any), completed operations, products, and for all liability for personal injury or property damage assumed by the Contractor under any contract or agreement (including this Contract).
- .7 Such insurance shall be for the following minimum limits: Personal Injury and Property Damage - \$2,000,000.00 Inclusive per occasion.
- .8 Automobile Insurance
 - .1 The Contractor shall buy and keep in force until all conditions of the Contract have been fully complied with, a Standard Automobile Policy covering all licensed vehicles owned by him, registered in his name, or leased to him.

- .2 Such insurance shall include Liability Insurance for the following minimum limits: Personal Injury and Property Damage - \$1,000,000.00 Inclusive per occasion.

.9 Non-Owned Automobile Insurance

- .1 The Contractor shall buy and keep in force until all conditions of the Contract have been fully complied with, a Standard Non-Owned Automobile Policy including Contractual Liability.
- .2 Such insurance shall be for the following limits: Personal Injury and Property Damage - \$2,000,000.00 Inclusive per occasion.

.10 Contractor's Equipment Insurance

- .1 Notwithstanding anything contained elsewhere herein, it is understood and agreed that the Owner and/or Engineer shall not be liable for any loss or damage to Contractor's equipment including loss of use thereof.
- .2 Each and every policy insuring Contractor's equipment to be used on this project shall contain the following clause: "It is agreed that the right to subrogation against the Owner and the Engineer or any of their parent, subsidiary, affiliated, or associated companies or corporation is hereby waived".

31. DAMAGE TO WORK

- .1 The Contractor shall bear all loss or damage whatsoever which may arise or occur to the Work or any portion thereof until the same are fully and finally completed and delivered to and accepted by the Owner.
- .2 If any such damage or loss occurs before such final completion, delivery and acceptance, the Contractor shall immediately, at his own expense, repair, restore and re-execute the Work.
- .3 The Contractor shall not have any claim for compensation for damages against the Owner for any stoppage, re-work or delay whatsoever.

32. INDEMNITY

- .1 The Contractor shall indemnify and save harmless the Owner and Engineer from and against all losses and all claims, demands, payments, suits, actions, recoveries and judgements of every nature and description brought or recovered against him and/or the Owner or Engineer by reason of any act or omission of the

said Contractor, his agents, or employees in the execution of the Work.

- .2 No claims for delay shall be made under any circumstances by the Contractor.

33. BONDS

- .1 To ensure the faithful execution and proper fulfillment of this Contract, the Contractor shall provide the Owner with the following bonds at the time of his execution of the Contract Agreement:
- .1 A Performance Bond in the amount of fifty percent (50%) of the Contract Price covering the faithful performance of the Contract including the corrections after completion provided for in Article 27 hereof, and the payment of all obligations arising under the Contract.
- .2 A Labour and Material Payment Bond in the amount of fifty percent (50 %) of the Contract Price covering the payment of all labour and material used or reasonably required in the performance of the Contract.
- .2 These bonds must be issued by a surety company licensed to conduct business in the province or territory wherein the Work is located and shall be provided on forms acceptable to the Engineer and compatible with the forms contained within the Contract Documents.

34. PATENTS AND ROYALTIES

- .1 The Contractor shall pay all royalties and license fees and shall save the Owner and Engineer harmless from loss on account of suits or claims which may arise by reason of the Work for infringement of patents in force at the time of execution of the Contract Documents.

35. PERMITS AND REGULATIONS

- .1 The Contractor shall, at his own expense, procure all permits, certificates and licenses required by law for the execution of the Work and shall comply with all federal, territorial, provincial and local laws, regulations and ordinances affecting the execution of the Work.
- .2 The Contractor is responsible to acquire all required crossing agreements within the designated work area. This includes but not limited to: pipeline crossings, shallow utilities such as (gas, power, phone, cables, fiber optic) crossings, crossing or occupation of private landowner etc.

36. INJURY OR DAMAGE

- .1 The Contractor shall use due care and take all necessary precautions to ensure the protection of persons and property and shall comply with the provisions of the Worker's Compensation Act of the province or territory in which the Work is

carried out.

- .2 The Contractor shall be liable for any and all injury or damage which may occur to persons or to property due to any act, omission, neglect or default of the Contractor, or of his employees, workmen or agents.
- .3 The Contractor shall, without further order, provide and maintain at all times during the progress or suspension of the Work, suitable barricades, fences, signs, signal lights and flagmen as are necessary to ensure the safety of the public and those engaged in the Work.
- .4 In an emergency affecting the safety of life, or of the work, or of adjoining property, the Contractor, without the necessity of authorization from the Engineer, shall act in a reasonable manner to prevent loss or injury.
- .5 The Work shall be carried out in a manner that will cause the least interruption to vehicular and pedestrian traffic.
- .6 Where Work is to be carried out on highways or properties other than those of the Owner, the Contractor shall familiarize himself with the requirements of the owner or controllers of these highways or properties which pertain to traffic control and safety or which place limitations on the Work and shall comply with these requirements.

37. NOTICE TO PROCEED

- .1 Written notice to proceed with the Work shall be given to the Contractor by the Owner.
- .2 The Contractor will commence Work at such time as to complement the Work schedule in the Tender Form and shall prosecute the Work regularly and uninterruptedly thereafter, unless otherwise directed in writing by the Engineer or Owner, in such a manner as to secure completion of the Work contracted for within the time stated in the Contract Agreement.
- .3 Time shall be of the essence in this Contract.

38. FAILURE TO COMPLETE ON TIME

- .1 Should the Contractor fail to complete the Work under this Contract within the time specified, the Owner shall be entitled to make deductions from payments due to the Contractor to compensate himself as indicated in the Special Provision 1000.

39. SCHEDULE OF COMPLETION

- .1 At such times as the Engineer may request, the Contractor shall provide a complete construction schedule showing proposed dates for completion of the various phases of the Work.

40. CHANGES IN THE WORK

- .1 The Owner may, as the need arises, order changes in the Work through additions, deletions, modifications or variations, without invalidating the Contract. The Owner shall promptly following receipt of the Change quotation either agree to the adjustments in the contract price and contract time or to the method to be used to determine the adjustments, or give the Contractor notice that the Change quotation is not acceptable. If the Change quotation is agreed to, then the Owner shall immediately issue a Change Order recording the Change, which shall be signed by the Owner, Engineer and the Contractor. The value of Work performed as a result of a Change Order shall be included in progress payments.
- .2 The value, if any, of such changes shall be taken into account in ascertaining the final amount of the Contract Price.
- .3 All such Work shall be executed under the conditions of the Contract.
- .4 No extra Work shall be carried out and no charge shall be made, unless pursuant to a Notice of Proposed Change and no payment for extra Work shall be made without a Change Order.
- .5 If the Contractor claims that any instruction involves extra costs under this Contract, he shall give the Engineer written notice thereof immediately and he shall then follow the Engineer's instructions regarding doing the Work in question.
- .6 No such claim shall be valid unless so made. If the Contractor's claim is approved it shall be paid as outlined herein.
- .7 The value of any change in the Work shall be determined in the following manner for either an increase or decrease in the Work:
 - .1 By unit prices provided for in the Tender Form.
 - .2 By unit prices agreed upon.
 - .3 By estimate and acceptance in a lump sum.
 - .4 By Unclassified Work.

41. UNCLASSIFIED WORK

- .1 When there is a change in the Work, not covered by Contract Unit Prices, the value of such "Unclassified Work" shall be determined either by an agreement in each instance between the Owner and the Contractor, or, on a cost basis in accordance with the following provisions.
- .2 The Contractor shall be paid for Work performed by him as follows:
 - .1 Approved hourly rates for equipment and labour as set forth using Construction Alberta guidelines or approved hourly rate schedule deemed reasonable within industry standard.
 - .2 Plus, the Contractor's cost of providing room and board for labour (if applicable) and approved by the Engineer.
 - .3 Plus, the Contractor's cost for materials on site, less trade discounts, as established by invoices.
 - .4 Plus 10% fee on the sum of items 40.2.1, 40.2.2 and 40.2.3 to cover overhead, use of small tools and profit. Overhead includes superintendents, time keepers and other administrative and supervisory personnel and shall include the cost of their vehicles.
 - .5 Plus, the rental of equipment for the hours worked, at locally accepted rates, or at current provincial or territorial rates, for complete equipment units including operator, fuel, grease, maintenance and such costs as are normal to an operating unit.
 - .6 Plus 5% markup on 40.2.5 to the Contractor (but not Subcontractors) provided the Contractor does not own the equipment himself.
 - .7 Plus, valid transportation costs for bringing in and taking out equipment specifically required for Unclassified Work, but with no markup.
- .3 The Contractor shall be paid for Work performed by his direct Subcontractors, the cost for Sub-Contractors, determined as in 40.2.1, 40.2.2, 40.2.3, 40.2.4 and 40.2.5 and plus 10% to cover the Contractor's coordination.
- .4 When Unclassified Work is being done on the cost basis, the Contractor shall submit to the Engineer, daily, an account, in triplicate, for Work done on the preceding day. The account shall include the man hours, equipment hours and materials used. The Engineer shall, each day, check the account and when he is satisfied that it is correct, he shall sign the three copies and return one signed copy to the Contractor.
- .5 If, on any day, the Contractor fails to submit an account for Unclassified Work,

the Engineer shall prepare the account and this shall be used as the basis for payment for that portion of the Work and no payment will be made for any account subsequently submitted by the Contractor for that portion of the Work.

42. EXTENSION OF CONTRACT TIME

- .1 The time for completion of the Work under the Contract may be extended in the event of one (1) or more of the following:
 - .1 Where extra Work as herein provided is added to the Work under this Contract.
 - .2 Where the Work is delayed on account of conditions which could not have been foreseen or which were beyond the control of the Contractor, and which were not the result of the fault or negligence of the Contractor, his agent, or employees, provided however, rain, wind, flood or other natural phenomena of normal intensity and duration for the area shall not be construed as cause for an extension of time for completion of the Work. Contractor to note that rain and inclement weather days are to be incorporated into the Contractor's regular work schedule.
 - .3 Where delay occurs as a result of an act of a public authority.
- .2 A claim for extension of Contract time at no Extra cost to the Owner shall only be considered when submitted by the Contractor to the Engineer in writing within seven (7) days of the occurrence of the delay on which the claim is based, provided, however, that in the case of a continuing cause of delay only one (1) claim shall be necessary. Failure by the Contractor to present any claim within the seven (7) day period shall be deemed to be an absolute waiver of such claim.
- .3 After the Contractor submits a request for an extension of time, the Engineer will present his written recommendation to the Owner stating his opinion on whether or not the delay justifies an extension of time; and, if so, the number of days extension due to the Contractor.
- .4 The Owner will make the final decision on all requests for extension of time.

43. USE OF COMPLETED PORTIONS

- .1 The Owner shall have the right to take possession of and use any completed or partially completed portions of the Work, notwithstanding that the time for completing the entire Work or such portions may not have expired; but such taking possession and use shall not be deemed an acceptance of any Work not completed in accordance with the Contract Documents. Contractor shall not have any claim against the Owner if this occurs.

44. PAYMENTS

- .1 At the end of each month, during performance of the Work, the Engineer shall prepare a Monthly Progress Certificate.
- .2 A holdback of ten (10%) percent of the total value of all Work performed and materials on site, as shown on the Monthly Progress Claim, shall be retained, along with any other deductions which the Engineer considers warranted or which may be required in accordance with the conditions of this Contract.
- .3 The amount of the Monthly Progress Claim shall be certified by the Engineer and shall be submitted to the Owner within ten (10) days following the end of the month during which the Work was performed. An acceptable invoice must be submitted by the contractor to the engineer. The Owner must receive contractors invoice within sixty (60) days following the end of the month during which the Work was performed or payment will not be made.
- .4 Upon certification by the Engineer, the Owner shall, within thirty (30) days make payment to the Contractor in the amount certified on the Monthly Progress Claim provided that there is no valid reason for withholding payment.
- .5 The Owner may withhold payment, of any Monthly Progress Claim, or the Final Monthly Progress Claim as may be necessary or prudent to protect himself from loss on account of:
 - .1 The Contractor not making satisfactory progress.
 - .2 Defective Work which is not remedied.
 - .3 Claims filed, or reasonable expectation that claims will be filed against the Owner or the Contractor.
 - .4 The failure of the Contractor to make payments properly to Subcontractors or for materials, labour or otherwise.
 - .5 Damages caused by the Contractor to another Contractor.
 - .6 Any other evidence of loss or danger of loss by the Owner, on account of the Contractor's operations.
- .6 When the grounds identified in 44.5 are removed, payment shall be made of accounts withheld because of them.
- .7 The 10% Holdback shall be retained until the 60-day Statutory Limitations Period has expired.
- .8 Payment of the 10% Holdback less the Guarantee Fund in accordance with

Article 28 shall be made to the Contractor by the Owner after the following conditions have been met.

- .1 The Engineer has issued a Construction Completion Certificate in accordance with Article 46.
- .2 The Contractor has filed with the Engineer, a statutory declaration stating that all claims and demands for payment in connection with this Contract have been submitted and approved, thus establishing the Final Contract Price.
- .3 The Contractor has filed with the Engineer, a certification from the Worker's Compensation Board, stating that all assessment due to them from the Contractor have been paid.
- .4 The Contractor has filed with the Engineer, a statutory declaration that all claims for payment of materials, labour and sub-contract Work, incurred by the Contractor directly or indirectly on account of the Work have been paid or reported to the Owner and that no claim exists against the premises in respect of anything done or furnished under this Contract. This statutory declaration shall be dated five (5) days after the expiry of the Statutory Limitation Period for filing claims, applicable in the location where the Work has been performed.
- .9 Final payment does not constitute Final Acceptance, nor shall it or attendant acts of the Engineer or the Owner prejudice their rights under any requirement of the Contract, nor relieve the Contractor of any of his responsibilities thereunder.
- .10 In the event that the Work has been completed, but minor items remain uncompleted and deficiencies have not all been rectified, the Owner may withhold payment of Monthly Progress Claim amounts sufficient, in the estimation of the Engineer, to ensure that the Contractor will complete such items and rectify such deficiencies in a timely manner.
- .11 The Owner, in consideration of the performance by the Contractor of his covenants and agreements, undertakes and agrees to pay the Contract price which shall be determined as follows:
 - .1 The total of those amounts determined for each item or Work in the Tender actually performed at the unit price stated therein.
 - .2 Plus, where no unit price is indicated for any item or Work in the tender, the amount of any Lump Sum specified in lieu thereof, providing that such Work is required and actually performed under and by virtue of the Contract Documents.
 - .3 Plus or less any additions, deductions, retention, penalty or other sum that may be ascertained in accordance with the Contract Document

- .4 Should the quantities of performed Work or any individual item of Work specified in the Tender vary, the Contractor understands that the Owner, through the authority of the Engineer, reserves the right to increase, decrease, delete or vary any portion of the Work and the Contractor agrees to do the Work whether the quantities are increased or decreased, at the unit prices listed in the Tender. If the quantity is reduced or deleted from the work, the Contractor will not be financially compensated for any types of cost incurred. If the quantity is increased, the Contractor will be paid as per his unit price in the contract.

45. REMOVAL OF LIENS

- .1 The Contractor shall forthwith remove at his own expense all affidavits of claim of lien, or liens, filed or registered against the lands and premises on which the Work is done or is being done.
- .2 The Contractor shall indemnify and save harmless the Owner from liability arising out of any such affidavit or affidavits of claim of lien.
- .3 Should the Contractor have reasonable evidence of the probable filing of such affidavit or affidavits of claim of lien or of the probable filing or registration of lien or liens he shall promptly notify the Owner in writing by Registered Mail.

46. COMPLETION AND ACCEPTANCE

- .1 On completion of the 2024 construction, all portions of the Work shall be reviewed carefully by the Contractor who shall satisfy himself that every item has been completed, that the whole Works are in a clean and tidy condition, and ready in all respects for acceptance by the Owner.
- .2 Upon notice by writing to the Engineer, an Interim Certificate of Completion inspection of the Works be carried out.

Unless otherwise specified, the warranty period:

- .1 and two years for all other Work; and commences on the date of the Interim Certificate of Completion pertaining to the project as a whole
- .3 The Engineer shall issue an Interim Certificate of Completion on the day that:
 - .1 all Work has been completed to the best of the Engineer's knowledge, information and belief, and
 - .2 the Contractor has complied fully with the Contract Documents and all orders, rulings and directions made pursuant thereto.
- .4 If the Engineer is satisfied that the Work is Substantially Completed (not necessarily synonymous with substantial performance as defined in the lien legislation applicable to the place of building) and is acceptable for use by the

Owner, the Engineer may at any time before issuance of a Construction Certificate of Completion, issue an Interim Certificate of Completion and shall describe therein the portions of the Work not completed and all things which must be done by the Contractor before a Construction Certificate of Completion can be issued.

- .5 On receipt of a written recommendation from the Engineer, the Owner shall issue the Construction Completion Certificate. Such recommendation will be made by the Engineer following final inspection of the Works.

47. TRAFFIC

- .1 It will be the Contractor's responsibility to control traffic, supply adequate direction for detours, barriers and warning lights so as to provide the minimum of inconvenience to the public. It is up to the Contractor to determine during the tender period the impact the traffic will have on his work and adjust his tender accordingly. The Contractor shall not have any types of claim for compensation against the Owner due to Traffic.

48. VARIATION OF INFORMATION

- .1 Information shown on the drawings or described in the specifications, including topographic lines, locations of existing facilities, ground surveys and soil conditions is approximate only.
- .2 The Owner assumes no responsibility for the accuracy of the information described above, nor does the Owner represent that materials or conditions other than those indicated will not be encountered.
- .3 The Contractor shall understand that any borings or other investigations made by the Engineer and which may be shown on the Drawings or as Appendices to the Specifications are for the Engineer's own information.
- .4 If any information as to the character of the materials likely to be encountered in performing the Work, or any other information as to the condition of the site is taken from this information, it shall be distinctly understood that the Engineer shall not be responsible if the information does not correctly set forth the facts or if the boring sheets or other written documents provided by the Engineer do not correctly set forth the results of borings or other investigations made.
- .5 The Tenderer is required to investigate and satisfy himself of everything and every condition affecting the work to be performed and the labour, material and equipment to be provided, and it is mutually agreed that submission of tender shall be conclusive evidence that the bidder has made such an investigation. Tenderer, having carefully examined the Contract Documents and the locality of the proposed work, and having full knowledge of the work required and of the materials to be furnished and used, hereby agrees to provide all necessary materials, supervision, labour and equipment and perform and complete all work

and fulfill everything as set forth and in strict accordance with the Contract Documents.

- .6 He shall inform himself by borings, test pits or by such other means as he may prefer as to the actual conditions of the subsurface and the Work prior to submitting his tender.
- .7 The Contractor shall assume all risk arising from, or out of, the nature of the materials to be excavated or used.

49. EXISTING SERVICES

- .1 The plans show the approximate location of known existing utilities, such as watermains, sewers, etc. However, these services may not be all the existing services and the Contractor shall use care and caution in his excavation operation so as not to break any existing services and structures that are not shown. Contractor shall not have any claim for compensation against the Owner for working around existing services.
- .2 Existing services and structures include pipes, culverts, ditches and/or other items which are part of an existing drainage, sewerage, or water system or are a part of a gas, power, telephone, T.V. or other system. Also included are sidewalks, curbs, gutters, swales, poles, fences, trees or buildings.
- .3 The Contractor shall supply all labour and materials to locate, protect, remove or replace existing structures, or to repair and make good any damage which may occur to any existing services.
- .4 The Contractor shall establish locations and state the use of all existing utilities that may affect the Work.

50. PRIME CONTRACTOR

- .1 The Contractor is the "Prime Contractor" as defined by Occupational Health and Safety Act and shall fulfill all obligations and responsibilities associated with this designation.
- .2 The "Contractor" is required to fully comply with all Alberta Occupational Health and Safety Act, Regulation and Code. For this reason, this letter is to certify that the "Contractor" referenced above will be acting as the "Prime Contractor" for this contract.

Between December 15, 2017 and May 31, 2018, most of the provisions in the current OHS Act (RSA 2000 cO-2) continue to be in effect. Effective June 1, 2018 Alberta Occupational Health & Safety Act (SA 2017 cO-2.1)

As per SA 2017 cO-2.1, Alberta Occupational Health & Safety Act, Section 10, (2), "The person in control of the work site shall designate in writing a person as the prime contractor of the work site." And (3) The name of the prime contractor must be posted in a conspicuous place at the work site.

The "Contractor" is required to fully comply with all Alberta Occupational Health and Safety Act, Regulation and Code. For this reason, this letter is to certify that the "Contractor" referenced above will be acting as the "Prime Contractor" for this contract.

The Contractor is the "Prime Contractor" as defined by Alberta Occupational Health and Safety Act, Regulation, Code as per:

Alberta Occupational Health & Safety Act, Section 10 – Obligations of prime contractors

- (5) The Prime Contractor shall:
- (a) establish, as far as it is reasonably practicable to do so, a system or process that will ensure compliance with this Act, the regulations and the OHS code in respect of the work site,
 - (b) coordinate, organize and oversee the performance of all work at the work site to ensure, as far as it is reasonably practicable to do so, that no person is exposed to hazards arising out of, or in connection with, activities at the work site,
 - (c) conduct the prime contractor's own activities in such a way as to ensure, as far as it is reasonably practicable to do so, that no person is exposed to hazards arising out of, or in connection with, activities at the work site,
 - (d) consult and cooperate with the joint work site health and safety committee or health and safety representative, as applicable, to attempt to resolve any health and safety issues,
 - (e) coordinate the health and safety programs of employers and self-employed persons on the work site, if 2 or more employers or self-employed persons or one or more employers and one or more self-employed persons on the work site have a health and safety program.
 - (f) cooperate with any other person exercising a duty imposed by this Act, the regulations and the OHS code, and
 - (g) comply with this Act, the regulations and the OHS code.
- (6) If a requirement in this Act, the regulations or the OHS code imposes a duty on an employer or a self-employed person with respect to equipment, work site infrastructure or an excavation and the equipment or infrastructure is designed, constructed, erected or installed, or the excavation is conducted by or on behalf of a prime contractor, the prime contractor shall comply with the requirement as if the requirement were directly imposed on the prime contractor.

- (7) Subsection (6) does not relieve the employer, self-employed person or prime contractor from fulfilling other responsibilities under this Act, the regulations and the OHS code. The Contractor shall be the "Prime Contractor" for the full duration from the issuance of "Notice to Proceed" through to the issuance of "Final Completion Certificate". He shall also be the Prime Contractor whenever the Contractor's personnel, equipment or subcontractors are on site between the period of issuance of the "Certificate of Construction Completion" and "Final Acceptance Certificate".

Establishment of joint work site health and safety committee – As per Part 3 of the Alberta Occupational Health and Safety Act section 16:

- (1) An employer shall establish a joint work site health and safety committee
- (a) If the employer employs 20 or more workers and work is expected to last 90 days or more, or
 - (b) at any other work site designated by a Director.
- (2) If there are 20 or more workers in total from 2 or more employers or employers and self-employed persons or one or more employers and one or more self-employed persons at a work site and the work is expected to last 90 days or more, the prime contractor or, if there is no prime contractor, all employers and self-employed persons shall coordinate the establishment of a joint work site health and safety committee for that work site.

Section 17:

- (1) Unless a Director approves an alternative measure to ensure the health and safety of workers, an employer shall designate a worker appointed or selected under subsection (2) as a health and safety representative
- (a) If the employer employs 5 to 19 workers and work is expected last 90 days or more, or
 - (b) At any other work site designated by a Director.
- (2) If there are 5 to 19 workers in total from 2 or more employers or employers and self-employed persons or one or more employers and one or more self-employed persons at a work site and the work is expected to last 90 days or more, the prime contractor or, if there is no prime contractor, all employers and self-employed persons shall coordinate the designation of a health and safety representative for that work site.

Employer and Prime Contractor to work with the committee or representative as per Alberta Occupational Health and Safety Act, Part 3, Section 21,27,28,29.

In the event that the Contractor refuses or fails to comply with an order under the Alberta Occupational Health and Safety Act, Regulation, Code thereunder and the performance of the work is stopped, the Owner may, upon written notice, hold the Contractor in default.

51. ENGINEER SAFETY PROGRAM

- .1 The Engineering firm managing this contract is committed to protecting its employees, its property, the public, the client, and the environment from incident and accident through the implementation of a strong safety program.
- .2 The Engineering firm strictly adheres to the Occupational Health and Safety regulations as well will adhere to the Client's safety policies at all times.

NOTICE

These Contract Documents include special provisions which take document precedence over the standard specifications. Tenderers should refer to the special provisions (pink pages) first to determine any changes or modifications to the standard specifications. Refer to Article 4 of the General Conditions for the order of document precedence.

1.0 STATUS OF SPECIAL PROVISIONS

- .1 As indicated in the General Conditions, Article 4, Special Provisions have document precedence over all but the Contract Agreement and Addenda issued during the tendering period.

2.0 GOODS AND SERVICE TAX

- .1 Work on Reserve for a First Nation in Canada is exempt from the Federal Goods and Service Tax (GST).
- .2 The Contractor will be provided with a letter confirming the exemption of this Contract to GST upon award.

3.0 COMPLETION DATE

- .1 The Project shall be fully completed as indicated on the Contract Tender form.

4.0 LUMP SUM PAYMENTS

- .1 Where lump sum payments are indicated in the Tender Form, this shall be full compensation for all items of work other than those that are expressly covered by the unit prices.
- .2 Where lump sum payments are broken into individual items, such a breakdown is solely for the purpose of estimating progress payments and comparing tenders.
- .3 The fact that all individual items may not appear in the lump sum breakdown does not relieve the Contractor from any responsibility to provide a complete facility as outlined at the total lump sum price tendered.
- .4 The lump sum price shall include but not limited to all supervision, labour, material, equipment, overhead and profit. All other items not expressly identified shall be deemed incidental and inclusive to the work involved. Work in the opinion of the Engineer that falls outside the lump sum price may be deemed either as Unclassified Work or fall into an item covered by unit prices which is at the discretion of the Engineer.

5.0 TENDER SECURITY

- .1 Tender security in the form of a bid bond, a certified cheque or a letter of credit is required with the tender submission.
- .2 The amount of tender security shall be 10% of the tender amount.

- .3 The tender security shall be payable to Sturgeon Lake Cree Nation Child and Family Services Society.

6.0 PROJECT SECURITY

- .1 Upon entering into a contract with Sturgeon Lake Cree Nation Child and Family Services Society, the Contractor will be required to provide the following security:
 - .1 Labour and Material Bond and Performance Bond each in the amount of 50% of the tender amount. A guarantee fund will also be required to cover defects and deficiencies remaining at the time of completion.
 - .2 The project security shall remain in effect until the end of the two-year Guarantee Period.
 - .1 Upon recommendation from the Engineer, due to non-performance on the part of the Contractor, the Owner will be entitled to make withdrawals from the project security.

7.0 GUARANTEE FUND WHEN PROJECT SECURITY IS CERTIFIED CHEQUE

- .1 Further to Article 28 of the General Conditions, the project security, when supplied as a certified cheque will be used as a guarantee fund. No amount will be withheld from the final payment.

8.0 GUARANTEE FUND WHEN PROJECT SECURITY IS A PERFORMANCE BOND

- .1 If the project security is provided in the form of a performance bond, then a separate guarantee fund, as described in Article 28 of the General Conditions will be required to cover defects and deficiencies remaining at time of completion.
- .2 The guarantee fund shall be in effect until which time defects and deficiencies are corrected to satisfaction of the Owner during the Guarantee Period.
- .3 All other provisions of Article 28 shall apply.

9.0 QUANTITIES IN THE CONTRACT:

- .1 That the estimate of quantities shown in the Tender Form serves only to provide a basis for comparing tenders and that the actual job quantities will not necessarily correspond with the quantities shown in the Tender Form, and further, that the Owner has the right to increase or decrease the quantities in any or all items and to eliminate schedules or items entirely from the work. If the quantity is reduced or deleted from the work, the Contractor will not be financially compensated for any types of cost incurred. If the quantity is increased, the Contractor will be paid as per their unit price in the contract.

10.0 PROVISIONAL ITEMS:

- .1 The Engineer will make the decision during construction if those provisional items are required. The estimate of quantities shown in the Tender Form for the provisional items serves only to provide a basis for the contractor to provide a price and, further, that the Owner has the right to increase or decrease the quantities in any or all items and to eliminate schedules or items entirely from the work including the Provisional items. If the provisional quantity is reduced or deleted from the work, the Contractor will not be financially compensated for any cost incurred. If the quantity is increased, the Contractor will be paid as per his unit price in the contract.

11.0 FAILURE TO COMPLETE WORK ON TIME

- .1 Further to Article 38 of the General Conditions, any work which remains incomplete after the specified Contract completion date, there will be deducted from money due the contractor, the cost to the owner of any work and material reasonably expended by the Owner which has been made necessary by reason of the Contractor's failure to complete the Work by the date specified in the contract and without in any way limiting the generality of the foregoing, shall include:
 - (i) Liquidated Damages
- .1 Further to Article 38 of the General Conditions, in the event that the Contractor shall fail to complete the work within the time fixed for such completion set forth in the Contract Documents, the Contractor shall pay to the Owner as damages for each calendar day of delay in completing the work the sum of \$3,500.00, per day. In view of the difficulty of accurately determining the loss which the Owner will suffer by delay in completion of the work, said sum is hereby fixed and agreed as liquidated damages and not as a penalty.
 - (a) There will be no liquidated damages for delay assessed for days lost due to inclement weather or conditions resulting from inclement weather, that occur after the specified or adjusted completion date. For liquidated damage not being assessed due to inclement weather contractor must be on site working. Inclement weather will not be taken into account if the contractor is off site or on days off.
 - (b) Engineer will keep track of all the construction days when the weather is clement and work can take place after contract is awarded. To determine the amount of Liquidated Damage when the contractor exceeds the contract completion date, Engineer will take into account the number of days when the weather is clement and work could have taken place and the contractor was not on site and deduct the number of days when the contractor was on site but could not work due to inclement weather.

For example:

- .2 The Engineer and owner reserves the right to extend the completion date without penalty, for extenuating circumstances.

If there are 30 construction days when the weather is clement and the contractor is not on site but could have work and there are 15 days of inclement weather when the contractor was on site but could not work and the contractor is 10 days over the contract completion date the liquidated damage would be 10 days x \$3,500.00 = \$35,000.00

If there are 20 construction days when the weather is clement and the contractor is not on site but could have work and there are 25 days of inclement weather when the contractor was on site but could not work and the contractor is 10 days over the contract completion date the liquidated damage would be 5 days x \$3,500.00 = \$17,500.00.

Assuming the contractor worked every clement weather days after contract was awarded and there were no inclement weather days during construction and the contract completion date is the 31st Oct and the work could no longer be completed due to inclement weather, and it takes 20 days to complete the work the following spring assuming there are no inclement weather days in the spring, the liquidated damage would be 20 days x \$3,500 = \$70,000.00.

(ii) Actual Loss or Damages

In addition to the daily stipulated sum for Liquidated Damages, as set out in (i), above, the Contractor agrees to provide to the Owner, the actual loss or damages suffered by the Owner for each and every day beyond the specified completion date the Work remains uncompleted for the following items:

- (a) The additional cost of maintenance and repair necessary; and
- (b) The cost of accommodating traffic over, through or around portions of Work.

The Owner will deduct assessed amounts from payments due on this contract. If there are insufficient funds to cover the assessed amounts, the Owner will invoice the Contractor. The Contractor shall promptly pay the amounts invoiced. Should any amount remain unpaid after 60 days from the date of invoice, the Owner may recover such unpaid sum from any money due to the Contractor from the Owner on any Contract or account, rendering an accounting to the Contractor for any sums so recovered.

- .2 The Owner reserves the right to extend the completion date without penalty, for extenuating circumstances.

12.0 EMERGENCY REPAIRS DURING WARRANTY PERIOD

Further to Article 26 of the General Conditions, in the case of Emergency Repairs, causing significant failures or hazards to the public as determined by the Engineer and/or the Owner during the Warranty Period, the Owner may, without prejudice to any other remedy he may have, correct such repairs.

The cost of Work performed by the Owner in correcting the Emergency Repairs shall be paid by the Contractor. The cost may include but not limited to:

- (a) The cost of maintenance and repair necessary carried out by the owner. Cost may include but not limited to: Supervision, labour, material, equipment.
- (b) The cost of accommodating traffic over, through or around portions of Work.
- (c) The cost of engineering to monitor the ongoing repairs and report daily to the Owner until such time as the repair is completed and meet the approval of the Engineer.
- (d) The cost of contracting if the Owner cannot do the repairs with his own resources.
- (e) The cost of rental equipment if applicable.
- (f) All work carried out by the Contractor to repair the damaged area will be at his/her own cost.

The work must be restored as per the terms of the contract. The Owner will deduct assessed amounts from payments due on this contract. If there are insufficient funds to cover the assessed amounts, the Owner will invoice the Contractor. The Contractor shall promptly pay the amount invoiced. Should any amount remain unpaid after 60 days from the date of invoice, the Owner may recover such unpaid sum from the contractor performance bond.

11.0 FAILED PROOF ROLLS

- .1 This test will be undertaken when the compaction of the subgrade has been completed and shall be under the direction and in the presence of the Contractor, Engineer, and Owner.
- .2 If this test fails where a proof roll must be re-scheduled with the Engineer and the Owner, the cost of engineering and the owner's time to redo the proof roll shall be paid by the Contractor.

12.0 REVISIONS TO TENDERS

- .1 Revisions to the tender by **FAX 780 594-4486** or email to engineering@sedesign.ca will be accepted if received prior to the specified closing time to the office of SE Design and Consulting Inc. on the date the tenders close.
- .2 Faxed tenders will be accepted only if the original of the tender security is delivered to the office of SE Design and Consulting Inc. prior to the specified closing time on the date the tenders close.

13.0 FORCE MAJEURE

- .1 In the event of a FORCE MAJEURE occurrence as defined in the General Conditions, The Contractor shall not have any claim for compensation against the Owner.

14.0 QUALITY CONTROL TESTING

- .1 The Contractor will be responsible for providing and paying for all standard quality control testing. Client will pay for material testing, and asphalt coring (when applicable).
- .2 The Contractors' quality control testing firm shall require approval by the Engineer.
- .3 Copies of results for any quality control testing carried out by the contractor shall be forwarded directly to the Engineer.
- .4 A designated testing firm will do quality assurance testing for Sturgeon Lake Cree Nation Child and Family Services Society at their expense.
- .5 Where tests or inspections by the designated testing firm reveal work not in accordance with contract requirements, the Contractor shall pay costs for additional tests or inspections as Engineer may require to verify acceptability of corrected work.
- .6 Contractor's Responsibilities
 - .1 Provide access to work to be inspected and tested.
 - .2 Cooperate to provide reasonable facilities for such access.
 - .3 Facilitate inspections and tests.
 - .4 Make good work disturbed by inspection and tests.
 - .5 Notify the appropriate agency and Engineer in advance of the requirement for tests, in order that attendance arrangements can be made.
 - .6 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in the work.

- .7 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

15.0 INCLEMENT WEATHER

- .1 A day on which the Contractor works on the Site less than half a Normal Working Day for reasons of inclement weather or rectifying conditions resulting from inclement weather, as determined by the Engineer, will not be counted as a Site Occupancy Day. Rain, wind, flood or other natural phenomena of average intensity and duration for the area shall not be construed as cause for an extension of time to complete the Work. The Contractor must note that rain and inclement weather days are to be incorporated into the Contractor's regular work schedule.
- .2 Rectifying conditions resulting from inclement weather includes:
 - .1 Any required activities that rectify or restore the Site and the Engineer deems necessary before any Work on the Site can continue and for the overall project to move forward.
 - .2 If, in the opinion of the Engineer, the Contractor can only perform minor Work and Substantial Completion has been attained before Construction Completion then Site Occupancy Days may not be counted.

END OF SECTION

1.0 DESCRIPTION OF WORK

- .1 Work under this contract covers the supply of all labour, equipment, materials and supervision required to bring this project to successful completion. This specification covers the work under the drawing set provided as part of this contract.

2.0 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy of each of the following:
 - .1 Contract drawings
 - .2 Specifications
 - .3 Addenda
 - .4 Reviewed shop drawings
 - .5 Change orders
 - .6 Other modifications to Contract
 - .7 Field test reports
 - .8 Copy of approved work schedule
 - .9 Copy of Alberta First Call
 - .10 Manufacturers' installation and application instructions

3.0 SITE CONDITIONS

- .1 The Contractor shall examine the Work site before submitting his tender, to satisfy himself as to the local existing conditions such as but not limited to access to the work site, local and commercial traffic on site and nature of work. The Contractor shall not seek nor receive any compensation for failing to investigate the site conditions.
- .2 The Contractor shall make allowance for adverse conditions which may exist. The Contractor shall make itself familiar with such conditions. No extra claims or compensation will be allowed for adverse site conditions.

4.0 PRODUCTS SUPPLIED BY OWNER

- .1 No products will be supplied by Owner.

5.0 WORK SCHEDULE

- .1 Provide within 7 calendar days after Contract award, schedule showing anticipated progress stages and final completion of work within time period required by Contract documents.
- .2 Interim reviews of work progress based on work schedule will be conducted as decided by Engineer and schedule updated by Contractor in conjunction with and to approval of Engineer.

6.0 COST BREAKDOWN

- .1 Before submitting first progress claim submit breakdown of Contract price in detail as directed by Engineer and aggregating contract price. After approval by Engineer cost breakdown will be used as basis for progress payment.

7.0 MEASUREMENT OF PAYMENT

- .1 Notify Engineer sufficiently in advance of operations to permit required measurement for payment.

8.0 CONTRACTOR'S USE OF SITE

- .1 Use of site: limited to working areas and public land as shown on the drawings for work and storage.
- .2 Do not unreasonably encumber site with materials or equipment.
- .3 Move stored products or equipment which interferes with operations of Engineer or other contractors.
- .4 If the Contractor requires access to private land to conduct his/her activity, (for example using land as laydown area, or spill pile dirt from excavation), contractor is to make sure the terms are made clear in writing and signed by the land owner and the contractor. Terms of the agreement must indicate what is agreed upon between both parties and restoration that is required after work is completed. A copy of this agreement must be provided to the Engineer. Contractor to note that the Owner will be absolved of any responsibility towards potential claim that may occur between the land owner and the contractor. Contractor to refer to sample land use agreement in Appendix.

9.0 CODES AND STANDARDS

- .1 Perform work in accordance with any applicable federal, provincial or municipal codes provided that in any case of conflict or discrepancy, more stringent requirements shall apply.
- .2 Meet or exceed requirements of specified standards, codes and referenced documents.

10.0 PROJECT MEETINGS

- .1 Engineer will arrange project meetings as required and assume responsibility for setting times and recording and distributing minutes.

11.0 CLIENT / CONTRACTOR / ENGINEER COMMUNICATION

1. Contractor is under no circumstances authorized to communicate directly with the Client. All communications and/or questions are to be directed to the Engineer.
2. The Engineer is the only contractual authority that can communicate with the Client.
3. Contractor is to be notified that if he/she makes a contractual arrangement with the client without the presence of the Engineer who is the contractual authority, the contractor may not be financially compensated for his/her effort.

12.0 LOCATION OF EQUIPMENT AND FIXTURES

- .1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
- .3 Inform Engineer of impending installation and obtain his approval for actual location.
- .4 Submit field drawing to indicate relative position of various services and equipment when required by Engineer.

13.0 CUTTING, FITTING AND PATCHING

- .1 Execute cutting (including excavation), fitting and patching required to make work fit properly together.
- .2 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work.
- .3 Obtain Engineer's approval before cutting, boring or sleeving load-bearing members.
- .4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.
- .5 Fit work airtight to pipes, sleeves, ducts and conduits.

14.0 EXISTING UTILITIES AND STRUCTURES

- .1 The Contractor shall take all necessary precautions to protect from damage all underground and surface structures and services located on the site.
- .2 The Contractor shall indemnify and hold harmless the Engineer and the Owner from all claims made against him in respect of any such damage. The Contractor shall be required to contact all the authorities controlling or owning these structures and services, and satisfy himself as to the locations of the same. If it is necessary to relocate the services because of construction procedures, the Contractor shall be responsible for payment of all costs incurred.
- .3 Existing services as shown on the construction drawings are plotted according to available information but are not guaranteed to be accurate.
- .4 The Contractor shall be responsible for inspecting all existing underground and surface structures prior to the commencement of construction, and shall be responsible for payment for subsequent damages which may occur prior to the final acceptance of the work.
- .5 Any poles, signs or other structures that require moving, solely to facilitate the Contractor's operation, shall be moved and replaced at the Contractor's expense.
- .6 The Contractor shall be responsible for the protection of all existing utilities and appurtenances, including but not limited to, power poles, street lights, pad mount transformers, car plug-ins, telephone pedestals, communication lines, legal survey monuments, buried utility conductors, gas lines and buried water, sanitary, and storm sewer mains including services. Extreme caution is to be exercised at all times, and damage is to be reported to the Engineer and repaired immediately. The costs associated with protection of and repair of all utilities and appurtenances shall be borne by the Contractor.
- .7 No extra claims or compensation will be allowed for any delay (or extra) in construction time as caused by efforts exercised in protecting existing utilities and structures.
- .8 Before submitting the Bid for this Tender, the Contractor shall contact the utility companies and/or departments which own or operate the existing underground utilities and structures on site, regarding the standards, procedures and other related requirements with respect to both protection and reparation of the existing underground utilities/structures and restoration of the corresponding, existing utility trenches. The costs associated with protection and reparation of all underground utilities/structures and restoration of utility trenches in meeting the utility companies' or departments' standards and other

requirements shall be borne by the Contractor and no extra payment will be allowed.

- .9 The Engineer reserves the right to charge the Contractor for the costs in association with works required to protect, repair and restore the existing underground utilities/structures and utility trenches in meeting utility companies' or departments' standards and other requirements, if the Contractor fails to do so. The above costs shall be deducted from the contract value or holdback money.
- .10 Contractor shall keep all existing utilities operational until the new connection for the utility is completed.
- .11 Where work involves breaking into or connecting to existing services, carry out work at times directed by governing authorities, with minimum of disturbance to pedestrian and vehicular traffic.
- .12 Before commencing work, establish location, elevation, size, type and extent of service lines in area of work and notify Engineer of findings.
- .13 Submit schedule to and obtain approval from Engineer for any shut-down or closure of active service or facility. Adhere to approved schedule and provide notice to affected parties. If there is a change in schedule, notify Engineer and provide and updated schedule immediately thereafter.
- .14 Where unknown services are encountered, immediately advise Engineer and confirm findings in writing.

15.0 EMERGENCY VEHICLE ACCESS

- .1 The Contractor is to maintain access for emergency vehicles during the construction. The Contractor is to schedule his work accordingly to maintain access for the duration of the project.

16.0 RESTORATION OF LANDSCAPED AREAS AND ACCESS ROADS

- .1 The Contractor is responsible for the restoration of all landscaped areas and existing access roads disturbed or damaged by construction activities required by his works.

END OF SECTION

- 1.0 For each Unit Price item in the Tender Form, the Contractor shall include in their Unit Price all work to complete that item to meet the stated specifications. This shall include, but not be limited to, all supervision, labour, materials, equipment, and work typically required.
- 2.0 No additional payment will be made for items the Contractor has failed to include that are required to deliver the work as described in this Contract. Should the Contractor note any error or omission in the scope of work needed to meet the design intention of the work, they shall notify the Engineer in writing before submitting a Tender.
- 3.0 The Contractor is expected to have included all information provided as part of the Tender in evaluating the effort needed to complete the work, including but not limited to all surveys, geotechnical work, etc.
- 4.0 Unless otherwise stated in this Section, all measurements will be taken at the units in the Tender Form.
- 5.0 Unless otherwise stated in this Section, all payments will be made by multiplying the Engineer measurements with the Unit Price specified in the Tender Form for all items.

6.0 SCHEDULE 1.0 - GENERAL

6.1 General Project Requirement

6.1.1 Measurement

See Section 01290 Article 4.0

6.1.2 Payment

Payment for general project requirements will be 50% of the Unit Price on the first Monthly Progress Certificate. Payment of the remaining 50% will be the Monthly Progress Certificate following the Contractor receiving the Construction Completion Certificate.

7.0 SCHEDULE 2.0 - REMOVALS

7.1 Culvert Removal

7.1.1 Measurement

See Section 01290 Article 4.0

7.1.2 Payment

Payment will be total compensation for culvert removal regardless of diameter, length, or location.

7.2 Waste Stripping to Common

7.2.1 Measurement

Measurement of waste stripping will be done by a topographical survey of removed materials and the use of AutoCAD to generate volumes from surface comparisons.

7.2.2 Payment

Payment shall include full compensation for the 100mm depth stripping, spreading, shaping, and compacting of the top surface of unsuitable material in the designated on-site berm.

8.0 SCHEDULE 3.0 – BUILDING SERVICES

8.1 Trenching and Backfill

8.1.1 Measurement

Measurement for trenching and backfilling will be made along the centerline of the trench. There is no difference in measurement regardless of trench depth.

8.1.2 Payment

Payment of trenching and backfilling is inclusive of all removal of unsuitable material and fill material required to meet the Standard Proctor Density specified on the Tender Form and/or the Drawings.

No additional payment shall be made for the contractor to condition the material to bring it to optimum moisture content. If the soil is beyond optimum moisture content, the contractor must disc and dry the material up to optimum moisture before putting the material back in the trench. The cost of working the material is incidental to the project and no extra payment will be made to the contractor.

8.2 Supply and Installation of Sanitary Service

8.2.1 Measurement

The supply and installation of sanitary service will be measured along the pipe alignment horizontally from centre to centre as per the Contract Drawings for each diameter and material shown on the Tender Form.

8.2.2 Payment

Payment shall be compensation in full for the supply of materials, including sand and washed rocks, the laying and jointing of the pipe, disposal of surplus excavation, dewatering, backfill, compaction as specified, and provision of a sieve analysis for bedding material.

8.3 Supply and Installation of Sanitary Service Riser

8.3.1 Measurement

See Section 01290 Article 4.0.

8.3.2 Payment

Payment will be total compensation for installing the riser, bends, insulation, and all required fittings as outlined in the details, regardless of length or location.

8.4 Supply and Installation of Water Service

8.4.1 Measurement

The supply and installation of water service will be measured along the pipe alignment horizontally from centre to centre as per the Contract Drawings for each diameter and material shown on the Tender Form.

8.4.2 Payment

Payment shall be compensation in full for the supply of materials, including sand, washed rocks, pipe laying and jointing, disposal of surplus excavation, dewatering, backfill, compaction as specified, and provision of a sieve analysis for bedding material.

8.5 Supply and Installation of Water Service Riser

8.5.1 Measurement

See Section 01290 Article 4.0.

8.5.2 Payment

Payment will be total compensation for installing the riser extension to the surface, thaw wire, insulation, cap, and all required fittings and materials outlined within the details.

8.6 Supply and Installation of Water CC Valve

8.6.1 Measurement

See Section 01290 Article 4.0.

8.6.2 Payment

Payment will be total compensation for installing the water CC valve, including the 20mm stop drain, cast iron valve box, cathodic protection, and adjustments to the final grade.

8.7 Supply and Installation of 3000 Gallon Water Cistern and Pump

8.7.1 Measurement

See Section 01290 Article 4.0.

8.7.2 Payment

Payment includes supply and installation of the water cistern, water connections, control panel, filtration, chlorination, surface riser adjustments, fittings, manhole access, and lid as indicated on the design drawings. In addition, payment for the water cistern installation includes the procurement of the water pump, all material, excavation, sand bedding, backfill, and compaction required to install the water cistern as per the drawings or as directed by the Engineer. Others will connect the power connection, but all other control elements are to be connected by the Contractor.

8.8 Supply and Installation of 3700 Gallon Sanitary Holding Tank

8.8.1 Measurement

See Section 01290 Article 4.0.

8.8.2 Payment

Payment includes supply and installation of the sanitary holding tank, sanitary connections, fittings, manhole access, and lid as indicated on the design drawings. In addition, payment for the sanitary holding tank installation includes all material, excavation, sand bedding, backfill, and compaction required to install the sanitary holding tank as per the drawings or as directed by the Engineer.

9.0 SCHEDULE 4.0 – EARTHWORKS

9.1 Common Excavation and Compaction

9.1.1 Measurement

Measurement of common excavation will be done by topographical survey of excavated materials and use of AutoCAD to generate volumes from surface comparisons.

9.1.2 Payment

Payment includes all work, including moisture content adjustment and otherwise working the soils as needed to meet the specified compaction and moisture content levels.

The Unit Rate shall include full compensation for the excavation, separation of materials, loading, hauling, dumping, spreading, scarifying, compacting, trimming in cut and fill slopes, place, and grade fill material on berms, boulevards, roads, or slopes.

Over excavation due to the Contractor's fault will not be paid for.

9.2 Waste Excavation and Compaction

9.2.1 Measurement

Waste excavation will be measured by a topographical survey of excavated materials and the use of AutoCAD to generate volumes from surface comparisons.

9.2.2 Payment

Payment includes all work, including moisture content adjustment and otherwise working the soils as needed to meet the specified compaction and moisture content levels.

The tendered rate shall include full compensation for waste excavation, spreading of material over the berm, shaping, and compaction.

Over excavation due to the Contractor's fault will not be paid for.

9.3 Engineered Fill

9.3.1 Measurement

Engineered Fill shall be measured in cubic metres, calculated by comparing surveyed cross-sections of the material placed and compacted as designated in the design to ground elevations taken after topsoil stripping and waste excavation operations.

9.3.2 Payment

Payment shall include excavating, loading, and hauling from the borrow site, placing, levelling, aerating, conditioning (drying or watering to optimum moisture content), compacting, and finishing to final grades.

10.0 SCHEDULE 5.0 – SURFACE WORKS

10.1 Subgrade Preparation

10.1.1 Measurement

Subgrade preparation will be measured as per the Tender Form of the subgrade prepared to the depth(s) indicated. Measurement will be done of the work by topographical survey or other field measurements as approved by the Engineer.

10.1.2 Payment

Payment includes scarifying, shaping, mixing of in situ and imported material if required, compacting the subgrade to design grades, and all other working of the materials to achieve the specified compaction and moisture content between +3% and -3% of optimum.

10.2 Supply, Place, and Compact Gravel

10.2.1 Measurement

The gravel's supply, placement, and compaction shall be measured per the Tender Form. Measurements shall be based on areas determined from topographical surveys of the material placed and compacted as per the design drawings and at the thickness specified in the Tender Form.

10.2.2 Payment

Payment shall include full compensation for procurement of gravel, loading, hauling from an offsite location, off-loading, remixing if segregation has occurred, moisture conditioning, shaping, and compacting the material to standard proctor densities as indicated on the Tender Form.

No additional payments will be made for changes in the supply location.

10.3 Geogrid (Provisional)

10.3.1 Measurement

Measurements will be made of the net surface area covered by the geogrid as directed by the Engineer.

10.3.2 Payment

No additional payment will be made for seems or overlaps necessary to install the geogrid to the manufacturer's specifications.

10.4 Cement Stabilization (Provisional)

10.4.1 Measurement

See Section 01290 Article 4.0.

10.4.2 Payment

Payment shall include full compensation for cement procurement and application, mixing, moisture conditioning, shaping, and compaction.

11.0 SCHEDULE 6.0 – LANDSCAPING

11.1 1.2m Drainage Ditch

11.1.1 Measurement

See Section 01290 Article 4.0

11.1.2 Payment

Payment will be total compensation for the excavation shaping and materials compaction along the drainage ditch's length.

11.2 Grass Swale

11.2.1 Measurement

See Section 01290 Article 4.0

11.2.2 Payment

Payment will be total compensation for the excavation shaping and compaction of materials along the length of the grass swale. No additional payment will be made for the installation of erosion control blankets.

11.3 Topsoiling

11.3.1 Measurement

Topsoiling shall be measured as indicated on the Tender Form of the finished area as indicated on the drawings or as directed by the Engineer.

11.3.2 Payment

Payment shall include compensation for everything required to place the topsoil in accordance with the specifications and drawings, including loading, hauling, off-loading, placing, spreading, levelling, and any incidentals required to complete the work to the satisfaction of the Engineer. In addition, the tender rate shall include full compensation for the restoration of the Southwest topsoil berm upon the completion of operations.

11.4 Broadcast Seeding c/w Harrowing

11.4.1 Measurement

Broadcast Seeding c/w Harrowing shall be measured as indicated on the Tender Form of the finished area and the area of the restored Southwest topsoil berm as indicated on the drawings or as directed by the Engineer.

11.4.2 Payment

Payment shall include compensation for everything required to establish grass cover of the topsoiled areas. This may include harrowing, watering, fertilizing, seeding, and any maintenance necessary including re-cultivating and reseeding until acceptable germination takes place. The topsoil and seeded areas are to be maintained by fertilizing, watering, and cutting until the time of acceptance.

12.0 SCHEDULE 7.0 – MISCELLANEOUS

12.1 Culvert Installation

12.1.1 Measurement

See Section 01290 Article 4.0.

12.1.2 Payment

Payment includes installation of culvert markers, non-woven geotextile fabric, and rip rap as indicated on the Tender Form and/or the drawings. In addition, payment for culvert installation includes the material, excavation, backfill, and compaction required to install the culvert as per the drawings or as directed by the Engineer.

12.2 Supply and Install Parking Bumper

12.2.1 Measurement

See Section 01290 Article 4.0.

12.2.2 Payment

Payment includes the procurement and delivery of pre-cast concrete parking bumpers and installation with steel dowels.

12.3 Straw Wattles

12.3.1 Measurement

See Section 01290 Article 4.0.

12.3.2 Payment

Payment will be total compensation for everything required to place the straw wattles in accordance with the design specifications and drawings, including excavation and staking.

12.4 Supply and install Silt Fence

12.4.1 Measurement

Supply and Installation of silt fence shall be measured in linear metres of the completed fence line as indicated on the Contract Drawings, to the satisfaction of the Engineer.

12.4.2 Payment

Payment will be total compensation for everything required to place the silt fence in accordance with the design specifications and drawings, including trenching, driving of the stakes, and the attachment of geotextile fabrics.

12.5 Supply and Place Conduit

12.5.1 Measurement

Measurement for the supply and installation of the conduit will be measured along the horizontal alignment from centre to centre as per the Contract Drawings and Tender Form.

12.5.2 Payment

Payment shall be compensation in full for the supply of materials, laying, and jointing of the conduit.

12.6 Erosion Control Mats

12.6.1 Measurement

Erosion control mats shall be measured in square meters as indicated on the Tender Form.

12.6.2 Payment

Payment for the Erosion Control Mat will be full compensation for supplying and installing the mat at locations as directed by the Engineer. No additional payment will be made for erosion control mat overlap or anchoring areas. In addition, payment shall include compensation for all labour, materials, equipment, tools, and incidentals necessary to complete the work to the satisfaction of the Engineer.

END OF SECTION

1.0 GENERAL

1.1 Scope

- .1 This Section describes the general requirements of the Contractor in the execution of this contract.
- .2 General Project Requirements refers to the provision of items incidental to completion of the work for which unit or lump sum prices are not applicable including bonding, profit, overhead, insurance, mobilization, demobilization, and maintenance costs as defined within either the General Conditions, the Special Conditions or the detailed specifications within Division 1 – General Requirements.

1.2 Drawings

- .1 The Issued for Tender Drawings, along with other Drawings that may be prepared during construction, form part of the Contract Documents.
- .2 The Drawings show the approximate dimensions and general requirements of the work's principal features. Where necessary, as determined by the Engineer, additional Drawings showing further details or alterations will be furnished to the Contractor during the progress of the work.
- .3 Any discrepancies found between the Drawings and the specifications and site conditions or any error or omissions in the Drawings or Specifications shall be immediately reported to the Engineer, who shall promptly correct such error or omission in writing. Any work done by the Contractor after discovering such discrepancies, errors or omissions, without reporting to the Engineer, shall be done at the Contractor's own expense should changes in the Drawings and/or Specifications be required.
- .4 The Contractor shall verify all dimensions, quantities and details shown on the Drawings, Supplementary Drawings, Schedules or other data received from the Engineer and shall notify the Engineer of any errors, omissions, conflicts and discrepancies found therein.
- .5 Failures to discover and correct errors, conflicts or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory work, faulty construction or improper operation resulting therefrom, nor from rectifying such conditions at the Contractor's own expense.

1.3 Historical Resources

- .1 Historical resources, as defined by the Historical Resources Act, or other objects of historical significance found on site will remain the property of the Owner, Province or Federal authority.
- .2 The Contractor shall protect such articles and request directions from the Engineer.

1.4 Fair Wages

- .1 The Contractor shall, in carrying out this Contract, pay fair wages and comply with and fix working conditions, with respect to each employee or class of employment, not less favorable than the wages and working conditions established in the area of the General Contractor's Association and/or the Association of the Industry.

1.5 Health and Safety

- .1 The Contractor shall be designated as the "Prime Contractor" as defined in the Occupational Health and Safety Act and shall be responsible for all duties prescribed thereunder.

1.6 Environmental Protection

- .1 The Contractor must conduct himself in accordance with all federal, provincial or municipal environmental legislation.
- .2 The Contractor shall perform the work in accordance with all approvals received from any federal, provincial or municipal authorities.
- .3 All work shall be performed in accordance with the Development and Reclamation Application as approved by Alberta Environment.

1.7 Night Work

- .1 Night work will only be allowed if the Engineer gives written permission in accordance with the Owners' Bylaws. When work is carried out at night, the Contractor must supply all equipment necessary for the illumination and safe and satisfactory working in the area designated for the night work.

2.0 PRODUCTS

2.1 General Instructions

- .1 Prior to commencing actual construction, the Contractor shall check field conditions to obtain actual dimensions required to ensure correct fabrication and execution of the work and notify the Engineer in writing of all matters which could prejudice proper execution of the work. Commencement of construction shall constitute acceptance of existing conditions and verification of dimensions.
- .2 Where work of this Contract involves breaking into or connecting to existing services or utilities, the Contractor shall carry out work as directed by governing authorities, with minimal disturbance to the public.

2.2 Alternates

- .1 Quality - To establish standards of quality, the Engineer may have, in the Specifications and/or Drawings, referred to the products by name. This procedure should not be construed as eliminating other equal or better-quality products. The Engineer will be the sole judge as to the acceptability of substitute materials.

2.3 Materials Supplied by the Contractor

- .1 All materials used in the work shall meet the requirements of the respective Specifications. The Contractor shall supply all materials not otherwise specifically indicated.

3.0 EXECUTION

3.1 Co-ordination of Work

- .1 The Contractor shall be responsible for coordinating all aspects of the completed work.
- .2 The Contractor shall confine his plant and equipment, the storage of materials and the operations of his workmen to limits indicated by law, ordinances, permits or directions of the Engineer and shall not unreasonably encumber the work areas with his materials.
- .3 The Contractor shall permit full use without charge by the Owner and/or Other Contractors of any facilities usable jointly.
- .4 The Owner and/or other Contractors may work at or near the site during the period covered by the Contract. The Contractor shall co-operate with and co-ordinate his activities with Other Contractors in the working area so that all Contractors' work will proceed unhindered.
- .5 No claims for additional payment will be considered on account of delays, changes in construction schedules or any other reason whatsoever because Other Contractors are operating in the work areas.

3.2 Project Meetings

- .1 Immediately following the Award of Contract, all parties to the Contract shall meet to discuss and resolve administrative procedures and responsibilities. Senior representatives of the Owner, the Engineer, the General Contractor, major Subcontractors, utility company representatives, provincial officials (as required), and all field inspectors and supervisors will be invited to attend.
- .2 After the award of the Contract, the Engineer may arrange progress meetings depending on the progress and issues that may arise during construction. The Engineer shall prepare minutes of these meetings and circulate them to all in attendance and other relevant individuals.

3.3 Construction Program

- .1 The Contractor's construction operations shall be subject to the review of the Engineer. The sequence of operations and methods of operation shall be such as to ensure the completion of the work in a timely manner with minimal inconvenience to the public and impact on the environment.
- .2 Within seven (7) calendar days after the Contractor has been advised in writing of the acceptance of his tender, he shall furnish the Engineer with his proposed operation program. The Contractor shall immediately advise the Engineer of any proposed changes to his construction program during the execution of the work. Should the Contractor's work fail to progress according to the applicable progress schedules, the Contractor shall explain the slippage in the construction schedule and develop measures to regain the original approved schedule.

3.4 Surveys

- .1 Establishment of the horizontal and vertical control for the work shall be done by the Engineer at the startup of the project. The contractor may be required to provide additional stakes and other material with the exception of technical instruments, required by the Engineer, should the initial stakes and setting out data be damaged due to negligence by the Contractor. The Contractor shall also supply the Engineer with reasonable assistance and with assistants as required for establishing or checking lines and grades as well as measuring quantities.
- .2 The Engineer is responsible for establishing the baseline with 3m offset at 50m intervals at the start of the project. If manpower is available, the Engineer may provide service above and beyond the baseline at the contractor's expense. If the contractor destroys the baseline stakes during construction and wants them replaced, the Engineer may do so if manpower is available and at the contractor's expense.
- .2 The Contractor shall be responsible for carefully preserving benchmarks, reference lines, stakes, grade marks, monuments, legal survey pins and all data pertaining to horizontal and vertical control. In the case of destruction of these by the Contractor or resulting from his negligence, the Contractor shall be charged with the expense and damage resulting from and shall be responsible for any mistakes that the unnecessary loss or disturbance of any horizontal and vertical control may cause.
- .4 Legal survey markers, disturbed or removed by the construction operation, that existed at a horizontal distance of two (2) meters or more from the centerline of the pipe being installed or one (1) meter or more of any roadway, sidewalk or curb and gutter shall be replaced at the Contractor's expense by a Registered Land Surveyor. If it is necessary to remove or disturb existing legal survey markers that are within two (2) meters of the pipe center line or one (1) meter of any roadway, sidewalk or curb and gutter, the Engineer shall be so notified before such removal and replacement will be at the Owner's expense.

3.5 Public Safety and Convenience

- .1 The Contractor shall at all times conduct the work to ensure the least possible obstruction to traffic, inconvenience to the general public and disturbance of the residents in the vicinity of the work and shall ensure the protection of persons and property.
- .2 No road or street shall be closed to the public except with the permission of the Engineer and proper governmental authority.
- .3 Fire hydrants on or adjacent to the work shall be kept accessible to fire-fighting equipment at all times.
- .4 The Contractor shall make temporary provisions to ensure the use of sidewalks and the proper functioning of all gutters, sewer inlets, drainage ditches and irrigation ditches, which shall not be obstructed except as approved by the Engineer.
- .5 Control all work site access points and work site activities. Delineate and isolate the work site from adjacent and surrounding areas by use of appropriate means to maintain control of all work site access points. Provide all necessary lighting, fencing, boarding, signage and security personnel to protect the work and the public adequately.
- .6 Make provisions for granting permission to access the work site to all persons who require access. Procedures for granting access permission are to follow the Alberta Occupational Health and Safety Act and the Regulations made pursuant to the Act and the Contractor's Health and Safety Program.
- .7 Ensure persons granted access to the work site have and wear the minimum personal protective equipment (PPE) designated by the Contractor's Health and Safety Program and the governing OH&S Legislation. Ensure persons granted access to the work site are provided with, trained in using, and wearing appropriate PPE that is required above and beyond the designated minimums previously noted and specifically related to the work site activity they are involved in. Be responsible for the efficacy of the PPE that is provided above and beyond the designated minimums.
- .8 Install a safety fence around the active construction site open excavation that may endanger the public as directed by the Engineer. The Contractor must follow Alberta Health and Safety Regulations and the governing OH&S legislation.
- .9 Safety fence shall be a minimum 1.9 m high wire construction fence. The Engineer will not approve snow fencing around open excavation.

3.6 Quality Control

- .1 An independent inspection firm appointed by the Engineer and paid for by the Owner shall conduct testing. The Contractor shall pay for extra tests required because of non-compliance of the works with the minimum requirements for materials and workmanship.

3.7 Warning Signs and Barricades

- .1 The Contractor shall provide adequate signs, barricades, red lights, and watchmen and take all necessary precautions for the protection of the work and the safety of the public. All barricades and obstructions shall be protected at night by signal lights or flares which shall be kept burning from sunset to sunrise. Barricades shall be readily visible at night. Suitable warning signs shall be placed and illuminated at night to show in advance where construction, barricades or detours exist.
- .2 Prior to leaving the site for extended periods of time (in excess of 24 hours) the Contractor shall ensure all excavations are backfilled. Alternatively, the Engineer may approve the use of temporary fencing to protect the public from entering open excavations.

3.8 Access Roads

- .1 Temporary roads shall be constructed as required for access to the working areas. Adequate drainage facilities in the form of ditches, culverts or other conduits shall be installed, when required for these roads.
- .2 In the construction of access roads, natural or otherwise, existing drainage facilities shall not be disturbed to the detriment of properties outside the working area and such facilities shall, unless otherwise provided elsewhere in the specifications, be restored to their original condition upon completion of the work.

3.9 Haul Routes

- .1 Haul routes used by the Contractor shall be subject to approval by the Owner and Engineer. The Contractor shall be responsible for damage and/or spillage on the roads used for hauling materials and equipment to and from the site, subject to the Engineer being satisfied such damage or spillage was a direct result of the actions of the Contractor or any of the Contractor's agents in the performance of the work required under this Contract. If remedial work is necessary, the Contractor shall immediately clean and/or restore the affected area at his own cost.

3.10 Water Consumption

- .1 Water for construction purposes will be obtained from sources approved by the Engineer. The Contractor is responsible for finding their water source.

3.11 Detours

- .1 Where construction requires the blocking or closing existing roads, a suitable detour with adequate signing and lighting shall be provided. The Contractor shall obtain the local authority's approval for the proposed closing and the detour route.
- .2 The Contractor is responsible to notify the police, ambulance and fire departments a minimum of 48 hours before the road closure and the location of the proposed detour.
- .3 The contractor shall provide all detour signs according to Alberta transportation

standards. All signs must meet Alberta Transportation Standard, no Contractor made signs will be accepted. Owner will not be responsible for the cost or the supply of the traffic detour signs or the replacement of the signs if they go missing.

3.12 Traffic Control

- .1 All traffic signs/devices, traffic channeling, detours, closures, etc. shall be in accordance with the Manual of Uniform Traffic Control Devices as published by the Transportation Association of Canada (TAC) .
- .2 All traffic control shall be carried out in accordance with Specification 01502 and Special Provisions.

3.13 Road Closures

- .1 A minimum of one-lane must be open to traffic at all times unless otherwise approved by the Engineer.
- .2 The use of parallel roads to accommodate traffic is subject to the approval of the Engineer.

3.14 Salvaged Utilities

- .1 The Owner reserves the right and/or dispose of all existing utility material such as hydrants, valves, pipes, etc., that is removed from the site during construction. If the Owner wishes to retain some or all existing utility material, they shall remain the property of the Owner and shall be stockpiled and/or disposed of as directed by the Engineer. If the Owner does not wish to retain the existing utility material, they shall be disposed by the contractor off the Owner's property.

3.15 Protection of Existing Surface and Underground Structures

- .1 The Contractor shall take all necessary measures to protect any existing structures from injury and damage and shall substantially and sufficiently support all structures that may be endangered by work or other operations carried out as part of the contract.
- .2 The existence and location of underground utilities shown on the Drawings is not guaranteed, and notwithstanding any other provision in the Contract and without limiting the generality of the foregoing, sewer, water and gas mains or lines, electric light, power, or telephone conduits, or other such structures of utilities must be located by the Contractor, and failure to locate same does not negate the Contractor's responsibility thereto. The Contractor shall pay any charges to the Utility Companies in this regard. The Contractor shall make arrangements with the Owner of any underground structure to be present to supervise the work adjacent to the structure. Should any structures be injured by the aforementioned operation, they shall be restored at the Contractor's expense to an operable state, or as specified by the Engineer, within the same working day as such disruption occurred.
- .3 Permanent repair must be completed during the next working day to the satisfaction of the Engineer.

3.16 Special Controls

- .1 The Contractor shall perform the work in conformity with all municipal by-laws with respect to noise, hours of work, night work and holiday work. Night work and holiday work requires the written permission of the Owner.
- .2 The Contractor shall perform the work in a manner that will not produce an objectionable amount of dust. Dust control shall be performed to the satisfaction of the Engineer and there will be no separate or additional payment for this work but it shall be considered incidental to the remaining work under the Contract.
- .3 The Contractor shall perform all work in conformity with the Environmental Protection and Enhancement Act and all existing municipal bylaws.

3.17 Construction Affecting Public, Commercial and Residential Areas

- .1 The Contractor shall provide suitable traffic control for pedestrians, cyclists and motorists, which will protect the public and maintain access to local traffic with as little disruption as possible.
- .2 All proposed routes for hauling equipment must be approved by the Engineer prior to commencement of the work. Rubber tired motor scrapers shall not be used to haul over improved streets or gas lines. When any travelled roadway is being entered or crossed by hauling equipment, traffic must be controlled by qualified flag persons and sufficient warning signs to ensure the safety of the public.
- .3 Trucks must be loaded in such a manner that no spillage occurs during haul. Care must be taken to prevent soil deposition onto existing streets and roads. The clean-up of soil deposition must be performed before the end of each day's haul or as directed by the Engineer.
- .4 All public relations elements, including open houses, advertisements, notices, other information requirements, emergency contract personnel, emergency response personnel, public relations telecommunications equipment, and emergency telecommunications equipment, whether on-site or off-site, shall be the Contractor's responsibility. In writing, the Contractor shall submit to the Owner their proposed public relations strategy and personnel for Owner approval before proceeding with construction.
- .5 Notify, in writing, every business or resident whose property is fronting, backing or immediately adjacent to the construction site at least seven (7) days in advance of construction in the affected area. Notices shall be printed on the Contractor's letterhead and submitted to the Engineer for his approval prior to delivery to businesses or residents.
- .6 Contractor notices shall give approximate date of construction in affected areas and clearly indicate the Contractor's name, address and telephone number, as well as a telephone number which residents can call for 24-hour emergency service. The notice shall also include a contact person's name for reporting damage to personal property, alternative parking, access, and garbage disposal and temporary water or sewer systems. The Contractor shall also provide notice, warning parents of the

dangers that exist on construction site and shall deliver this to every household in the vicinity of construction.

- .7 In the event that it should become necessary to disrupt water or sanitary services to any residences during the course of construction, the Contractor shall give 48-hour written notice of the intended disruption to all affected residences or businesses. The notice shall be delivered to an adult member of the residence or business.
- .8 If the date of garbage collection falls within the lane/street closure period, the Contractor shall make arrangements for removing the garbage to a location where sanitation trucks can pick up the garbage without driving on the closed road or excavated area. The Contractor shall co-ordinate this activity with the Owner and shall have Owner approval of proposed strategy for garbage collection.
- .9 The Contractor shall be responsible for providing, maintaining, protecting and repairing temporary utility (water, sewer, gas, power, telephone and other utility) services.
- .10 During construction and warranty periods, if the Contractor fails to respond to customer's (property owner's) requests for remedial works regarding maintaining (or repairing) temporary utility services or correcting faulty works (or products) within a reasonable time, the Owner shall have the right to carry out the necessary remedial works (by Owner forces or Other Contractors) in this regard and shall charge the costs of the remedial works done to the Contractor or deduct the costs of the remedial works from the contract value or holdback monies due to the Contractor.
- .11 The Contractor shall be responsible for providing temporary parking spaces for property owners and customers whose access to their normal parking spaces (i.e. garages, parking lots, etc.) are affected by construction on site.
- .12 The Contractor shall be responsible for providing temporary accesses to private/public properties in which accesses to the property (i.e. sidewalks, driveways, para-ramps, etc.) are affected by construction on site.
- .13 During construction periods, if the Contractor fails to respond to customer's (property owner's) requests for providing temporary access to his or her property(s) within a reasonable time, the Owner shall have the right to carry out the necessary remedial works (by Owner forces or Other Contractors) in this regard and shall charge the costs of the remedial works done to the Contractor or deduct the costs of the remedial works from the contract value or holdback monies due to the Contractor.

3.18 Site Maintenance and Clean up

- .1 The working area shall be maintained in an orderly manner and shall not be encumbered with equipment, materials or debris.
- .2 Clean up shall be a continuing process from the start of the work to the Final Acceptance of the project.

- .3 The Contractor shall at all times, and without further order, keep property on which work is in progress free from accumulations of waste materials or rubbish caused by employees or by the work. Accumulations of waste materials, which might constitute a fire hazard, will not be permitted. Spillage from the Contractor's hauling vehicles on travelled public or private roads shall be promptly cleaned up. On completion of construction, the Contractor shall remove all temporary structures, rubbish, and waste materials resulting from his operations.

3.19 Access to Private Property

- .1 The Contractor shall provide and maintain reasonable access to all private property and places of business. When actual construction operations prohibit provisions of such access the Contractor shall notify, well in advance, any residents and businesses affected by the closure.

3.20 Project Closeout

- .1 The Contractor and his Sub-contractors shall conduct an inspection of the Work and correct all deficiencies. The Contractor shall notify the Engineer in writing of satisfactory completion of the "Contractor's Inspection" and request an Engineer Inspection. The Engineer's inspection shall consist of the Engineering team and the Contractor. During the "Engineer's Inspection" a list of all deficiencies shall be drawn up and signed by the Engineer. The Contractor shall correct all deficiencies in a satisfactory manner. When the Contractor is satisfied that all deficiencies have been corrected, the Contractor shall request, in writing, a "Final Inspection." The Final Inspection Team shall consist of the Owner, Engineer and the Contractor.
- .2 When the Final Inspection team mutually agrees that the work is completed, the Engineer will state in writing his approval of the inspected work and issue a Construction Completion Certificate. The Engineer may, at any time, before issuance of a Construction Completion Certificate, describe the portions of the Work not completed to his satisfaction and all things which the Contractor must do before a Construction Completion Certificate will be issued.
- .3 Immediately prior to the expiration of the relevant maintenance period, the Contractor shall request, in writing, a joint inspection of the work by the Final Inspection Team. The Engineer will thereafter issue a Certificate of Total Performance upon being satisfied that all necessary maintenance has been completed.

4.0 PAYMENT

4.1 General

- .1 Unless otherwise provided in the Tender Form there shall be no separate or additional payment for work required under this Section but it shall be considered incidental to the remaining work under this Contract.

END OF SECTION

1.0 GENERAL

1.1 Traffic Accommodation

- .1 It is the Contractor's responsibility to familiarize themselves with the existing traffic on this project that may impact the construction. It is the Contractor's responsibility to control traffic and supply adequate direction for detours, barriers and warning lights to provide the minimum inconvenience to the public and the industry. It is up to the Contractor to determine during the tender period the impact the traffic will have on his work and adjust his tender accordingly. The Contractor shall not have any type of claim for compensation against the Owner due to the impact of Traffic on construction progress. The contractor is to submit the traffic accommodation plan to the Engineer for approval prior to the start of construction.
- .2 Make suitable provisions, including detours, to accommodate all vehicular and pedestrian traffic safely and with minimal inconvenience through and around the work.
- .3 Fire truck access to all buildings and houses to be maintained at all times.
- .4 Provide, install, maintain and protect traffic control devices such as signs, barriers, fences and lights as required to perform the work safely.
- .5 Poorly maintained, defaced, damaged and/or dirty construction signs shall be replaced, repaired or cleaned without delay. Special care shall be taken to ensure that construction materials and dust are not allowed to obscure the face of a sign.
- .6 Provide the required number of flag-persons during all periods of active equipment operations which may affect normal traffic operations.
- .7 Control operations to ensure normal school bus operations are not interfered with.
- .8 Ensure uninterrupted access to developments along the project.
- .9 Obtain prior approval of the Engineer before changing or disrupting existing accesses and road crossings.
- .10 Carry out construction operations in one continuous operation at road crossings, intersections and entrances for each phase of the work.
- .11 Provide and use other methods or equipment necessary to safely accommodate traffic through the work site.
- .12 The Engineer has the right to require the Contractor to modify operations if, in the Engineer's opinion, traffic is being unduly hindered or public safety is being compromised.
- .13 The Contractor must maintain one lane of traffic for all type of traffics (domestic and industrial) at all times unless authorized by the Engineer.

- .14 The Contractor shall promptly modify the traffic accommodation operations deemed necessary by the Engineer.
- .15 The Engineer may suspend work where, in the Engineer's opinion, the Contractor fails to adequately provide for the public's safety, for re-occurring safety issues or when the Contractor fails to comply with orders issued by the Engineer regarding traffic accommodation operations.
- .16 The Contractor shall remove or cover all traffic control devices when not essential for the safe accommodation of traffic to eliminate unnecessary inconvenience to the traffic.
- .17 The Contractor shall coordinate his traffic accommodation measures with those of other forces at or adjacent to the work, as required, to accommodate traffic safely and conveniently. This shall not relieve the Contractor of the responsibility for the safe accommodation of traffic throughout the work.
- .18 Before any prolonged Contractor's Site Vacancy/Contractor's shutdown, the Contractor shall ensure that any disturbed roadway surface is restored to a condition suitable for traffic operations approved by the Engineer. Prior to the Contractor's shutdown, a meeting between the Contractor, the Engineer, the Owner and any other necessary participants is required. During the Contractor's shutdown, the Contractor remains the Prime Contractor for the Work Zone. The purpose of the meeting is to document a "Shutdown Plan" based on the specific needs and requirements of the project. The Shutdown Plan must outline the Contractor's methods and procedures for monitoring and maintaining the project during the shutdown period and will outline any and all responsibilities of the other parties. The Engineer's record of the meeting results will be circulated amongst the parties and, if not objected to or revised will form the Shutdown Plan. As applicable, the items in the Contractor's Shutdown Plan include, but are not limited to:
 - (a) Work area signage (i.e. advance warning, proper spacing, etc.) and permanent signage in the work zone (maintaining and cleaning)
 - (b) Appropriate speed zones (i.e. reconstructed sections, Work Areas, non-surfaced areas)
 - (c) Delineators along grade widening where slopes are not completed
 - (d) Temporary protection hazards measures
 - (e) Arrangements for any special maintenance requirements
 - (f) Environmental protection measures
 - (g) Proper barricading of adjacent and intersecting roads
 - (h) Drainage issues
 - (i) Securing any open excavation borrows, gravel pits, etc.
 - (j) Roadway maintenance including, but not limited to, line painting, pavement irregularities including pot hole repair, guardrail and other safety items
 - (k) Service roads
 - (l) Detours
 - (m) Traffic accommodation
 - (n) Shutdown transition planning and coordination for the start and end of the shutdown period
 - (o) Occupational Health and Safety

Before the re-commencement of construction, a pre-construction meeting will be held, and a date set for when the Contractor will return to Work. Once construction has recommenced, the Contractor shall submit an updated construction schedule.

No component of the Contractor's Shutdown Plan will relieve the Contractor of his obligations under the Contract.

- .19 The contractor shall provide all detour signs according to Alberta transportation standards. All signs and materials must meet Alberta Transportation Standards. Contractor-made signs will not be accepted. The Owner will not be responsible for the traffic detour signs' cost or supply. Detours shall meet or exceed the requirements of the following Alberta Transportation manuals:
- (a) Traffic Accommodation in Work Zones, 2018, 2nd Edition, and;
 - (b) Section B7 of the Highway Geometric Design Guide, (September 2020)
- .20 The Contractor shall provide adequate signs, barricades, red lights, and watchmen and take all necessary precautions to protect the work and the public's safety. All barricades and obstructions shall be protected at night by signal lights or flares, which shall be kept burning from sunset to sunrise. Barricades shall be readily visible at night. Suitable warning signs shall be placed and illuminated at night to show in advance where construction, barricades or detours exist.
- .21 The Contractor shall supply all equipment required to complete the Work.
- .22 Work on the project shall not commence until all necessary temporary construction signs and all other traffic control devices as proposed in the traffic accommodation strategy are in place.
- .23 When signs require frequent moves, portable type signs mounted on weighted stands may be used. Portable signs shall be placed on the shoulder of the road such that the face of the sign is fully visible to oncoming traffic and the bottom of the sign is not less than 0.3 m above the road surface. The stands shall be securely weighted and erected to ensure against being blown over by prevailing winds or gusts from passing vehicles.
- .24 Non-portable signs shall be conspicuously posted and erected at right angles to the roadway, with the bottom of the sign at a height of 1.5 m above the roadway surface and not less than 2.0 m nor more than 6.0 m from the nearest traffic lane.
- .25 Objects within or immediately adjacent to the roadway which constitute a traffic hazard shall be marked with alternating black and orange stripes attached directly to the object or erected immediately in front of it.

1.2 Flag-persons

- .1 When construction operations or work zone conditions cause interruption, delay or hazard to the travelling public or anyone on the worksite that requires flag-persons,

- the Contractor shall provide and equip responsible flag-persons for the continuous direction and control of traffic.
- .2 The Contractor shall ensure that flag-persons are instructed in and use proper traffic control procedures appropriate for the prevailing conditions.
 - .3 Flag-persons shall have proof of certification from a recognized training program on traffic control procedures through construction zones.
 - .4 Flag-persons shall be dressed in clean uniforms or coveralls, orange hardhats and fluorescent red-orange over vests for maximum visibility and be equipped with proper traffic control paddles.
 - .5 During hours of darkness, flag-persons shall be additionally equipped with a red signal hand-light with sufficient brightness to be visible to approaching traffic, and flagging stations shall be illuminated by overhead lighting.
 - .6 During hours of darkness, signs indicating hazardous conditions and requiring increased attention shall be marked with flashers.

1.3. Removal, Salvage and Replacement of Existing Signs and Guideposts

- .1 All existing signs and guideposts which must be removed in the prosecution of the work shall be carefully salvaged by the Contractor.
- .2 Critical signs necessary for traffic protection, such as stop signs, shall be maintained.
- .3 All signs shall be replaced as soon as possible after the completion of the work.
- .4 All costs associated with the maintenance of existing signs, the removal and disposal of guideposts, and replacement of existing signs will be considered incidental to the Work, and no separate or additional payment will be made.

1.4. Detour Road and Roadway Maintenance

- .1 Subject to the approval of the Engineer, detours may be used to carry traffic around the worksite.
- .2 Construction of the detour road is part of the contract and is covered under line item – Traffic Accommodation on the schedule of quantities. Maintenance of the detour road during construction is the contractor's responsibility and is part of the Traffic Accommodation line item on the schedule of quantities.
- .3 If a detour road must be constructed, the contractor will be responsible for constructing this detour road at their own cost, and he will be responsible for maintaining that detour road for as long as the detour road is required. The Contractor will be responsible for removing this detour road and restoring the ground to its original state prior to completion of the project. Contractor to account for this cost on the line item: Traffic Accommodation on the schedule of quantities.
4. The Contractor may request to use local roads as detour roads. If the Owner

approves this request, the Contractor will be responsible for maintaining that detour road for as long as the detour road is required. The local roads must be re-instated to their original condition or better prior to completion of the project. The Contractor shall not have any claim for compensation against the Owner if this request is denied.

- .5 When the work required disturbance of an existing roadway carrying public traffic, the Contractor shall keep the disturbed areas of the travel lanes well graded, free of potholes and of sufficient width for the required number of travel lanes.
- .6 Prior to any prolonged shut down of construction, the Contractor shall ensure that any disturbed roadway surface is restored to a condition suitable for traffic operations as approved by the Engineer.
- .7 When traffic is diverted entirely off the right-of-way, the Contractor shall establish and maintain a detour which shall be complete with signs at every intersection.
- .8 When, in the opinion of the Engineer, surfacing gravel is required for traffic accommodation in areas disturbed by the Contractor prior to the completion of the work on those areas, the Contractor shall promptly provide and place crushed surfacing gravel to the satisfaction of the Engineer.
- .9 When a secondary or local road is used as a detour, the Contractor shall maintain and leave it as good as it was prior to its use as a detour, in the opinion of the Engineer, including resurfacing if required.
- .10 If the Contractor fails to maintain the road and apply gravel promptly, the Engineer may make other arrangements to have the work done and deduct the cost thereof from any money the Contractor is owed.

1.5. Dust Abatement

- .1 The Contractor shall keep detours and roadways within the project limits free of excessive dust.
- .2 The Contractor shall supply and apply all dust abatement material at their expense.
- .3 If the Contractor fails to undertake dust abatement measures promptly, the Engineer may make other arrangements to have the work done and deduct the cost thereof from any money the Contractor is owed.

1.6. Daily Recording of Temporary Construction Signing

- .1 Each day and as the work area changes, the Contractor shall record the location of all temporary construction signs and any other traffic control devices used at the work areas.
- .2 The Contractor shall record this information on a form suitable to the Engineer and submit it to the Engineer weekly or when requested.

END OF SECTION

1.0 GENERAL

1.1 Contractor's Responsibility

- .1 The Contractor shall assume full responsibility for safeguarding all existing and relocated utility installations during the progress of the work.
- .2 "Utility installations" shall mean:

Utilities and facilities which are located on, in or near the right-of-way and which may be affected by the construction and shall include but not be limited to pipelines, drainage works, irrigation works, water works, sewage works, power facilities, telephone facilities, cable facilities and related appurtenances.
- .3 While the Engineer has made every effort to collect and present complete details concerning utility installations, no responsibility will be assumed by the Engineer for the correctness and completeness of its information, and the Contractor shall have no claim on that account.

1.2 Liaison and Location

- .1 The Contractor shall be responsible for ensuring that all utility installations are located and marked on the ground before commencing construction operations.
- .2 The Engineer may provide information respecting known utilities, but the Contractor shall be responsible for contacting all affected utility owners or operators to determine the existence and location of all utility installations, maintaining liaison with the utility owners or operators concerning adjustment of the utilities and coordinating construction accordingly.

1.3 Precautionary Measures

- .1 The Contractor shall take all precautionary measures as may be necessary when working over or adjacent to utility installations, whether above or below ground and shall control equipment and method of construction to prevent damage to any utility and its appurtenances.
- .2 Under no circumstances shall the Contractor carry out any construction operations over or adjacent to any utility until the required adjustments and protection for the proposed construction have been completed.
- .3 The Contractor shall provide a minimum of 48 hours (excluding weekends and holidays) notice to the utility owner or operator in advance of commencing construction operations that may affect their installations.
- .4 After completion of utility work by the utility owner or operator, the Contractor shall continue to work in close liaison with the utility owner or operator and, if the utility owner or operator so requires, ensure that a representative of the affected utility owner or operator is present at all times during active equipment operations at that location.

- .5 The Contractor shall ensure that no equipment crosses or operates over or under any utility installations at locations other than where required protection has specifically been provided and shall work in close cooperation with the utility owner or operator in the execution of the work.
- .6 When construction is undertaken in the vicinity of any unprotected utility installation, the Contractor shall exercise extreme caution to ensure that the utility installation is not damaged by construction equipment or applied loads.
- .7 When haul roads or equipment crossings are required, it shall be the Contractor's responsibility to determine, provide and install any protective works necessary and to observe any other precautions which may be required.

1.4 Telephone Facilities

- .1 When there are telephone facilities which are affected by the work, the applicable telephone company may carry out the required relocation of their facilities concurrently with the Contractor's operations.
- .2 In those areas where it is not immediately feasible to relocate buried cable to the final location, the telephone company may temporarily place cable on the surface and bury it upon completion of construction operations.

1.5 Power Facilities

- .1 When there are power facilities within the limits of this project, alterations will be carried out by the applicable power company concurrently with construction operations.
- .2 The Contractor, in undertaking any work near existing power facilities, shall comply with the requirements under the Electrical Protection Act and associated regulations.
- .3 Prior to the commencement of power facility relocation, the Contractor shall first carry out necessary clearing and grubbing.
- .4 The Contractor may be required to undertake additional clearing and grubbing to accommodate the relocated power facilities, payment for which will be made at the applicable unit prices.
- .5 When the Contract does not contain bid items for clearing or clearing and grubbing, any required clearing or clearing and grubbing will be considered incidental to the work.
- .6 It shall be the Contractor's responsibility to maintain liaison with the power company to ensure that the necessary land clearances have been arranged.

1.6 Pipelines

- .1 When the magnitude and degree of complexity of any required adjustments prevent the Contractor from working in the vicinity of the pipeline, the Contractor shall arrange operations clear of those pipelines until the required adjustments are

completed, and permission to construct in their vicinity is received.

- .2 The Contractor shall not have any claim for compensation or damages for any stoppage, delays, inconvenience, or damage sustained due to any interference with the pipelines or the operation of relocating them.
- .3 Prior to the commencement of construction operations, the Contractor shall review the project with representatives of each pipeline company and the Engineer to determine the location and specifics of each pipeline.
- .4 The Contractor, being fully aware of the location of all pipelines, shall mark the location of the same so their positions are readily identifiable to all workforces.
- .5 Under no circumstances shall work be commenced within 30 metres of any pipeline until the required adjustments (if any) have been completed and a written crossing agreement has been received from the affected company.
- .6 The Contractor shall contact the company representative 72 hours (excluding weekends and holidays) prior to commencing construction operations within 30 metres of a pipeline so arrangements may be made to have a company representative or delegate present during the period machinery is being employed within 30 metres of a pipeline.
- .7 Absolutely no work shall be undertaken within 30 metres of a pipeline until a company representative is present at the site and has authorized the work.
- .8 No operations involving the use of machinery shall be commenced within 5 meters of a pipeline/underground utilities (gas, power, sanitary, water and storm) until the line has been exposed (by hand or hydro-vac), its location accurately referenced, and any required protection is put in place and/or adjustment to the pipeline is complete.
- .9 The exposure and backfilling of the pipelines shall be undertaken by the Contractor under the direct supervision of the Engineer and the pipeline company's representative.
- .10 The exposure and backfilling of pipelines shall be incidental to the project.
- .11 If the Contractor proposes to move any equipment across the pipeline right-of-way prior to the commencement of construction operations, the Contractor shall use timbers or a pad of earth if the pipeline company so requires or the Engineer so directs.
- .12 All labour, equipment, materials, and incidentals as may be required for the protection of a pipeline and the safe execution of work will not be paid for separately but shall be considered incidental to the work.
- .13 Clearing required within 30 meters of a pipeline shall be carried out using suitable hand-operated tools and burning or burying debris within 30 metres of a pipeline is strictly prohibited.

- .14 This work will be paid at the applicable unit prices.
- .15 When the Contract does not contain bid items for clearing or clearing and grubbing, any required clearing or clearing and grubbing will be considered incidental to the work.
- .16 The Contractor shall not store, park or drive any equipment, materials and/or vehicles over or along any pipeline right-of-way except as reasonably necessary in the actual construction.
- .17 Notwithstanding the foregoing, the Contractor shall conduct operations in the vicinity of all pipelines in accordance with the Pipeline Act of Alberta, the National Energy Board Regulations and other related legislation.
- .18 The Contractor is advised that in the event of a pipeline accident, all work is to cease immediately, and the Contractor is to contact the pipeline company involved as well as the local area office of the Energy and Utilities Board (EUB).

END OF SECTION

1.0 CONSTRUCTION SAFETY MEASURES

- .1 Comply with the latest edition of the Alberta Occupational Health and Safety Act and the Regulations made pursuant to the Act.
- .2 Contractor is required to fully comply with all Provincial Safety Acts, Codes and Regulations. For this reason, the Contractor will act as the "Prime (Principal) Contractor" for this contract.
- .3 Observe and enforce construction safety measures required by the latest edition of:
 - .1 National Building Code of Canada
 - .2 Provincial Worker's Compensation Board
 - .3 Municipal Statutes and Ordinances
 - .4 Contractors Health and Safety Program
- .4 In the event of a conflict between any provisions of the above authorities, the most stringent provision shall apply.
- .5 Provide and maintain Worker's Compensation Board coverage for all employees for the duration of the contract. Prior to the commencement of the work and prior to final payment, provide the Engineer with a letter/certificate of Clearance from the Worker's Compensation Board indicating that the Contractor's account is in good standing.
 - .1 Should the Contractor be a sole proprietor, provide documented proof in a form acceptable to the Engineer of an alternative means of personal coverage that meets or exceeds the requirements set out above for the Worker's Compensation Board Coverage.
- .6 The Contractor is responsible for the safety of persons and property both on and adjacent to the work site to the extent that they may be affected by work conduct.
- .7 If the work site has an existing emergency plan, the Contractor shall familiarize all of the workers on the work site with the contents of the plan. The contractor shall adhere to any key control system established by the Owner to protect the work site.
- .8 Should an unforeseen or peculiar safety-related hazard or condition become evident during performance of work, immediately take measures to rectify the situation and prevent damage or harm. Advise the Engineer verbally and in writing of the hazard or condition.
- .9 Before beginning construction work in any existing Owner facility, the Contractor shall meet with the Owner and/or Engineer to discuss potentially hazardous material on site. This shall include health hazards of a physical or chemical nature. The Contractor shall also conduct an on-site review of existing construction materials and equipment for additional hazardous material and notify the Owner and/or Engineer in writing of their findings and proposed remediation or control measures. The Owner and/or Engineer

will then decide on the appropriate action. If further potentially hazardous material is discovered during construction, work in that area shall cease, and access to the area shall be restricted. The Contractor shall immediately notify the Engineer to have the alleged hazardous materials identified and tested. Authorization by the Owner and/or Engineer to proceed with the work will be contingent on test results.

- .10 Install a safety fence around the active construction site, including any open excavations that may endanger the public, as directed by the Engineer. The Contractor must follow Alberta Health and Safety Regulations and the governing OH&S legislation.
- .11 Safety fence shall be a minimum 1.9 m high wire construction fence. The Engineer will not approve snow fencing around open excavations.

2.0 INSPECTIONS AND REPORTING

- .1 The Contractor shall conduct frequent inspections to ensure compliance with legislation. Any unsafe conditions or work practices observed shall be corrected as soon as possible. In the event of an imminent danger situation, Section 27 of the Occupational Health and Safety Act shall be followed. All reports provided by outside agencies shall be copied to the Engineer within 24 hours following inspections.
- .2 All serious or potentially serious accidents or incidents shall be reported as required by the Occupational Health and Safety Act. In addition, the Occupational Health and Safety Services section of the appropriate Department shall be notified immediately and provided with a copy of the investigation report as soon as practicable.

3.0 ALBERTA ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT (AEPEA)

- .1 The Contractor and subcontractors shall meet all aspects of the AEPEA. Contractors will be responsible for reporting all of their own and their subcontractor's releases or spills in or about the work site in accordance with the Act. Reporting shall be to the Director of Pollution Control, Alberta Environment. The Owner and Engineer will be copied on all AEPEA reports.

4.0 PRIME CONTRACTOR

Effective April 1, 2023, Alberta Occupational Health & Safety Act (SA 2020 cO-2.2).

As per SA 2020 cO-2.2, Alberta Occupational Health & Safety Act, Section 10, (2), and (6).

The Contractor is required to fully comply with all Alberta Occupational Health and Safety Act, Regulation and Code. For this reason, the Contractor referenced above will be acting as the Prime Contractor for this contract.

The Contractor is the Prime Contractor as defined by Alberta Occupational Health and Safety Act, Regulation, Code as per:

Alberta Occupational Health & Safety Act, Section 10 – Obligations of prime contractors

“(7) The Prime Contractor shall:

- (a) establish, as far as it is reasonably practicable to do so, a system or process that will ensure compliance with this Act, the regulations and the OHS code in respect of the work site, including a system or process to ensure cooperation between the employer and workers in respect to health and safety,
 - (b) designate a person in writing for the purposes of ensuring cooperation between the employer and workers in respect to health and safety and implementing a system to address the matters set out in section 13(6), and
 - (c) conduct the prime contractor's own activities in such a way as to ensure, as far as it is reasonably practicable to do so, that no person is exposed to hazards arising out of, or in connection with, activities at the work site,
- (8) If a requirement in this Act, the regulations or the OHS code imposes a duty on an employer with respect to equipment, work site infrastructure or an excavation and the equipment or infrastructure is designed, constructed, erected or installed, or the excavation is conducted by or on behalf of a prime contractor, the prime contractor shall comply with the requirement as if the requirement were directly imposed on the prime contractor.
- (9) Subsection (8) does not relieve the employer or prime contractor from fulfilling other responsibilities under this Act, the regulations and the OHS code.
- (10) Every prime contractor shall ensure that the owner and any employer, supplier or service provider on a work site is informed of any existing or potential work site hazards that may affect workers or other persons at the work site.
- (11) Every prime contractor shall cooperate with any person exercising a duty imposed by this Act, the regulations and the OHS Code.”

The Contractor shall be the Prime Contractor for the full duration from the issuance of Notice to Proceed through to the issuance of Final Completion Certificate. He shall also be the Prime Contractor whenever the Contractor's personnel, equipment or subcontractors are on site between the period of issuance of the Certificate of Construction Completion and Final Acceptance Certificate.

Joint health and safety committees – As per Part 2 of the Alberta Occupational Health and Safety Act, section 13:

- “(1) For the purposes of ensuring cooperation between the employer and workers in respect to health and safety, an employer shall, after consultation with any union that is a certified bargaining agent or has acquired bargaining rights on behalf of the employer's workers, establish a joint health and safety committee
- (a) If that employer regularly employs 20 or more workers, or
 - (b) at any work site designated by a Director.

- (2) If there are 20 or more regularly employed workers in total from 2 or more employers at a work site, all employers shall, after consultation with any union that is a certified bargaining agent or has acquired bargaining rights on behalf of the employer's workers, coordinate the establishment of a joint health and safety committee for that work site.
- (3) Subsection (2) does not apply to a work site where a prime contractor has been designated.
- (4) A joint health and safety committee shall, in accordance with the OHS Code, consist of
 - (a) workers who represent the workers engaged in the work of the employer and are not associated with the management of the work,
 - (b) where applicable, workers who represent the workers engaged in the work of the employer and are not associated with the management of the work and who are represented by any union that is a certified bargaining agent or has acquired bargaining rights on behalf of those workers, and
 - (c) persons who represent the employer
- (5) The number of persons on a joint health and safety committee who represent the employer shall not exceed in total the number of worker representatives on the committee.
- (6) The duties of a joint health and safety committee include the following:
 - (a) the receipt, consideration and disposition of concerns respecting the health and safety of workers;
 - (b) participation in the employer's hazard assessment;
 - (c) the making of recommendations to the employer respecting the health and safety of the workers;
 - (d) review of the employer's work site inspection documentation.
- (7) A joint health and safety committee shall hold its meetings and carry out its duties and functions during normal working hours."

Health and safety representative – As per Part 2 of the Alberta Occupational Health and Safety Act, Section 14:

- "(1) For the purposes of ensuring cooperation between the employer and workers in respect to health and safety, an employer shall, after consultation with any union that is a certified bargaining agent or has acquired bargaining rights on behalf of the employer's workers, designate a worker, who is not associated with the management of the employer, as the health and safety representative
 - (a) If the employer regularly employs 5 to 19 workers, or

- (b) at any work site designated by a Director.
- (2) If there are 5 to 19 workers in total from 2 or more employers regularly employed at a work site, all employers shall coordinate the designation of a health and safety representative for that work site.
- (3) Subsection (2) does not apply to a work site where a prime contractor has been designated.
- (4) The health and safety representative shall, in cooperation with a representative of the employer, perform the same duties, with any necessary modifications, as set out for the joint health and safety committees in section 13(6).
- (5) A health and safety representative shall carry out all duties and functions during normal working hours.
- (6) An employer that is required to designate a health and safety representative under this section may establish a joint health and safety committee under section 13 instead of designating a health and safety representative."

Inspection of work site with officer – As per Part 2 of the Alberta Occupational Health and Safety Act, Section 15:

- "(1) When an officer inspects a work site, the officer may request any member of the joint health and safety committee, their designates or a health and safety representative to be present at that inspection."

Health and safety program – As per Part 2 of the Alberta Occupational Health and Safety Act, Section 16:

- "(1) An employer who regularly employs 20 or more workers or on the direction of a Director shall, subject to the OHS Code, establish and implement a health and safety program."

In the event that the Contractor refuses or fails to comply with an order under the Alberta Occupational Health and Safety Act, Regulation, Code thereunder and the performance of the work is stopped, the Owner may, upon written notice, hold the Contractor in default.

5.0. ENGINEER SAFETY PROGRAM

- .1 The Engineering firm managing this contract is committed to protecting its employees, its property, the public, the client, and the environment from incidents and accident through the implementation of a strong safety program.
- .2 The Engineering firm strictly adheres to the Occupational Health and Safety regulations and will always adhere to the Owner's safety policies.

END OF SECTION

1.0 GENERAL

- .1 All work on this project shall be carried out in accordance with the approval received from Alberta Environment, DFO and/or other approving agency.
- .2 All work on this project shall be governed by the Development and Reclamation Application as approved by Alberta Environment.
- .3 The approved application shall have precedence over and supersede all other Clauses, Standard Specifications, Special Provisions, etc. contained within the Contract.

2.0 FIRES

- .1 Fires and burning of rubbish on site are permitted only when approved by the Engineer.
- .2 Where fires or burning permitted, prevent staining or smoke damage to structures, materials or vegetation which is to be preserved. Restore, clean and return to new condition stained or damaged work.
- .3 Provide supervision, attendance and fire protection measures as directed.

3.0 DISPOSAL OF WASTES

- .1 Do not bury rubbish and waste materials on site unless approved by the Engineer.
- .2 Do not dispose of waste or volatile materials, such as mineral spirits, oil, or paint thinner, into waterways, storm or sanitary sewers.

4.0 DRAINAGE

- .1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

5.0 SITE CLEARING AND PLANT PROTECTION

- .1 Protect trees and plants on site and adjacent properties where indicated.
- .2 Wrap in burlap, trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with a protective wood framework from grade level to a height of 2 m.
- .3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .4 Minimize stripping of topsoil and vegetation.
- .5 Restrict tree removal to areas indicated or designated by the Engineer.

6.0 POLLUTION CONTROL

- .1 Maintain temporary erosion and pollution control features installed under this contract.
- .2 Control emissions from equipment and plant to local authority's emission requirements.
- .3 Prevent sandblasting and other extraneous materials from contaminating air beyond the application area by providing temporary enclosures.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

7.0 DEWATERING

- .1 All discharge of dewatering water is to comply with all applicable local, provincial, and federal guidelines, including:
 - .1 Canadian Council of Ministers of the Environment (CCME).
 - .2 Canadian Soil Quantity Guidelines, Alberta Tier 1 Soil and Groundwater Remediation Guidelines.

8.0 HYDROVAC OPERATIONS

- .1 Fluid from hydrovac operations must be disposed of off-site in accordance with all local, provincial and federal guidelines.

9.0 EROSION AND SEDIMENT CONTROL

- .1 Temporary and Permanent Erosion and Sediment Control (ESC) required for the works shall be Installed and Paid for as per the schedule of quantities.
- .2 The constructor shall install all ESC measures, including but not limited to silt fence, straw wattles, seeding, and rock check dams, as soon as reasonable to limit erosion.
- .3 The constructor is responsible for any additional ESC measures required to prevent erosion due to the means and methods of the work.
- .4 In all cases, biodegradable ESC means will be preferred for temporary measures. Temporary, non-biodegradable ESC measures must be removed at the completion of the work only after the temporary conditions have stabilized and no risk of erosion remains.

10.0 ALBERTA ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT (AEPEA)

- .1 The Contractor and subcontractors shall meet all aspects of the AEPEA. Contractors will be responsible for reporting all of their own and their subcontractor's releases or spills in or about the work site in accordance with the Act. Reporting shall be to the Director of Pollution Control, Alberta Environment. The Owner and Engineer will be copied on all AEPEA reports.

END OF SECTION

1.0 UTILITY LOCATIONS

- .1 Hydrovac operations pertaining to work under Schedule 7.0 will be paid in accordance with Section 01290, Article 14.12. All other hydrovacating shall be incidental to the project.
- .2 Fluid from hydrovac operations must be disposed of off-site in accordance with all local, Provincial, and Federal guidelines.

2.0 FILL EXCAVATION

- .1 Contractor to remove fill and organic materials under the proposed road, building, and tank servicing area to be used in the Southeast berm.
- .2 The Contractor shall take proper care when excavating cuts not to loosen, where it can be avoided, any material outside the specified cut line, whether by ripping, blasting or by other means, which would endanger the stability of the slopes or which would subsequently cause undue erosion or disintegration of side slopes.

3.0 BERM BUILDUP

- .1 All stripping, fill, and organic material on site shall be used to construct a berm on the Southeast end as shown on the Drawings.
- .2 Contractor shall shape and compact soil to 98% Standard Proctor Density.

4.0 COMMON EXCAVATION

- .1 Excavate, separate materials; load; haul the free haul distance; dump and spread; scarify, trim, cut and fill slopes; place and grade fill material on the berm, boulevard, road, or slope.
- .2 Course rock encountered shall be utilized for the lower layers of fills or as directed by the Engineer.
- .3 The Contractor shall take proper care when excavating cuts not to loosen, where it can be avoided, any material outside the specified cut line, whether by ripping, blasting or by other means, which would endanger the stability of the slopes or which would subsequently cause undue erosion or disintegration of side slopes.
- .4 Care should be taken not to undercut any slopes.

5.0 ENGINEERED FILL

- .1 Engineered fill will include excavating, loading, hauling material from the borrow site, placing onsite, levelling, aerating, conditioning (either drying or watering), compacting, and finishing to the final grade.
- .2 The contractor shall take all reasonable precautionary measures to avoid contamination of the suitable engineered fill by the inclusion of unsuitable material from the floor of the borrow area, the overburden, any unsuitable layers, or areas beyond the limits of the borrow area.
- .3 Prior to placement of Engineered fill the existing surface/interface is to be scarified to a minimum depth of 150mm to allow for adequate cohesion between the interface of the materials as per Geotechnical recommendation.
- .4 The contractor will be responsible for access and maintenance of the haul road during construction operations.

6.0 1.2m DRAINAGE DITCH

- .1 The contractor shall shape a 1.2m drainage ditch and compact soil to 98% of Standard Proctor Density
- .2 The drainage ditch shall have a continuous, gentle, and uniform slope as indicated in the drawings to ensure efficient flow of runoff.
- .3 The cross-sectional profile, indicating the side slopes and depth, shall be consistent with the detail drawings.
- .2 Erosion control blankets are to be installed along the drainage ditch channel as shown in detail drawings.

7.0 GRASS SWALE

- .1 The contractor shall shape and compact soil to 98% of Standard Proctor Density
- .2 The grass swale shall have a continuous, gentle, and uniform slope as indicated in the drawings to ensure efficient flow of runoff.
- .3 The cross-sectional profile, indicating the side slopes and depth, shall be consistent with the detail drawings.
- .2 Erosion control blankets are to be installed along the swale channel as shown in detail drawings.

8.0 POLYETHYLENE PRESSURE TUBING

- .1 Water service pipe shall be polyethylene blue pipe conforming to AWWA C901-20 and ASTM D3350-21. Pipe shall use plastic insert fittings and be certified for potable water service.
- .2 Fittings to conform to ASTM D2609-24.
- .3 Joint lubricants shall be certified for potable water use conforming to NSF 61.

9.0 WATER CISTERN AND PUMP

- .1 Contractor to supply and install 3000-gallon water cistern from Westcon Precast Inc. or an equivalent 3000-gallon tank pending approval from the Engineer.
- .1 Contractor to supply a Webrol WT1005 water pump or an equivalent water pump pending approval from the Engineer.
- .2 Water cistern and pump installation is to include all accessories detailed in **Appendix A**.
- .3 Contractor to submit shop drawings to the Engineer for approval before ordering the cistern and accessories. The contractor will be responsible for any extra costs if the contractor orders the cistern before shop drawing approvals and the water cistern or accessories do not meet specifications.

10.0 SANITARY HOLDING TANK

- .1 Contractor to supply and install a 3700-gallon holding tank from Westcon Precast Inc. or an equivalent 3700-gallon tank pending approval from the Engineer.
- .2 Holding tank installation is to include all accessories detailed in **Appendix A**.
- .3 Contractor to submit shop drawings to the Engineer for approval before ordering the tank and accessories. The contractor will be responsible for any extra costs if the contractor orders the cistern before shop drawing approvals and the tank or accessories do not meet specifications.

11.0 DEWATERING OF THE PIPE ZONE

- .1 No additional payment shall be made for any dewatering and groundwater management. All dewatering and groundwater management shall be incidental to all excavation work for which it is required.

12.0 CONDITIONING THE "WET CLAY" MATERIAL

- .1 No additional payment shall be made for the contractor to condition the material to bring it to optimum moisture content. If the soil is beyond optimum moisture content, the contractor must disc and dry the material up to optimum moisture before putting the material back in the trench. The cost of working the material is incidental to the project and no extra payment will be made to the contractor.

13.0 MISCELLANEOUS LANDSCAPE FEATURES

- .1 All disturbed landscape features outside of the marked site boundary are to be reinstated to a pre-existing condition or better and will be considered incidental to the work.

END OF SECTION

1.0 GENERAL

1.1 Protection

- .1 Protect existing items designated to remain and materials designated for salvage. In the event of damage, immediately replace such items or make repairs to the approval of the Engineer and at no additional cost to the Owner.

2.0 EXECUTION

2.1 Preparation

- .1 Inspect the site and verify with the Engineer items designated for removal and items to be preserved.
- .2 Locate and protect utility lines. Preserve in operating condition active utilities traversing the site as per Section 01503.
- .3 Notify utility companies before starting demolition.

2.2 Removal

- .1 Remove items indicated.
- .2 Do not disturb adjacent items designated to remain in place.

2.3 Salvage

- .1 Salvage items will be as per the tender form or identified on-site by the Engineer.

2.4 Disposal of Material

- .1 Dispose of materials off-site as directed by the Engineer.

END OF SECTION

1.0 GENERAL

1.1 Mill Certificates

- .1 Submit to the Engineer copies of mill test data and certificate at least 2 weeks prior to the start of work.

1.2 Delivery and Storage

- .1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

2.0 PRODUCTS

2.1 Non-Woven Geotextile (Filter Fabric)

- .1 Geotextile: non-woven synthetic fibre fabric, supplied in rolls.
 - .1 Width: 4.6 m minimum.
 - .2 Length: 50 m minimum.
 - .3 Composed of: minimum 85% by mass of polypropylene with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 60 days.
- .2 Physical properties:
 - .1 Thickness: to CAN/CGSB-148.1, No. 3, minimum 43 mm.
 - .2 Mass per unit area: to CAN/CGSB-148.1, No. 2, minimum 400 g/m².
 - .3 Grab tensile strength and elongation (to ASTM D4632):
 - .1 Breaking force: minimum 650 N.
 - .2 Elongation at future: maximum 50%.
 - .4 Mullen burst strength (to ASTM D3786): 2.1 MPa.
 - .5 Puncture strength (to ASTM D4833): 275 N minimum.
 - .6 Trapezoid tear strength (to ASTM D4533): 250 N minimum.
- .3 Securing pins and washers: to CAN/CSA-G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m² to CAN/CSA G164.
- .4 Factory and/or field seams: sewn in accordance with manufacturer's recommendations.
- .5 Thread for sewn seams" equal or better resistance to chemical and biological degradation than geotextile.

2.2 Woven Geotextile

The synthetic geotextiles shall consist of a durable, permeable, woven, polypropylene fabric composed of continuous synthetic filaments with typical properties as follows:

Tensile Grab Strength — ASTM D4632 890 N

Trapezoid Tear Strength — ASTM D4533 334 N

Mullen Burst Strength — ASTM D3786 2,750 kPa

CBR Puncture Strength—ASTM D6241 3114 N

UV Resistance at 500hrs – ASTM D4355 70% Retained

The geotextile shall be woven Propex 200ST, Layfield LP200 or approved equal.

3.0 EXECUTION

3.1 Installation

- .1 Place geotextile material by unrolling onto the graded surface in orientation, manner and locations indicated and retain in position with metal spikes complete with 25 mm washers.
- .2 Place geotextile material smooth and free of tension stress, folds, wrinkles, and creases.
- .3 Place geotextile material on sloping surfaces in one continuous length from the toe of the slope to the upper extent of the geotextile.
- .4 Overlap each successive strip of geotextile 600 mm over the previously laid strip.
- .5 Pin successive strips of geotextile with securing pins at 600 mm intervals at the mid point of the overlap, or as per the manufacturers specifications should they differ.
- .6 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .7 After installation, immediately cover with the overlying granular layer.
- .8 Replace damaged or deteriorated geotextile to the approval of the Engineer.

3.2 Protection

- .1 No vehicles permitted directly on geotextile.

END OF SECTION

1.0 REFERENCE: Contractor to note that section 02232 must be read in conjunction with section 02340.

2.0 DEFINITION:

- .1 Cement-Stabilized Subgrade: soil immediately below a pavement structure or slab, mixed with Portland cement and compacted to a depth of 150mm, 300mm or as specified.

3.0 PRODUCTS

3.1 Materials

- .1 In situ material or approved imported material
- .2 Portland Cement: to Can/CSA-A3000, A3001-03, Type GU – General use hydraulic cement.
- .3 Water obtained from domestic supply or other sources subject to the Engineer's approval.

4.0 EXECUTION

4.1 Preparation

- .1 Subgrade areas to be stabilized will be indicated on plans or designated by the Engineer.
- .2 Pre-grade and shape soil to designated grade and cross section.

4.2 Subgrade Preparation & Stabilization

- .1 Loosen soil to required depth. Work soil with cultivating and mixing equipment until soil is pulverized into pieces no larger than 25mm maximum dimension, exclusive of stones and rocks.
- .2 Contractor must assess the soil conditions prior to stabilizing. If the soil is saturated beyond optimum moisture content the contractor must disc and dry the material up to optimum moisture. Only then must he apply the concrete powder for stabilizing. The owner will not pay for extra concrete powder.
- .3 Dust Control: Contain cement dust within site area. Do not spread during or when there is imminent danger of high winds or rain.
- .4 Spread and blend cement into soil at a rate as specified on the schedule of quantities.

- .5 Add sufficient water to the blended soil and cement to best achieve the required compaction. Mix until homogeneous.
- .6 Spread the mixture uniformly in lifts of 150mm compacted thickness. Compact each lift to the required density.
- .7 Complete mixing, compaction and finishing on the same day.
- .8 Water may be lightly sprayed with a pressurized distributor for surface finishing.
- .9 Leave the surface of the compacted subgrade slightly higher than required elevation, then trim to design crown and grade. Leave finished surface even and free of depressions, humps or loose material.

4.3 Testing Compaction and Quality Control

- .1 The Contractor shall be responsible for quality control.
- .2 Trim high spots and refinish surface to within tolerance.
- .3 Add approved mixed material to low areas, scarify and blend to full subgrade depth, recompact to required density and refinish surface. Alternatively, fill low areas with extra thickness of subsequent sub-base or base course.
- .4 If a density test result is less than the required density, that test result is discarded and 3 retests shall be performed on the area represented by the failed test. The average is less than the required density, the area shall be reworked to full depth of the lift, the soil moisture altered as necessary and recompact to the required density. The cost of reworking the subgrade to pass the density shall be borne by the contractor.
- .5 In the case where specified density has passed but the proof roll failed. The failed area shall be reworked to full depth of the lift, the soil moisture altered and extra concrete powder added as necessary and recompact to pass the proof roll. The cost of reworking the subgrade including extra concrete powder if necessary to pass the proof roll shall be borne by the contractor.
- .6 Compaction results shall be based on a minimum of one density test per 2,000 square metres of road. Additional tests may be called for by The Engineer as deemed necessary to ensure the quality of the work.
- .7 Copies of results for any quality control testing carried out by the contractor shall be forwarded directly to the Engineer.
- .8 Field density tests shall conform to ASTM D1 556, ASTM D21 67, or ASTM D2922 for comparison with a maximum density determined according to ASTM D698 Method A.

- .9 Areas which are not satisfactory to the Engineer shall be reworked and retested at the Contractors expense.
- .10 The Contractor shall supply a Loaded Tandem Axle Water truck for the subgrade proof roll test. This test will be undertaken when the compaction of the subgrade has been completed, and shall be under the direction and in the presence of the Owner, Engineer and the Contractor.
- .11 Under no circumstances shall the Contractor cover the subgrade with sub-base, base-course, asphalt base-course, curb and gutter, or monolithic curb, gutter and sidewalk until all density test results and the Subgrade proof roll test performed in the presence of the Engineer are approved by the Engineer.
- .12 Areas which are not satisfactory to the Engineer shall be reworked and retested at the Contractors expense.
- .13 The Contractor shall not cover the subgrade until density and proof roll has passed successfully.

4.4 Proof Roll Test

- .1 For proof rolling use a loaded Tandem Axle Water truck. The Engineer may authorize use of other acceptable proof rolling equipment.
- .2 Proof roll top of subgrade upon completion of fine grading and compaction as directed by the Engineer
- .3 Make sufficient passes with proof roller to subject every point on surface to three (3) separate passes of loaded tire or as directed by the Engineer.
- .4 No movement while doing the roll test will be tolerated. In addition, (rebound) movement or rutting or cracking or lateral movement will be considered failure. All areas identified by the Engineer and/or Owner during the proof rolling will have to be rectified by the contractor and re-proof rolled.
- .5 Proof roll will be undertaken when the compaction of the subgrade has been completed, and shall be under the direction and in the presence of the Contractor, Engineer and the Owner.
- .6 If proof roll fails where a proof roll must be re-schedule with the Engineer and the Owner, the cost of engineering and the owner's time to redo the proof roll shall be paid by the Contractor.

4.5 Re-work of Failed Proof Roll Area(s)

- .1 Break up and pulverize rejected cement stabilized subgrade into no larger than 25mm pieces. Spread the pulverized material for additional cement. The re-work of failed proof roll area(s) cost is incidental to the work and shall be borne by the Contractor.
- .2 Add cement as follows:
 - .1 For a section reprocessed within 24 hours and 48 hours of the original construction, add 50% of original cement content.
 - .2 For a section reprocessed more than 48 hours following the original construction, add 100% of the original cement content.
 - .3 Process the new mixture using pulverization equipment.

4.6 Tolerances

- .1 The finished surface of the subgrade shall conform to approved grades and shall show no depression more than 30 mm under a straightedge 3.0m long when placed parallel to the centerline. Subgrades higher than the approved grades shall be cut to the required grades.
- .2 The tolerance for ditches, boulevards, etc., shall be $\pm 50\text{mm}$ as long as the variance does not change the flow of water.

4.7 Inspection

- .1 Before acceptance, the subgrade surface shall be true to cross-section and grade, and shall conform to the density and bearing ratio requirements specified.
- .2 Field density and moisture content tests may be made by the Owner or their representative to ensure that the material is satisfactory. Material not meeting the specifications will not be approved.

4.8 Maintenance

- .1 Maintain finished base in a condition conforming to this Section until succeeding material is applied or until acceptance by the Engineer.

4.9 Re-Work of Failed Proof Roll Area(s)

- .1 Break up and pulverize rejected cement stabilized subgrade into no larger than 25mm pieces. Spread the pulverized material for additional cement. The re-work of failed proof roll area(s) cost is incidental to the work and shall be borne by the Contractor.

.2 Add cement as follows:

- .1 For a section reprocessed within 24 hours and 48 hours of the original construction, add 50% of original cement content.
- .2 For a section reprocessed more than 48 hours following the original construction, add 100% of the original cement content.
- .3 Process the new mixture using pulverization equipment.

END OF SECTION

1.0 GENERAL

1.1 Definitions

- .1 Topsoil:
 - .1 Surface soil containing organic material that supports good vegetative growth and is suitable for top dressing, landscaping and seeding.

2.0 PRODUCTS

- .1 Supply all labour, materials and equipment required for topsoil stripping.

3.0 EXECUTION

- .1 Excavate topsoil as close as is practicable to the lines and grades shown on the Drawings or as required.
- .2 Topsoil shall be stripped to a depth that will ensure complete removal of all organic materials. The topsoil shall be spread in the area indicated on the drawings or as otherwise designated by the Engineer.
- .3 Special care must be taken to avoid mixing topsoil with the underlying soil.

END OF SECTION

1.0 GENERAL

1.1 Definitions

.1 Common Excavation:

- .1 Excavation, placement and compaction in embankments of all on site material whatever nature, which are not included under the definition of topsoil stripping, waste excavation, borrow excavation or rock excavation, including dense tills, hardpan, frozen materials and partially cemented materials which can be ripped and excavated with heavy construction equipment. Refer to special provision 2000.

.2 Rock Excavation:

- .1 The excavation of rock, concrete or masonry exceeding 1.0m³ in volume; and solid ledge rock, concrete or masonry which requires for its removal drilling, blasting, wedging, sledging, barring or breaking with a power operated hand tool shall be classified as rock excavation. Soft or disintegrated rock, concrete or masonry which can be removed with a hand pick, power operated excavator or shovel; and loose, shaken or previously blasted rock will not be classified as rock excavation.

.3 Class 1 Backfill:

- .1 Class I backfilling shall consist of backfilling the trench with sand or gravel compacted in even layers not exceeding 300mm in depth so that there is no subsequent subsidence in the trench. Backfill shall be compacted to a minimum of 100% Standard Proctor Density. Fillcrete may be used in lieu of Class 1 backfill.

.4 Class 2 Backfill:

- .1 Class 2 backfilling shall consist of replacing the excavated material in even layers not exceeding 300 mm in depth, and compacting each layer by mechanical means to 95% Standard Proctor Density in landscaped areas and 98% - 100% Standard Proctor Density within the road carriage way. Specify Standard Proctor Compaction will be indicated on the tender form or directed by the Engineer.

.5 Topsoil:

- .1 The top layer of soil containing organic material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

1.2 Protection of Existing Features

.1 Existing buried utilities and structures:

- .1 Prior to commencing any excavation work, notify applicable owner or authorities; establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during work.
- .2 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered. All damage incurred shall be repaired by the contractor at his expense.

.2 Existing buildings and surface features:

- .1 Maintain and protect from damage existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, paving, survey bench marks and monuments which may be affected by work. All damage incurred shall be repaired by the Contractor at his expense.

1.3 Safety Requirements

- .1 The Contractor shall be required to observe all applicable sections of the Alberta Regulations made under the Occupational Health and Safety Act Part 32 covering worker safety in trenches and excavations.
- .2 Open cut trenches shall be sheeted and braced as required by the Accident Prevention Regulations of the Occupational Health and Safety Division of the Department of Labour and Municipal Ordinances, and as may be necessary to protect life, property and the work.
- .3 Prefabricated cages or shields, provided they conform with all applicable safety requirements, may be used to supplement or replace conventional shoring.

1.4 Samples

- .1 At least 2 weeks prior to commencing work, inform of proposed source of granular materials.
- .2 The Contractor shall provide a sieve analysis of the material for approval.
- .3 Sand and gravel shall be approved before being used.

2.0 PRODUCTS

2.1 Stabilizing Base Gravel

- .1 Stabilizing base gravel shall be well-graded gravel consisting of hard, durable particles free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

- .2 The material shall meet one of the following gradations depending on the native foundation material encountered unless otherwise specified in the geotechnical report:

Screened Rock-Washed (Not Crushed)		Crushed Gravel	
Sieve Size (10 ⁻⁶ m)	Percent Passing (by weight)	Sieve Size (10 ⁻⁶ m)	Percent Passing (by weight)
25,000	100	25,000	100
10,000	30-55	20,000	35-60
2,000	5-25	5,000	15-40
400	0-5	400	5-15
		63	0-5

- .3 The liquid limit shall not exceed 25 and the plasticity index shall not exceed 6.

2.2 Woven Geotextiles

- .1 The synthetic geotextiles shall consist of a durable, permeable, woven, polypropylene fabric composed of continuous synthetic filaments with typical properties as follows:

Tensile Grab Strength — ASTM D4632	890 N
Trapezoid Tear Strength — ASTM D4533	334 N
Mullen Burst Strength — ASTM D3786	2,750 kPa
CBR Puncture Strength—ASTM D6241	3114 N
UV Resistance at 500hrs – ASTM D4355	70% Retained

The geotextile shall be woven Propex 200ST, Layfield LP200 or approved equal.

2.3 Bedding and Backfill Material

- .1 Material for Class 1 backfill shall consist of sound, hard, durable, uniformly graded crushed gravel and shall not contain organic or soft materials, materials that break up when alternately frozen and thawed or wetted and dried, or other deleterious materials. When compacted near the optimum moisture content to not less than 100% of the maximum dry density corrected for the stone content as determined by ASTM D698, the material shall have a minimum bearing ratio as defined ASTM D1883, of fifteen percent (15%).
- .2 Material for Class 2 backfill shall consist of sound, hard, crushed rock or crushed gravel free from organic or soft material that would disintegrate through decay or weathering, well graded throughout conforming to the grading requirement of table below. Class 2 material is to have 100% crush content and be well graded throughout.
- .3 Sand is to be clean and free running conforming to the grading requirements of table below.

- .4 Class 1 & 2 material is to have a loss of not more than 35% when subjected to abrasion testing in accordance with Grading B of ASTM C131.
- .5 Imported clay material is to be low to medium plastic clays with liquid limit <50 or mixtures of clay and sand suitable for compaction and is use to be free of silt, rock, concrete rubble and organic materials. Material is to be approved by Engineer before placing in excavation.

TABLE: GRADING REQUIREMENTS FOR IMPORTED BACKFILL

Canadian Metric Sieve Size	Percent of Total Dry Weight Passing Each Sieve		
	Class 1	Class 2	Sand
75,000	90%-100%		
28,000	80%-100%		
20,000		100%	
10,000			100%
5,000	40% - 80%	40% - 70%	90% - 100%
2,500		25% - 60%	
630			25% - 60%
315	10% - 35%	8% - 25%	

2.4 Fillcrete

- .1 Non-shrinking fill made up of a mixture of portland cement, sand, water and admixtures conforming to the following:
 - .1 Minimum 28 day compressive strength 1.00 to 2.00 MPa
 - .2 Slump 100 mm ±25 mm
 - .3 Portland Cement Type 10
 - .4 Air entrainment 5% ±1%

3.0 EXECUTION

3.1 Site Preparation

- .1 Strip organic material, clear and grub, remove weeds and grasses as specified or as required prior to excavation. Avoid intermixing of subsoil fill materials with organic material and from other forms of contamination.

3.2 Trenching

- .1 Trench width:
 - .1 The minimum trench width below the crown of the pipe shall be not less than the nominal diameter of the pipe plus 400mm. The maximum width of the trench below the crown of the pipe including shoring shall not be more than the nominal diameter of the pipe plus 600mm or not more than a total width of 900mm, whichever is larger. Where the maximum trench width is exceeded,

- the Contractor shall, at his own expense, provide special bedding or take other precautions as directed by the Engineer.
- .2 The contractor shall confine his activities to the immediate area of the trench. All activities outside the trench boundaries shall be performed so as not to damage other existing features. The Contractor shall generally have the option of using either vertical shored trenches or Vee trenches. Every effort shall be made to restrict the trench widths to minimize the area disturbed.
- .2 All excavated material shall be piled at least 1.0m clear of the trench top to prevent material from falling back into the excavation. The material shall be piled in such a manner that it will not endanger the work, or obstruct other work or rights-of-way. Sufficient clear space must be left on one side of the trench to accommodate the surveyor's stakes.
- .3 The trench shall be excavated so that the pipe can be laid to the alignment, grade and depth required.
- .4 When the walls of an open excavation are cut back, the contractor must ensure that:
- .1 If the soil is classified as "hard and compact soil", the walls are sloped to within 1.5 meters of the bottom of the excavation at an angle of not less than 30 degrees measured from the vertical.
- .2 If the soil is classified as "likely to crack or crumble soil" the walls are sloped to within 1.5 meters of the bottom of the excavation at an angle of not less than 45 degrees measured from the vertical, and
- .3 If the soil is classified as "soft, sandy or loose soil" the walls are sloped from the bottom of the excavation at an angle of not less than 45 degrees measured from the vertical.
- .5 Trench Rock Excavation:
- .1 Where excavation is made in rock or where excavation is made in a material which cannot provide an even, uniform and smooth surface; or where large stones are encountered in the trench, such material shall be removed to provide a clear distance between any part or projection of such material and the surface of all pipe and fittings of not less than 150mm for 600mm outside diameter pipe or less, and 200mm for pipe having an outside diameter greater than 600mm. The subgrade shall then be made by backfilling with an approved sand compacted in 75mm layers at the Contractors expense. Excavated rock shall not be used for backfill. The finished subgrade surface shall be shaped by hand tools to provide a uniform and continuous support for the pipe.
- .2 Blasting for excavation will be permitted only with the approval of the Engineer and only when proper precautions are taken for the protection of persons or property. The Contractor's method of procedure in blasting shall conform to provincial statutes and municipal ordinances.

- .6 The subgrade shall provide a uniform and continuous support for the pipe and fittings on solid undisturbed ground. Any over excavation by the Contractor below the required grade shall be backfilled at his expense with an approved compacted sand.

3.3 Classification of Soil Type

- .1 Soil is classified as “hard and Compact” if it closely exhibits most of the following characteristics:
 - .1 it is hard in consistency and can be penetrated only with difficulty by a small, sharp object;
 - .2 it is very dense;
 - .3 it appears to be dry;
 - .4 it has no signs of water seepage;
 - .5 it is extremely difficult to excavate with hand tools;
 - .6 if has not been excavated before.
- .2 Soil is classified as “likely to crack or crumble” if:
 - .1 it has been excavated before but does not exhibit any of the characteristics of “soft, sandy or loose” soil, or
 - .2 it closely exhibits most of the following characteristics:
 - .1 it is stiff in consistency and compacted;
 - .2 it can be penetrated with moderate difficulty with a small, sharp object;
 - .3 it is moderately difficult to excavate with hand tools;
 - .4 it has a low to medium natural moisture content and a damp appearance after it is excavated;
 - .5 it exhibits signs of surface cracking;
 - .6 it exhibits signs of localized water seepage
 - .3 Soil is classified as “soft, sandy or loose” if it closely exhibits most of the following characteristics:
 - .1 it is firm to very soft in consistency, loose to very loose;
 - .2 it is easy to excavate with hand tools;

- .3 it is solid in appearance but flows or becomes unstable when disturbed;
 - .4 it runs easily into a well-defined conical pile when dry;
 - .5 it appears to be wet;
 - .6 it is granular below the water table, unless water has been removed from it;
 - .7 it exerts substantial hydraulic pressure when a support system is used.
- .4 if an excavation contains soil or more than one soil type, the contractor must operate as if all of it is the soil type with the least stability.

3.4 Unstable Subgrade

- .1 Where the subgrade of the trench is unstable or will not properly support the pipe, or where it contains materials harmful to the pipe such as ashes, cinders, refuse, vegetable or organic material, the Contractor shall excavate such material to the width, depth and length as directed and dispose of the material. The subgrade shall then be made by backfilling with an approved stabilizing gravel compacted in 75mm layers. The finished subgrade surface shall be shaped by hand tools to provide a uniform and continuous support for the pipe.
- .2 The stabilization gravel may be completely wrapped in the filter fabric as specified. The fabric shall be overlapped a minimum of 500 mm at all joints to provide a full, continuous wrap and shall be smooth and free of tension, stress, folds, wrinkles or creases.
- .3 Where the subgrade cannot be made to properly support the pipe by replacing unsound material with stabilizing gravel, the Contractor shall construct a foundation for the pipe in accordance with a drawing prepared at the time. Payment for this work shall be made in accordance with the provisions for extra work unless specified otherwise.

3.5 Shoring

- .1 When close sheeting is required, it shall be so driven as to prevent adjacent soil from entering the trench either below or through such sheeting. When directed, the sheeting shall be driven to the full depth of the trench or to such additional depths as may be required for the protection of the work.
- .2 Trench bracing may be removed when the backfilling has reached the respective level of such bracing. Sheeting shall be removed as the backfilling proceeds. Backfilling of holes left by sheeting below the trench bottom shall be carefully compacted, and thereafter backfilling and withdrawal of sheeting shall proceed together. No voids shall be left in the backfill by the withdrawal of the sheeting.
- .3 When a cage or shield is used in the trench instead of shoring, special care shall be taken to ensure that there is no lateral or longitudinal movement of the pipe when the

cage is moved. The cage shall be raised vertically so that the bottom member is clear of the crown of the pipe before the cage is pulled forward in the trench.

3.6 Trench Drainage and Stormwater Management

- .1 Gutters and natural drainage channels shall not be obstructed. Satisfactory provisions shall be made for alternate drainage where this is impractical.
- .2 The trench shall be so drained that the workmen may work safely and effectively. All water encountered in trenches whether caused by high water table, rain or surface runoff shall be pumped or bailed out, and in no case shall the pipe be used as a drain for such water. It is essential that the discharge of the trench dewatering pumps be conducted away from the site of the work and into natural drainage channels, drains or storm sewers.
- .3 Keep excavations free of water while work is in progress.
- .4 Protect open excavations against flooding and damage due to surface run-off.
- .5 Manage flows in active storm sewer during construction.
- .6 Dispose of water in a manner not detrimental to public and private property, or any portion of work completed or under construction.
- .7 Submit details of proposed surface and stormwater management methods to Engineer for approval prior to start of work.
- .8 All surface run-off, trench drainage and Stormwater Management activities are the responsibility of the Contractor. The Contractor is to familiarize himself with the geotechnical report (if available) and determine the amount of dewatering effort that will be required to do the work in a safe and efficient manner. No separate payment will be made for dewatering.

3.7 Backfilling

- .1 Bedding and initial backfilling shall be as specified for the particular pipe installed.
- .2 General backfilling:
 - .1 Class 1 backfill as defined in Section 1.1 - Definitions shall be used underneath all existing asphalt road or concrete areas. Class 2 backfill as defined in Section 1.1 - Definitions shall be used in all other areas including future roads, boulevards and open areas
 - .2 No boulders, rock, ice, snow, organic material or debris shall be permitted in the trench. These unsuitable materials shall be hauled away.
 - .3 All surplus excavated material shall also be hauled away, or disposed of as directed. In the event of deficiency of backfill material, suitable material shall be supplied by the Contractor at his expense.

- .4 All trenches shall be backfilled as the work proceeds and no more than 30 m shall be left open at the end of a days work.

3.8 Backfill Compaction

- .1 The Contractor shall be responsible for adequate compaction of the trenches and for the correction of settlement during the maintenance period of the Contract. Mechanical compaction equipment shall not be used until there is sufficient cover to prevent damage to the pipe.
- .2 The type of compaction equipment shall be chosen with regard to minimizing the vibration effect on nearby buildings and utilities. The Contractor shall inspect the condition of buildings prior to construction. The Contractor is responsible for any damage caused to buildings due to construction.

3.9 Testing Backfill Compaction

- .1 Compaction results shall be based on a minimum of one density test per 100 metres of trench for each 1.0 meter of compacted vertical backfill. Additional tests may be called for by the Engineer as deemed necessary.
- .2 If a density test indicates insufficient compaction at any depth, then two more densities, where are proportionally representative of trench length, shall be taken at that depth. If the average of these tests is below the required density, the trench shall be re-excavated and re-compacted to meet the specified density.
- .3 This testing in no way relieves the Contractor of his maintenance responsibilities with respect to settlements as specified. The Contractor shall repair any settlement and damaged surface improvements due to the settlement which occurs during the maintenance period.
- .4 The cost of all initial testing will be borne by the Owner. Non-conformity with the specified density or moisture content shall constitute sufficient grounds for rejection of the work.

3.10 Augured/Bored Crossings

- .1 The auguring/boring machine shall be aligned and set to the required grade. If the hole deflects from desired course, another hole shall be bored in a location specified. Minimum allowable grades and maximum allowable bends shall be as specified by water mains laid in an open trench.
- .2 The bored hole shall be of sufficient size to allow the carrier pipe or casing pipe, as specified, to pass through unrestricted. After installation of the pipe, the bored hole void shall be backfilled with pneumatically blown free running sand or sealed with 5 MPa pressure grouting.
- .3 Highway crossings shall be cased as shown on the drawings. Casing pipe joints shall be welded. Each joint shall be coated and wrapped with primer and tape.
- .4 Anodes and warning signs shall be installed as specified.

3.11 Fences and Gates

- .1 Maintain gates and fences along and crossing the right-of-way and on access roads.
- .2 Do not open fences crossing the construction right-of-way unless installing the pipe underneath the fence is not feasible.
- .3 Notify landowners and tenants if a fence must be opened. Install temporary gates in accordance with the wishes of the landowners and tenants.
- .4 Return the fences to its original condition as soon as the fence openings or alterations are no longer required for construction.

END OF SECTION

1.0 PRODUCTS

1.1 Imported Granular Material

- .1 Material for the imported granular material shall consist of sound, hard, durable, uniformly graded crushed gravel and shall not contain organic or soft materials, materials that break up when alternately frozen and thawed or wetted and dried, or other deleterious materials.
- .2 Imported granular Material shall meet the following gradation when tested to ASTM C136

Sieve Size (10 ⁻⁶ m)	Percent Passing (by weight)
60,000	100
16,000	32-85
5,000	20-65
315	6-30
80	2-10

- .3 At least 30 percent by weight of material retained on the 25,000 sieve shall have two or more fractured faces.

1.2 Woven Geotextile (If required)

- .1 The synthetic geotextiles shall consist of a durable, permeable, woven, polypropylene fabric composed of continuous synthetic filaments with typical properties as follows:

Tensile Grab Strength — ASTM D4632	890 N
Trapezoid Tear Strength — ASTM D4533	334 N
Mullen Burst Strength — ASTM D3786	2,750 kPa
CBR Puncture Strength—ASTM D6241	3114 N
UV Resistance at 500hrs – ASTM D4355	70% Retained

The geotextile shall be woven Propex 200ST, Layfield LP200 or approved equal.

1.3 Road Geogrid (If required)

- .1 The structural geogrid reinforcement shall be an integrally formed grid structure manufactured of a stress resistant polypropylene material with molecular weight and molecular characteristics which impart: (a) high resistance to loss of load capacity or structural integrity when the geogrid is subjected to mechanical stress installation; (b) high resistance to deformation when geogrid is subjected to applied force in use; and (c) high resistance to loss of load capacity or structural integrity when the geogrid is subjected to long-term environmental stress.
- .2 The structural geogrid shall accept applied force in use by positive mechanical interlock (i.e. direct mechanical keying) with: (a) compacted soil or construction fill

materials; (b) contiguous sections of itself when overlapped and embedded in compacted soil or construction fill materials; and (c) rigid mechanical connectors such as bodkins, pins or hooks.

- .3 The structural geogrid shall possess sufficient cross sectional profile to present a substantial abutment interface to compacted soil or particulate construction fill materials and to resist movement relative to such materials when subject to applied force. The structural geogrid shall possess sufficient true initial modulus to cause applied force to be transferred to the geogrid at low strain levels without material deformation of the reinforced structure. The structural geogrid shall possess complete continuity of all properties throughout its structure and shall be suitable for reinforcement of compacted soil or particulate construction fill materials to improve long term stability in structural load bearing applications such as stabilized roadway systems.

The structural geogrid shall otherwise have the following characteristics:

Product Properties	Testing	MD Values	XMD Values
Aperture Dimensions		25 mm	33 mm
Min. Rib Thickness		0.76 mm	0.76 mm
Tensile Strength @2% Strain	ASTM-6637-10 Method A	4.1 kN/m	6.6 kN/m
Tensile Strength @5% Strain	ASTM-6637-10 Method A	8.5 kN/m	13.4 kN/m
Ultimate Tensile Strength	ASTM-6637-10 Method A	12.4 kN/m	19.0 kN/m
Junction Efficiency	ASTM D7737-11	<93%	
Flexural Stress Stiffness	ASTM D7748/D7748M-14	250,000 mg-cm	
Aperture Stability	ASTM D7864/D7864M-15	0.32 m-N/deg	
Resistance to Installation Damage	ASTM D6637	95 / 93 / 90 %SC / %SW / %GP	
Resistance to long term Degradation	EPA-9090	100%	
Resistance to UV Degradation	ASTM D4355-05	100%	

Structural Geogrid Reinforcement shall be Tensar BX 1100 or approved equal.

2.0 EXECUTION

2.1 Unsuitable Material

- .1 Where the material is unsuitable, or where it contains materials such as ashes, cinders, refuse, vegetable or organic material, the Contractor shall excavate such material to the width, depth and length as directed and dispose of the material as required. The subgrade shall then be made by backfilling with approved native material or imported granular material as required. Material shall be placed in

successive layers not exceeding 150 mm in depth and compacted to a minimum of 98% Standard Proctor Density.

2.2 Subgrade Preparation

- .1 The subgrade shall be scarified and compacted to a minimum of 100% Standard Proctor Density at optimum moisture content, over the full width of the cross-section. The material shall be worked to ensure as much uniformity as possible in material.
- .2 Contractor must assess the soil conditions prior to working and compacting the material. If the soil is saturated beyond optimum moisture content the contractor must disc and dry the material up to optimum moisture at contractor's cost. The cost of working the material is incidental to the subgrade preparation and no extra payment will be made to the contractor.
- .3 If the soil is dry below optimum moisture, water shall be added to bring the moisture content to optimum value. The supply of water shall be the responsibility of the Contractor. The cost of working the material is incidental to the subgrade preparation and no extra payment will be made to the contractor.
- .4 All work to bring the material to optimum moisture is incidental to the subgrade preparation and no extra payment will be made to the contractor.

2.3 Testing Compaction and Quality Control

- .1 The Contractor shall be responsible for quality control. The Owner shall be responsible for Quality Assurance.
- .2 Compaction results shall be based on a minimum of one density test per 2,000 square metres of road. Additional tests may be called for by The Engineer as deemed necessary to ensure the quality of the work.
- .3 Copies of results for any quality control testing carried out by the contractor shall be forwarded directly to the Engineer.
- .4 Field density tests shall conform to ASTM D1556, ASTM D2167, or ASTM D6938 for comparison with a maximum density determined according to ASTM D698 Method A.
- .5 Areas which are not satisfactory to the Engineer shall be reworked and retested at the Contractors expense.
- .6 The Contractor shall supply a Loaded Tandem Axle Water truck for the subgrade proof roll test. This test will be undertaken when the compaction of the subgrade has been completed, and shall be under the direction and in the presence of the Engineer and the Owner.
- .7 Under no circumstances shall the Contractor cover the subgrade with sub-base, base-course, asphalt base-course, curb and gutter, or monolithic curb, gutter and sidewalk until all density test results and the Subgrade proof roll test performed in the presence of the Engineer are approved by the Engineer.

- .8 Areas which are not satisfactory to the Engineer shall be reworked and retested at the Contractors expense.
- .9 Compaction density testing may be waived by the Engineer upon satisfaction of the construction operations and results of the proof roll test.

2.4 Proof Roll Test

- .1 For proof rolling use a loaded Tandem Axle Water truck. The Engineer may authorize use of other acceptable proof rolling equipment.
- .2 Proof roll top of subgrade upon completion of fine grading and compaction as directed by the Engineer.
- .3 Make sufficient passes with proof roller to subject every point on surface to three (3) separate passes of loaded tire or as directed by the Engineer.
- .4 **No movement while doing the roll test will be tolerated. In addition, (rebound) movement or rutting or cracking or lateral movement will be considered failure. All areas identified by the Engineer and/or Owner during the proof rolling will have to be rectified by the Contractor and re-proof rolled.**
- .5 Contractor may be asked to re-proof rolled after the initial proof rolled passed if inclement weather occurred and Engineer notice rutting or damages occurred on the road subgrade prior to contractor placing the granular base. Re-working the subgrade preparation and re-proof rolled will be considered incidental and will be at contractor's expense.
- .6 If the Engineer and/or Owner determine the proof roll failed, contractor is to carry out the following:
 - .1 Contractor to re-work the material and follow steps identified in paragraph 3.2. at their own cost.
 - .2 If material is found to be unsatisfactory to pass the proof roll by the Engineer, contractor will be directed to remove unsuitable material and replace with suitable material. Materials that could be considered unsatisfactory are: topsoil/black dirt, peat moss etc. Clay that is saturated does not qualify as unsatisfactory, it is up to the contractor to disc and dry the material before placing and compacting.
- .7 Proof roll will be undertaken when the compaction of the subgrade has been completed, and shall be under the direction and in the presence of the Contractor, Engineer and the Owner.
- .8 If proof roll fails and a proof roll must be re-scheduled with the Engineer and the Owner, the cost of engineer and the owner's time to redo the proof roll shall be paid by the Contractor.

2.5 Tolerances

- .1 The finished surface of the subgrade shall conform to approved grades and shall show no depression more than 15mm under a straightedge 3.0m long when placed parallel to the centreline. Subgrades higher than the approved grades shall be cut to the required grades.
- .2 The tolerance for ditches, boulevards, etc., shall be $\pm 30\text{mm}$ as long as the variance does not change the flow of water.

2.6 Inspection

- .1 Before acceptance, the subgrade surface shall be true to cross-section and grade, and shall conform to the density and bearing ratio requirements specified.
- .2 Field density and moisture content tests may be made by the Owner or the Engineer to ensure that the material is satisfactory. Material not meeting the specifications will not be approved.

3.9 Maintenance

- .1 Maintain finished base in a condition conforming to this Section until succeeding material is applied or until acceptance by the Engineer.

END OF SECTION

1.0 PRODUCTS

1.1 Rock Riprap

- .1 Materials for rock riprap shall be sound and durable field stone, or rough unhewn quarry stone as nearly rectangular as practicable, conforming to the following graduation and weight range:

- .1 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered. All damage incurred shall be repaired by the Contractor at their expense.

Equivalent Diameter [mm]	Percentage of Riprap Greater than Equivalent Diameter [by weight]
300	0%
200	20% to 50%
175	50% to 80%
125	100%

- .2 The rock riprap shall be graded between the weights specified.

1.2 Non-Woven Geotextile (Filter Fabric)

- .1 Geotextile: non-woven synthetic fibre fabric, supplied in rolls.
- .1 Width: 4.6 m minimum.
- .2 Length: 50 m minimum.
- .3 Composed of: minimum 85% by mass of polypropylene with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 60 days.
- .2 Physical properties:
- .1 Thickness: to CAN/CGSB-148.1, No. 3, minimum 43 mm.
- .2 Mass per unit area: to CAN/CGSB-148.1, No. 2, minimum 400 g/m².
- .3 Grab tensile strength and elongation (to ASTM D4632):
- .1 Breaking force: minimum 700 N.
- .2 Elongation at future: maximum 50%.
- .4 Sewn Seam Strength (to ASTM D4632): 630 N
- .5 CBR Puncture (to ASTM D6241): 1375 N
- .6 Trapezoid tear strength (to ASTM D4533): 250 N minimum.
- .7 Ultraviolet Stability (% retained strength) (to ASTM D4355): 50% @ 500 hr.
- .3 Securing pins and washers: to CAN/CSA-G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m² to CAN/CSA G164.
- .4 Factory and/or field seams: sewn in accordance with manufacturer's recommendations.

- .5 Thread for sewn seams" equal or better resistance to chemical and biological degradation than geotextile.

2.0 EXECUTION

2.1 Placing

- .1 The hand laid rock riprap erosion protection shall be placed in the areas indicated on the Drawings or as designated by the Engineer.
- .2 Placement of Filter Fabric
- .1 The surface to receive the riprap shall be smooth, well dressed and prepared with the synthetic filter fabric.
- .2 The areas to be covered by the synthetic filter fabric shall be trimmed and dressed to the lines and grades shown on the Drawings or as required by the Engineer.
- .3 The synthetic filter fabric shall be placed on the dressed surfaces to cover the areas that are the rock riprap erosion protection. The fabric shall be overlapped a minimum of 500 mm at all joints to provide a full, continuous mat and shall be laid smooth and free of tension, stress, folds, wrinkles, or creases. Securing pins and washers shall be inserted through both strips of overlapped fabric at no greater than 1.0m intervals along a line through the midpoint of the overlap, and at intervals necessary to prevent slippage of the fabric on the downslopes. Each securing pin shall be pushed through the fabric until the washer bears against the fabric firmly and secures it to the foundation. The indicated filter fabric may also be overlapped as specified and welded at the seams.
- .4 The fabric placed on the inlet and outlet aprons shall be laid perpendicular to the centre line of the culvert and shall be laid so that the upslope strip of fabric will overlap the downslope strip.
- .3 Riprap Placement:
- .1 Nominal size 175mm riprap, as defined in Section 1.0- Products shall be used.
- .2 The riprap stones shall be placed on the surface to be covered as shown by the plans or as directed by the Engineer, on slopes not exceeding 1 1/2H:1V starting with the larger stones on the bottom row. Each stone shall be placed with the broad flat surface resting on a horizontal earth bed prepared for it such that the weight of the stone is carried by the earth and not by the underlying stones. Stones shall be laid in successive rows, or layers, proceeding upward with the joints staggering those of the adjacent rows as so to secure a 'shingled' effect, evenly stepped. Voids between stones shall be filled with spalls rammed into place.

- .3 Care shall be taken not to puncture the synthetic filter fabric when placing the riprap. Any damaged filter fabric shall be repaired or replaced at the contractor's expense as directed by the Engineer.

END OF SECTION

1.0 GENERAL

1. Contractor to note that any erosion control methods listed in this section will be accepted by the Engineer if the material selected meets the design criteria and is installed as per manufacturer's recommendation and detail listed below. Preference is given to biodegradable products.
- .2 Materials placed outside the specific areas will not be measured.
- .3 Maintenance of all items shall be incidental work.
- .4 Removal of temporary items shall be incidental to the work.

2.0 PRODUCTS

2.1 Straw Wattles:

- .1 The work shall consist of laying and anchoring straw-filled tubes made of jute, nylon, or other photo-degradable materials on the contour across the slope materials and firmly securing it in place. The tubes shall be 0.15m to 0.3m in diameter filled with compressed, weed-free straw. The wattles are placed on the contour to intercept water flowing down the slope and trap the sediments being moved with the water.
- .2 Wattles should be spaced as indicated on the drawings and no further than 30m apart.
- .3 A shallow depression trench 75mm to 150mm deep should be formed, and the wattle placed into the trench. Soils placed on the uphill side of the wattle should be foot tamped into place. Wattles are to be anchored with 25mm x 50mm or 50mm x 50mm wooded stakes 0.45m to 0.60m in length. These shall be placed roughly every 2.0m along the length of the wattle. Stakes shall be driven in perpendicular to the slope.
- .4 Straw Wattle installation shall comply with the manufacturer's recommendations.
- .5 Staking shall be sufficient to hold the wattle firmly in place to the satisfaction of the Engineer.

2.2 Coconut Matting:

- .1 The work shall consist of laying and anchoring Coconut Matting made of 70 percent agricultural straw and 30 percent coconut fiber. Netting shall be made of jute, nylon, or other photo-degradable materials and firmly securing it in place.
- .2 Matting should be spaced as indicated on the drawings,
 - .1 Apply topsoil or soil conditioning as directed in the Contract to prepare seed bed.
 - .2 Place seed in accordance with the Contract.

- .3 Unroll the covering parallel to the primary direction of flow.
- .4 Ensure that the covering maintains direct contact with the soil surface over the entirety of the installation area.
- .5 Do not stretch the material or allow it to bridge over surface inconsistencies.
- .6 Adjacent rolls shall overlap a min of 0.1m
- .7 Staple the covering to the soil such that each staple is flush with the underlying soil.
- .8 Ensure that staples are installed at full depth to resist pull out. No bent over staples will be allowed. Install anchor trenches, seams, and terminal ends as shown on the plans.
- .3 Installation shall comply with the manufacturer's recommendations.
- .4 Staking shall be sufficient to hold the wattle firmly in place to the satisfaction of the engineer.

2.3 Straw Bales:

- .1 The work shall consist of Placing and anchoring weed-free Straw Bales wrapped with Sisal twine or equivalent.
- .2 Bales should be spaced as indicated on the drawings.
 - .1 Excavate a trench approximately 0.10m deep with a width of one straw bale at the straw bale barrier location.
 - .2 Place straw bales in excavated trench along contour, perpendicular to flow direction.
 - .1 Ensure twine or wire is not in contact with the soil.
 - .2 Ensure straw bale is in continuous contact with base of trench.
 - .3 Ends of barrier should be angled upslope to form enclosure to contain runoff.
 - .3 Infill all joints with loose straw.
 - .4 Drive two 50 mm by 560 mm section wooden stakes 1.2m long through each straw bale, ensuring each stake is embedded a minimum of 0.15m into soil.

- .5 Backfill and compact the upstream and downstream edges of the check structure to seat the straw bales into the subgrade.
- .6 If multiple rows of bales are required, joints shall be staggered.
- .3 Installation shall comply with the manufacturer's recommendations.
- .4 Staking shall be sufficient to hold the bales firmly in place to the satisfaction of the engineer.

2.5 Silt Fence:

- .1 The work shall consist of Placing and embedding a permeable fabric barrier as specified.
- .2 Select location of silt fence (usually along contours).
- .3 Drive support posts a minimum of 0.3m into ground, spaced a maximum of 2m apart.
- .4 Excavate trench approximately 0.15m deep by 0.15m wide for entire length of fence along upstream side of posts.
- .5 Attach the wire mesh or snow fencing, if used as reinforcement, to upstream side of posts with staples.
- .6 Extend filter fabric to base of trench and attach over wire mesh or snow fence, if used, on upstream side of posts.
- .7 Backfill and compact soil in trench, being careful not to damage fence.
- .3 Installation shall comply with the manufacturer's recommendations.

END OF SECTION

1.0 GENERAL

1.1 Related Work

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

2.0 PRODUCTS

2.1 Corrugated Steel Pipe

- .1 Corrugated steel pipe: to CSPI-501-78 metric (interim). Corrugated steel pipe.
Note: CSPI specifications may be obtained from Corrugated Steel Pipe Institute, Suite 207, Crestview Plaza, 1640 Crestview Avenue, Mississauga, Ontario, L5G 3P9 or affiliated member.

3.0 EXECUTION

3.1 Excavation and Preparation of Base

- .1 Excavation for the culvert base shall be to a depth of not less than 0.3m below the invert grade, and shall be of sufficient width to permit assembly of the pipe and the operation of compaction equipment on either side of the pipe. All soft, yielding, or unsuitable material at this level shall be removed to a depth as directed by the Engineer, and replaced with gravel or other suitable material to provide a firm foundation of uniform density throughout the entire length of the pipe.
- .2 On completion of excavation for the culvert base and the removal and replacement of any soft, yielding or unsuitable material the Contractor shall compact the exposed surface to uniform density. The Contractor shall then construct the culvert bed to the established elevation using gravel material or other material acceptable to the Engineer. The culvert bed shall be compacted in accordance with Section 02315. The width of the culvert bed shall be 3 times the culvert diameter.
- .3 Contractor to ensure sufficient clay "cap" compacted around the culvert to prevent erosion on the sides of the culvert.
- .4 When the culvert installation is in rock, excavation for the culvert base shall be carried out to a depth of not less than 0.2m below the invert grade. The width of the culvert bed shall be a minimum of 1.5 times the diameter of the pipe.
- .5 Where gravel bedding or backfill is used, impervious, compacted clay cut-offs shall be constructed at both ends of the culvert.
- .6 Do trenching and backfill work to Section 02315.
- .7 Do not backfill until pipe grade and alignment checked and accepted by the Engineer.

4.0 INSTALLATION

4.1 General

- .1 The culvert shall be installed on the prepared base, true to the designed lines and grades unless otherwise established by the Engineer. Separate sections shall be securely joined in accordance with the manufacturer's instructions. Coupler bands shall be used for metal and polyethylene pipe unless otherwise specified, rubber gasket type joints shall be prepared and made between sections or reinforced concrete pipe. At all coupling and joint areas and at areas of concrete pipe that have external bells, depressions shall be constructed in the culvert bed so that the pipe is uniformly supported along its entire length.
- .2 Contractor to install culvert markers as per detail on page 5. Approved supplier for culvert markers: Canada Culvert Steelcor CSP or similar acceptable product to be approved by Engineer.
- .3 The Contractor shall use due care when installing pipe to avoid damaging the pipe. Damaged pipe shall be removed and replaced by the Contractor at his expense.

4.2 Installation of Corrugated Metal Pipe and Pipe Arches

- .1 When required, elbows shall be installed to accommodate sharp changes in gradient or direction of the pipe.
- .2 Pipe shall be carefully handled to prevent damage to the protective coating. Any damage to coatings shall be repaired by the Contractor at his own expense.
- .3 Ensure bottom of pipe is in contact with shaped bed or compacted fill throughout its length. Ensure proper clay "cap" surrounding the pipe to prevent erosion.
- .4 Lay pipe with outside circumferential laps facing upstream.
- .5 Do not allow water to flow through pipes during construction except as permitted by Engineer.

4.3 Joints: Corrugated Steel Culverts

- .1 Corrugated steel pipe:
 - .1 Match corrugations or identifications of coupler with pipe sections before tightening.
 - .2 Tap couplers firmly as they are being tightened, to take up slack and ensure a snug fit.

.3 Insert and tighten bolts.

4.4 Installation of Reinforced Concrete Pipe

- .1 Reinforced Concrete Pipe shall be placed beginning at the downstream or lower end of the culvert. The pipes shall be placed with the bell or grooved ends facing upstream.
- .2 Pipe shall be joined using either a wedge and block or mechanical pipe pullers to bring the pipe to the homed position. Joints shall not be deflected beyond the manufacturer's recommended maximum.
- .3 End sections shall be anchored to adjacent sections by tie bars, where provided. Lifting holes and holes for engaging bars shall be filled with mortar and finished flush with the pipe surface.

4.5 Installation of Polyethylene Pipe

- .1 The culvert bed shall be shaped to the curvature of the pipe to a depth of 75mm using a template.
- .2 Blocking shall not be used to bring the pipe to grade. The pipe shall be placed on the prepared base to the lines and grades established by the Engineer, with the separate sections securely joined with the applicable welds and gasket joints.
- .3 Temporary hold downs shall be used to maintain the position of the pipe during installation.
- .4 Section of pipe with a minimum length of 6m shall be used on each end of each culvert.

4.6 Extension of Existing Culvert

- .1 Extensions to existing culverts will be considered as new installations. Where an existing culvert is to be extended, the removal, salvage and reinstallation of the existing sloped end sections may be required as directed by the Engineer.
- .2 Where the existing pipe was manufactured to imperial dimensions and the new pipe is manufactured to metric dimensions and a mismatch occurs at the joint, the Contractor shall caulk the joint with oakum or fillcrete to obtain a water resistant joint.

5.0 BACKFILLING

5.1 General

- .1 Backfill under the haunches and immediately adjacent to the pipe extending from the culvert base up to an elevation of 30 percent of the vertical height of the pipe shall be comprised of select gravel or soil material, as directed by the Engineer. Backfill immediately adjacent to the pipe above this level shall be

comprised of select soil material. All backfill material shall be free from frozen lumps and organic material. Backfill with 300mm of the pipe wall shall be free from stones of diameter larger than 80mm.

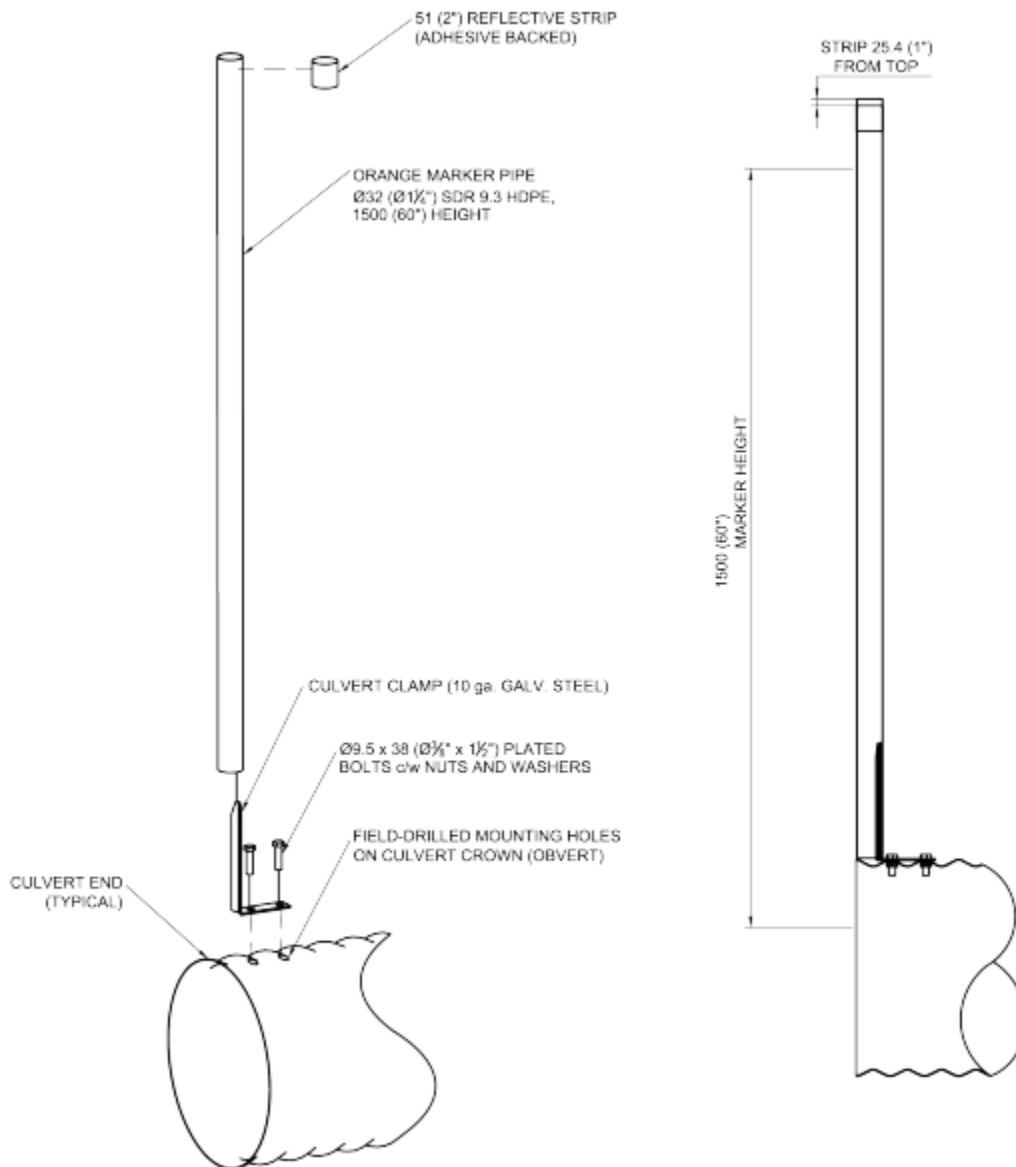
- .2 All backfill material shall be placed in layers not exceeding 0.15m in depth. Each layer shall be thoroughly compacted at optimum moisture content by means of pneumatic or other mechanical tamping equipment. Backfill and compaction layers shall be brought up simultaneously and evenly on both sides of the pipe filling all corrugations and ensuring firm contact with the entire bottom surface of the pipe. This compaction procedure shall be continued until the backfill reaches a minimum elevation of 0.3m above the top of the pipe, or greater if necessary to carry the weight of construction equipment without damage to the pipe.
- .3 The Contractor is to ensure a proper seal around the culvert ends at both ends of the culvert. This can be achieved with suitable material such as Clay to ensure the water does not erodes the sides and underside of the culverts eventually rendering the culvert ineffective possibly causing a washout of the road. The "clay" cap should be a minimum of 1.0m in length.
- .4 If during the warranty period, it is determine by the Engineer that the culvert is rendered ineffective due to improper seal at both ends of the culvert, the Contractor will be responsible at his own cost to repair all the damages which may include but not limited to installing a new culvert, bringing new borrow material for proper culvert installation, geotech fabric, riprap, and for the road restauration: subgrade preparation, gravel, asphalt, line painting as detailed in the contract) that may have been caused by the poor workmanship. Contractor responsible to carry-out the repairs to the approval of the Engineer. Contractor to refer to Section 1000 with regards to Emergency Repairs.
- .5 Backfilling of the remainder of the culvert excavation, beyond the immediate region of the pipe, shall be carried out in accordance with Section 2315. Compacting equipment shall be operated parallel to the longitudinal axis of the culvert, until sufficient acceptable fill has been placed to proceed with construction of the embankment in the normal manner.

5.2 Backfilling Polyethylene Pipe

- .1 The minimum height of fill above the top of the pipe is 0.6m rather than 0.3m. Immediately after backfill is completed, the Contractor shall saw cut the sloped ends at a ratio of 4:1.

5.3 Culvert Markers

- .1 Contractor to submit shop drawings to the engineer for approval the culvert marker selected. Culvert marker is to be bright color (orange or red) similar to orange tubing of the SteelCor CSP Culvert Markers. Culvert Marker to be affix with spring loaded tubing so it does not brake if accidently hit (refer to detail in this specification section).



END OF SECTION

1.0 GENERAL

1.1 Definitions

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

1.2 Samples

- .1 At least 2 weeks prior to commencing work, inform of proposed source of bedding materials.
- .2 Provide a sieve analysis of the bedding materials for review.
- .3 Bedding material samples shall be submitted before being used.

2.0 PRODUCTS

2.1 Water Mains

- .1 Water mains shall be Polyvinyl Chloride (PVC) pipe, Class 1035, DRI8 conforming to AWWA C900 and CAN B137.3. Pipe shall have gasketed bell-end joints, and be certified for potable water service.
- .2 Gasket material conforming to ASTM F477.
- .3 Joint lubricants shall be certified for potable water use conforming to NSF 61.

2.2 Fittings

- .1 PVC conforming to CAN B137.3, CAN B137.2, UNI B12 and AWWAC907 for sizes from 100mm to 200mm. Fittings shall be made from PVC compound meeting ASTM cell classification 12454-B in ASTM 01784 and be approved for potable water service. Fabricated fittings shall be fibreglass reinforced and pressure rated. PVC fabricated pressure fittings shall have elastomeric joints and are to be manufactured in accordance with CSA BI 37.0, CSA 8137.3 and AWWA C900 or C905.
- .2 Cast ductile iron fitting to AWWA C110 with bell end joints with gaskets conforming to AWWA C111. Mechanical and flange joints as specified

or approved by Engineer, with gaskets conforming to AWWA C111 and ANSI 303 stainless steel bolts, hex head nuts and washers conforming to ASTM A-3200.

- .3 Cast ductile iron couplings to be Robar 1506, epoxy coated couplings or approved equal complete with T304 (ASTM A743) stainless steel nuts and bolts, compatible with outside diameters of pipes to be joined in locations approved or specified by Engineer.

2.3 Valves

- .1 Iron body resilient seated conforming to AWWA C509 gate valves with non-rising spindle, to open by turning in a counter clockwise direction.
- .2 Ends shall be suitable for use with the pipe specified.
- .3 Type 304 stainless steel bolts and nuts.
- .4 50mm square operating nut.
- .5 "O" Ring seals for the valve stem.
- .6 Asphaltic coated.

2.4 Valve Boxes

- .1 150mm cast iron sliding type complete with operating extension stems to provide for 600mm adjustment flexibility.
- .2 Complete with lids marked water, rock disc, 25mm square mild steel valve spindle.
- .3 Asphaltic coated.

2.5 Hydrants

- .1 Compression type conforming with AWWA C502.
- .2 Drains shall be unplugged and drainage pits will be required.
- .3 Bolts and nuts shall be Type 304 stainless steel.
- .4 All buried components shall be asphaltic coated.
- .5 Contractor responsible to account for the hydrant extension(s) required to bring the hydrant to proposed elevation as part of the hydrant installation.

- .6 Acceptable material: Canada Valve Century Model with 150mm barrel diameter complete with one 100mm pumper with "Storz" connection and two 65mm hose connections with AMA thread.
- .7 Hydrant colour shall be yellow.
- .8 Hydrant flow tests will be performed by the Contractor witnessed by the Engineer and Owner.
- .9 Minimum flow 60 liters per second.
- .10 Minimum working pressure of 1034kPa (150 psi).
- .11 Main valve opening of 133.3mm (5 ¼ in).
- .12 "O" ring positive type seals.
- .13 Grease lubricated operating mechanism.
- .14 360° rotation of upper body.
- .15 Hose connection:
- .16 Two hose connections at 180° with 65mm I.D., 75 mm thread O.D. with Alberta Mutual Thread.
- .17 One pumper connection with 100mm "Storz" connection facing the street.
- .18 Square shaped operating nut and hose nozzle caps.
- .19 Counter clockwise opening.
- .20 Four, six or eight bolt connection flanges.
- .21 Bury of 3.0m overall including a 450mm top extension.
- .22 Hydrant rod to be coupled at the top and bottom of extension.
- .23 Ground line breakaway system.
- .24 All exterior bolts, nuts and washers to be 18-8 type T304 stainless steel.
- .25 Inlet elbow connection to be 150mm push on bell end complete with gasket for PVC DR 18, C-900 water pipe.
- .26 Dimension from the top of the operating nut to the bottom of the base flange to a minimum of 660mm.

2.6 Blow-Off Hydrant

- .1 Mainguard #77 Side Inlet 2" blow-off

2.7 Non-Metallic Couplings

- .1 Non-metallic shall be approved prior to being used.
- .2 PVC couplings shall be gasket push-on type conforming to AWWA C900 or AWWA C907.

2.8 Metallic Couplings

- .1 All metal pieces shall be stainless steel or coated with factory applied fusion bond epoxy corrosion-proof coating or approved equal.
- .2 Bolts, nuts and washers shall be stainless steel, ASTM F593/F594.
- .3 Acceptable material: Robar, Dresser, Viking.

2.9 Corrosion Protection

- .1 Zinc anodes asphalt conform to ASTM B418, Type II and shall have the following composition:

Zinc	99.991% minimum
Aluminum	0.005% maximum
Cadmium	0.003%
Iron	0.001%

- .2 Anode lead wires shall be a minimum of 2 metres long of AWG #10 type RWLJ XLPE stranded copper conforming to CAN C22.2 No. 38.
- .3 Lead wire connection shall be silver-soldered (brazed) to the steel core using suitable filler material and flux.
- .4 All metallic buried fittings and valves shall be cathodically protected with 2.3 kilogram zinc anodes and all hydrants shall be cathodically protected with 5.5 kilogram zinc anodes.

2.10 Concrete

- .1 Sulphate Resistant ASTM, Type 50 developing a compressive strength of not less than 25 MPa in 28 days.

2.11 Bedding Material

- .1 Well graded sand consisting of hard durable particles free from clay lumps cementation, organic material, frozen material and other deleterious materials.
- .2 The material shall meet the following gradation:

Sieve (1 06 m)	Size	Percent (by weight)	Passing
12,500		100	
5,000		95	
80		2-10	

- .3 The liquid limit shall not exceed 25 and the plasticity index shall not exceed 6.

2.12 Insulation

- .1 Any insulation that is used must be manufactured using a process that does not utilize ozone-depleting chemicals in any way.
- .2 For insulating pipes, use DOW HI-40 Styrofoam or similar approved board.
- .3 Insulation shall be required for bury depth less than 3.0m for watermains and 2.7m for services or otherwise directed by the engineer.

3.0 EXECUTION

3.1 Preparation

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

3.2 Trenching and Backfill

- .1 Do trenching and backfill work. in accordance with Section 02315 - Trenching and Backfilling.
- .2 The water main shall be laid at the minimum depth indicated on the Drawings. This depth shall be varied only at crossings under or over

existing utilities or to avoid conflicts with other services and at connections to existing mains.

- .3 Conduct trenching operations sufficiently ahead of pipe laying operations in order to make any necessary adjustments.
- .4 The method of supporting the utility passed under or over by the water main must be inspected.
- .5 Trench alignment and depth require approval prior to placing bedding material or pipe.
- .6 Do not backfill trenches until installed work has been checked and accepted.

3.3 Pipe Bedding

- .1 Pipe bedding shall be Class B as defined in Section 1.1 - Definitions. Bedding material shall be as specified in Section 2.0 -Products.
- .2 Granular bedding:
 - .1 Place granular bedding material in uniform layers not exceeding 150mm compacted thickness for the full width of the trench up to a level of 300mm above the crown of the pipe to at least 95% Standard Proctor Density.
 - .2 Shape bed true to grade and to provide continuous, uniform bearing surface for barrel of pipe. Do not use blocks when bedding pipe.
 - .3 Shape transverse depressions as required to receive bell if bell and spigot pipe is used.

3.4 Pipe Installation

- .1 Install water main as per manufacturer's instructions to the alignment and grade as shown on the drawings.
- .2 The pipe shall be laid true to the line, grade and depth as staked and specified to prevent sags and humps and provide the proper bury at hydrants and specials.
- .3 Where minor deflections in line or grade are required, the deflections shall not exceed the maximum recommended by the pipe manufacturer.

- .4 Pipe having bell-ends shall be laid with the bell-ends facing the direction of laying.
- .5 No pipe shall be laid in water or where the trench conditions are unsuitable.
- .6 Handle pipe by approved methods. Do not use chains or cables passed through pipe bore so that weight of pipe bears on pipe ends.
- .7 Lay pipes on prepared bed, true to line and grade. Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
- .8 Take up and replace defective pipe.
- .9 Correct pipe which is not in true alignment or grade or pipe which shows undue settlement after installation.
- .10 Do not lay pipe on frozen bedding.
- .11 Keep jointing materials and installed pipe free of dirt and water and other foreign materials.
- .12 Whenever work is stopped, install a removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.
- .13 Cut pipes in an approved manner as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
- .14 Pipe jointing:
 - .1 All joints shall be made in strict accordance with the recommendations of the manufacturer.
 - .2 PVC pipe:
 - .1 Lay and join PVC pipe in accordance with AWWA M23.
 - .2 The bell, spigot and rubber ring shall be wiped clean and dry immediately before assembly. The ring shall be inserted into the groove in the bell with colour marking facing outward, ensuring that it is seated evenly without twists. The ring shall not be lubricated. The spigot shall be lubricated using the lubricant supplied by the manufacturer, ensuring that the entire circumference is coated. It shall then be inserted into the bell and pushed in until the reference mark on the spigot is flush with the end of the bell.

- .3 Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
- .4 Avoid displacing gasket or contaminating with dirt or other foreign material. Gaskets so disturbed or contaminated shall be removed, cleaned, lubricated and replaced before jointing is attempted again.
- .5 Apply PVC pipe lubricant approved for potable water systems in accordance with manufacturer's recommended application procedure.
- .6 Cut pipes as required to install fittings, valves or hydrants; make cuts according to pipe manufacturer's recommendations, and use the recommended tools to ensure square cut, and machined ends.

3.5 Valve Installation

- .1 Gate valves shall be installed at the locations shown on the construction drawings.
- .2 All valves shall be securely braced in place using adequate treated timber bracing and supports prior to complete backfilling. Additional vertical bracing may be required under valve box to maintain its set elevation.
- .3 The valve box shall be plumb and centred over the wrench nut of the valve, shall be set evenly on the valve bonnet, shall be supported so that it does not transmit shock or stress to the valve, and shall be braced against lateral movement to the sides of the trench.
- .4 The top of the valve box shall be adjusted to the elevation required.
- .5 Valve boxes which are not plumb or centered over the valve nut shall be dug up and reset properly.
- .6 The casing shall be of sufficient length to accommodate the specified cover over the water main.
- .7 The casing shall consist of a hood, one or more intermediate sections and a top section with a lid and a suitable stone disc. The top section shall be flanged at its lower end and provided with a socket at the ground surface to receive a suitable cast iron lid. An extension stem of sufficient length to reach within 300mm of the top of the casing when casing and extension stem are assembled in place shall be provided with each valve.

3.6 Hydrant Installation

- .1 Hydrants shall be installed at the locations and proposed elevation shown on the construction drawings. Contractor to install hydrant extension(s) as required to bring to proposed elevation.
- .2 All hydrants shall be plumb and shall have their nozzles parallel with the street with pumper nozzles facing the street. The bottom of the hydrant flange shall be set at an elevation of 150mm above the proposed finished ground elevation.
- .3 The hydrant bowl shall be seated on a 600mm x 600mm x 150mm concrete or treated timber pad as indicated on the standard drawing.
- .4 Hydrant drain ports shall be left open to drain into sumps and shall be unobstructed by concrete poured for thrust blocking. The drain pit shall contain not less than one (1.0) cubic metre of coarse gravel carried up to a level 100mm above the drain port. The drain pit shall be covered with tar felt or approved filter fabric before backfilling. Where the water table is above the hydrant drain, the hydrant drain port may require plugging. The Engineer shall be consulted to determine drain plugging requirements. When the drain port is plugged, the words "no drain" shall be painted on the hydrant barrel above grade in white letters 50mm high.
- .5 Off-line hydrants shall be connected to the water main by a 150mm diameter hydrant lead and valve. On-line hydrants shall be connected to the water main by a tee.
- .6 Install Hydrant extension as per manufacturer instructions.
- .7 Hydrants may be used for pressure testing, disinfection and flushing of water mains. They must be operated in full open position only. To restrict flow, attach a secondary valve to hydrant nozzle. All hydrants to be pumped dry to prevent freezing.

3.7 Blow-Off Hydrant Installation

- .1 Mainguard #77 blow-off hydrant shall be self-draining, non-freezing type with a minimum of 3m depth of bury, hydrant shall be furnished with a 2" FIP horizontal side inlet connection, a non-turning operating rod and shall open to the left. Outlet shall be 2 ½" NST with cap and extend a minimum of 12" above the ground.
- .2 All water flow shall pass thru a 2" steel pipe and waterway. The operating drive mechanism shall raise and lower a plunger to control the flow of water and shall be serviceable from above ground with no

digging, with all working parts being brass, galvanized steel, or PVC.

- .3 Said operating drive shall operate with a standard universal slotted valve wrench. When open the flow of water shall be unobstructed and the drain hole shall be covered.
- .4 Hydrant shall be set in 0.11 cubic meters (4 cubic feet) of crushed stone to allow for proper drainage of hydrant.

3.7 Concrete Reaction Blocking

- .1 All plugs, caps, tees, crosses, reducers, hydrants, valves, and bends (deflecting 11-1/4 degrees or more) shall be anchored to prevent movement. Suitable reaction blocking shall be used for this purpose.
- .2 Blocking shall be placed between solid ground and the fitting to be anchored.
- .3 The area of bearing on the pipe and on the ground in each instance shall be determined by the Contractor to suit the soil conditions.
- .4 The blocking shall be so placed that the pipe and fitting joints will be accessible for repair.
- .5 Typical thrust block locations are shown on the standard drawing.

3.9 Cathodic Protection

- .1 Provide cathodic protection for cast iron fittings, valves, hydrants and metallic couplers.
- .2 Cadweld or thermoweld anode lead to each valve, hydrant, metallic coupler and fittings as follows;
 - .1 Remove portion of coating on valve or fitting to be orthermowelded.
 - .2 Thoroughly clean area and file metal until a shiny, roughened surface is obtained approximately 75mm square.
 - .3 Remove insulation and crimp copper sleeve over bared wire covering the length to be cadwelded or thermowelded.
 - .4 Use crucible and weld metal as manufactured by Erico Products Inc., cadweld or thermoweld, or equal, and to manufacturer's recommendations.
 - .5 Remove slag off completed weld and file smooth any sharp edges.

- .6 Thoroughly coat the weld and area adjacent that has had the coating removed with Polyken 927 primer with Polyken 930 tape.
- .3 Install anodes as follows:
 - .1 Install the number and size of anodes and at locations indicated.
 - .2 Immerse anode in water prior to placing in the ground
 - .3 Remove anode from plastic bag, leaving cloth bag or cardboard tube intact. Do not lift anode by lead wire.
 - .4 Place anodes a minimum of 1m from fitting in a horizontal position and at same elevation and parallel to the fitting.
 - .5 Ensure soil is tamped uniformly around each anode to eliminate voids of air pockets.
 - .6 Wrap anode wire once around appurtenance.
 - .7 Cadweld or thermoweld anode wire leads to fitting or valve as indicated.
- .4 Prior to coating and/or wrapping each cadwetded or thermowelded junction, take a resistance measurement of all pairs of anode lead wires. This measurement shall be taken with an ohmmeter after installation has been completed. A resistance value of less than 0.5ohms shall be considered satisfactory.

3.10 Testing

- 1. Before acceptance of the work, the entire system shall be subjected to a hydrostatic pressure test in the presence of the Engineer. Notify the Engineer at least 48 hours in advance of all proposed tests.
- .2 Provide all necessary labour, materials and equipment for the test including a suitable pump, measuring tank, pressure hoses, connections, plugs, caps, gauges and all other apparatus necessary for filling the main, pumping to the required test pressure and recording the pressure and leakage losses. Provide evidence that the gauges used are accurate.
- .3 The system shall be filled with water slowly and air bled off at each hydrant. If there are sections that cannot be bled from hydrants, due to the profile of the main, tap the main at high points and install temporary bleeder valves. At the completion of the testing, these taps

shall be satisfactorily plugged at the Contractor's expense.

- .4 When the line has been filled and most of the air expelled, time should be allowed for the remaining air and water to reach a constant temperature.
- .5 The test pressure shall be at the pressure rating for the class of pipe concerned or otherwise as directed. The test section length shall be approved prior to testing.
- .6 No test shall be applied until at least 5 days after the concrete thrust reaction block has been cast and plugged ends securely braced. In the case of high early strength concrete, allow a minimum of 3 days.
- .7 The test section may be pressured through a hydrant or a tap may be installed in the line. After testing the pipe, the tap shall be plugged at the Contractor's expense.
- .8 Fill the water main at a velocity of less than 0.6m/s.
- .9 Each section between valves shall be brought to test pressure with the valves closed, to test the valves under pressure. Test pressure shall be held without loss for two (2) minutes before opening the valve and releasing the pressure into the next section.
- .10 Raise the water main test section pressure using either a hand or motor-powered pump located. The flow rate shall be controlled by the valve at the pump.
- .11 Mark the gauge and the level of water in the storage barrel at the beginning of the test.
- .12 Maintain the test pressure within $\pm 20\text{kPa}$ of the specified test pressure for the duration of the test. Pump the test section back to the test pressure at the end of the first 30 minutes. If the allowable leakage is exceeded, air may be trapped. Remove trapped air and repeat the test.
- .13 Polyvinyl Chloride (PVC) Pipe:
 - .1 The test section, with all intermediate valves open, shall be brought up to test pressure and held for two (2) hours. At the end of the two (2) hour test period, any loss of water shown by a drop in pressure shall be made up by pumping a measured quantity of water into the test section until the original test pressure is reached.
 - .2 The allowable leakage shall be determined by the following formula:

.1 PVC pipe:

$$L = \frac{ND \sqrt{P}}{65410} \quad \text{for the 2hour test}$$

Where:

L is the allowable leakage in litres

N is the number of couplings

D is the pipe diameter in mm

P is the pressure of the test in kPa.

.2 Each fitting bell shall be counted as 1/2 coupling.

.3 Pipe couplings shall be counted as 1, regardless of the type of joint.

.14 If the test fails any section of the water main, locate and repair the leaks at no extra cost. After such repairs, retesting of the repaired sections shall be conducted.

.15 Where connections are made to existing water mains, the pressure used to test sections of new mains which cannot be isolated from the existing mains shall be as directed, or the leakage test may be waived by the Engineer. This shall not relieve the Contractor from his obligation to repair leaks or replace defective material.

.16 It is the responsibility of the Contractor to ensure that safety precautions are observed for hydrostatic pressure tests.

.17 Flush and clean out pipes after pressure tests.

.1 Remove stops after satisfactory completion of test and seal holes with plugs, make repairs to insulation and external protective jacket as required.

.2 Dispose of flushing water in an acceptable manner.

3.11 Disinfection

- .1 Comply with all applicable Occupational Health and Safety requirements including the Workplace Hazardous Materials Information System (WHMIS). The storage and handling of chlorine compounds requires due diligence and careful attention. Chlorine is very toxic to living organisms. Chlorine gas can be produced very easily if the wrong chemicals come into contact with chlorine compounds. WHMIS requires that Material Safety Data Sheets (MSDS) be supplied with the chemical. The MSDS describe in detail the hazards associated with the chemical, safe storage requirements, PPE, handling procedures and first aid for each specific chemical compound. The responsibility for the implementation of WHMIS lies with the employer.

However, all workers and all persons involved with supervising workers handling hazardous materials should be aware of their roles and responsibilities.

- .2 After all leakage tests pass and before being placed into service, all new mains shall be chlorinated throughout their entire length.
- .3 The method to be used to introduce the disinfectant into the line shall be approved.
- .4 Chlorine shall be added to attain a concentration of 50mg/L throughout the system. This solution shall be retained for 24 hours, after which time the chlorine concentration must not have dropped below 5mg/L. **Tablets or granular disinfectants will not be allowed. Pipes with tablets placed inside are not acceptable.**
- .5 During chlorination all valves and accessories shall be operated and any water required to make up the loss of water shall be chlorinated at 50mg/L.
- .6 Water discharged from the water distribution system and released to water bodies, either directly or indirectly (e.g. via the storm-water sewer system), is to be dechlorinated at the point of discharge in accordance with the applicable federal legislation. This includes de-chlorination of water released due to main breaks once the risks to public safety and property damage have been controlled. For water disposed to the sanitary sewer system, there are limits on the chlorine concentration and volume of water discharged as set by the Owner.
- .7 After chlorination is completed, the mains shall be flushed throughout until the replacement water is equal chemically and bacteriologically to the supply. The flushing flow rate should be sufficient to achieve a minimum velocity of 0.8m/s. The tests shall be made in the presence of the Engineer.
- .8 Do not dispose of chlorinated water greater than 2mg/L, or waste material such as, mineral spirits, paint thinner, into any surface waterway or storm or sanitary sewer. This requirement may be relaxed if written approval to exceed this limit from Alberta Environment and the Engineer is provided. Approved de-chlorination neutralizing chemicals may also be used for neutralizing chlorinated water.
- .9 The Canadian Water Quality guidelines for the Protection of Aquatic Life (Canadian Council of Ministers of the Environment, 1999) sets a guideline residual chlorine concentration of 0.5 micrograms per litre, which is below the reliable limits of detection (i.e., chlorine should be neutralized to the point where no chlorine is detected). Depending on the method of dechlorination, the chemicals used may impact on the dissolved oxygen concentration of receiving waters, which may be a concern for the aquatic health or receiving wetlands and/or creeks.

- .10 The contractor is responsible for the water quality impacts of water discharged during construction activities, including dechlorination of water disposed as part of acceptance tests and disinfection.
- .11 Dechlorination may be performed by adding a neutralizing chemical to the chlorinated water as it is discharged. Two common methods for applying the neutralizing chemicals are:
 - .1 Continuous-feed, where neutralizing chemicals are applied at the point of water discharge; or
 - .2 Dechlorination tank, where chlorinated water is discharged to a tank then treated to dechlorinate. The tank may be mounted on a mobile trailer.
- .12 The choice and amount of dechlorination chemical will be impacted by project or site specific issues such as water release, temperatures, strength of chlorine, volume or water release and distance from receiving waters. Dechlorination must always be verified through field sampling of discharge waters.
- .13 Follow all manufacturer's recommendations and safe work procedures when handling dechlorination chemicals. Adhere to all applicable safety regulations including: Workplace Hazardous Materials Information System (WHMIS), Occupational Health and Safety (OH&S) and Transportation of Dangerous Goods (TDG).
- .14 After final flushing, the Engineer will allow 16 hours to pass before collecting water samples for bacteriological testing. The water main is to be flushed for not more than five (5) minutes before taking the sample. One sample is to be taken from each leg of the water main, stubs longer than 12.2m, and services greater than 50mm in diameter.

3.12 Acceptance

- .1 If leaks develop in the work before the expiry of the maintenance period, make the necessary repairs. The leaks shall be deemed repaired when the leakage is less than the allowable as determined in the leakage tests.
- .2 Before being placed in service, and before certification of completion by the Engineer all installed mains shall be disinfected according to AWWA C651 and tested for bacterial content and chlorine residual.
- .3 Bacteriological samples shall be collected 16 hours after the chlorine test is passed.
 - .1 Contractor obtain approved bacteriological sample bottles from the Provincial Laboratory of Public Health or the Local Health Unit.

- .2 Do not sample from hydrants but from a copper service or blowoff.
 - .3 Flow the sample line at a high rate for a minimum of 5 minutes to flush the line thoroughly before sampling. Reduce the flow rate and cut the water stream with the sample bottle.
 - .4 Contractor to complete all Provincial Laboratory of Health Forms and deliver to the laboratory within 1 hour of sampling. If the sample can not be delivered to the laboratory within 1 hour, use an iced cooler for storage during transport. In no case, should the samples be delivered to the laboratory more than 6 hours after the sample was collected. Keep samples away from sources of heat and light.
 - .5 The Owner and Engineer are to be witness to the bacteriological sampling and ALL testing.
-
- .4 On completing the chlorination of the mains, set the system in operation as reviewed by the Engineer and supply the necessary labour for the opening and closing of all valves as required.

END OF SECTION

1.0 GENERAL

1.1 Definitions

.1 Class B Bedding:

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

1.2 Samples

- .1 At least 2 weeks prior to commencing work, inform of the proposed source of bedding materials.
- .2 Provide a sieve analysis of the bedding materials for review.
- .3 Bedding materials shall be submitted before being used.

1.3 Scheduling of Work

- .1 Schedule work to minimize interruptions to existing services.
- .2 Submit a schedule of expected interruptions for approval and adhere to the approved schedule.

1.4 Regulations

- .1 All building services installed shall conform with regulations governing plumbing and drainage issued by Alberta Labour and Bylaws in effect at the site of the work.

1.5 Protection of Existing Features

- .1 Obtain permission from the property owner before removing any fences, trees, hedges, shrubs, private walks or other private property. Where necessary, the Contractor shall remove fences and re-erect them immediately after backfilling and cleaning up but he will not be required to replace fence material which is unsound. Where the Contractor believes the fence material is unsound, he must first reach a written agreement with the owner of the fence as to the method of removing and relocating it.
- .2 Written permission from the Engineer will be required before removing trees, hedges, shrubs or sidewalks within right-of-way limits. The Contractor shall replace or repair all sidewalks removed for excavation at his own expense.
- .3 Where trees, hedges and shrubs must be removed, this shall be done in an approved manner, removing only a sufficient amount to make space for the excavating equipment. The Contractor shall not be expected to replace any

trees, hedges or shrubs; provided no unnecessary damage has resulted from his operations. All trees, hedges and shrubs which have been dug up, and all surplus earth, shall be removed from the site of the work and disposed of as directed.

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

2.0 PRODUCTS

2.1 Water Service Pipe

- .1 Water service pipe shall be soft tempered Type "K" copper tubing conforming to AWWA C800 and ASTM B88. All couplings shall be standard brass compression type. Copper tubing c/w thaw wire.

2.2 Sewer Service Pipe

- .1 Sewer service pipe shall be Polyvinyl Chloride (PVC) pipe DR 28, conforming to ASTM D3034. The pipe shall be manufactured from PVC compound conforming to ASTM D1 784. Joints shall be rubber rings conforming to ASTM DI 869 preset in the bell groove.

2.3 Corporation Main Stops

- .1 Corporation main stops shall be Mueller Oriseal H-15013 or approved equal, conforming to ASTM C800. Stainless steel Type 304 or bronze construction conforming to ASTM B62 service clamps with double stainless steel straps shall be used with all main stops for service lines larger than 25mm. Nuts and bolts to have treated threads to prevent binding. Gaskets shall be synthetic rubber suitable for potable water use.

2.4 Curb Stops

- .1 Curb stops shall be standard brass with compression type connection, Mueller Mark 11 Oriseal stop and drain H-I 5219 or approved equal.

2.5 Service Curb Box

- .1 Extension service boxes and rods shall be Mueller A726 for sizes up to 25mm and Mueller A728 for sizes 32mm to 50mm. Operating rods for 25mm and smaller curb stops shall be Type 304 stainless steel. Operating rods for 40mm and 50mm curb stops shall be steel. The rod shall be attached to a manganese bronze clevis with a brass or stainless steel rivet. The length shall permit a minimum 600mm adjustment at the top.

2.6 Wooden Marker Stake

- .1 Wooden marker stake shall be 38mm x 89mm x 3.0m timber extending 0.6m above ground. The exposed portion of the stake shall be painted red with the service type designation of the line in black.

2.7 Sewer Service Inspection Chamber

- .1 The sanitary sewer inspection chamber shall be as manufactured by Royal or Le-Ron Plastics, complete with riser pipe and **cast iron lid**. PVC Locking lid and metal bolt will not be accepted.

2.8 Bedding Material

- .1 Well-graded sand consisting of hard, durable particles free from clay lumps, cementation, organic material, frozen material and other deleterious materials.
- .2 The material shall meet the following gradation:

Sieve Size (10 ⁻⁶ m)	Percent Passing (by weight)
12,500	100
5,000	95
63	2-10

- .3 The liquid limit shall not exceed 25, and the plasticity index shall not exceed 6.

2.9 Insulation

- .1 Any insulation that is used must be manufactured using a process that does not utilize ozone-depleting chemicals in any way.
- .2 For insulating pipes, use DOW HI-40 Styrofoam or similar approved board.

3.0 EXECUTION

3.1 Preparation

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

3.2 Water Service

- .1 Tapping of main:
 - .1 Direct tapping of PVC water main shall be in strict compliance with procedures recommended by the Uni-Bell Plastic Pipe Association, AWWA C900 and AWWA C905. Use a tapping machine to drill, tap and thread the corporation cock into the main. Wherever possible, tap the main under pressure and use special care to prevent cuttings from falling into the main. Tapping a service line larger than 25mm into a water main requires the use of service camps.
 - .2 Corporation stops shall be tapped into the upper half of the water main within 30 degrees of the crown of the pipe. All corporation stops shall be left open before backfilling.

- .3 Where multiple connections to the water main are used, the tappings shall be spaced 600mm apart and staggered around the upper half of the water main. No main stop shall be within 300mm of a coupling or collar.
- .2 Building service water pipe shall be connected to the corporation stop with a suitable goose neck which shall be no higher than the top of the water pipe. The pipe shall be laid sufficiently slack to allow for settlement. Additional goosenecks should be provided, maintaining a minimum 300mm gooseneck spacing over the storm and sanitary sewer pipes.
- .3 Copper services are to be one piece; use couplings only when the service pipe exceeds the length of a standard roll of copper pipe; locate double unions outside of paved areas if possible, usually close to curb valve end of service.
- .4 Where the pipe is to be installed between the curb box and an existing or proposed building, the pipe shall be laid so that it will drain from the building to the curb box. The building end of the pipe shall be crimped.
- .5 The building service water pipe shall be laid adjacent to the building service sewer pipe when present.
- .6 Curb stops and service:
 - .1 Curb stops shall be placed 150mm from the property within right-of-way, and installed so as to drain water from the building when in the shut-off position. The curb stops shall be laid on a 38mm plank base or curb stop chair. In fine grained or clay soils a drainage sump .05m³ in volume shall be placed below and around the curb stop. The curb extension rod shall be adequately secured to the curb stop.
 - .2 The service box shall be set plumb, and the upper section of the service box adjusted to grade elevation. The lower section of the service box and the extension rod shall be a minimum of 250mm below ground elevation to prevent heavy loads from being transmitted to the curb stop. Curb stops shall be left closed. Installation shall be in accordance with the standard drawing and shall be complete with a wooden marker stake.

3.3 Sewer Service

- .1 Connection to sewer main:
 - .1 The connection to the sewer main shall be made using prefabricated tee branches or wye branches. Branches shall be installed during the construction of the sewer main.
 - .2 Use prefabricated saddles or approved field connections for connecting pipes to existing sewer pipes. The joint of the saddle to the pipe shall be structurally sound and watertight. The sewer main shall be taped in the upper half of the pipe. Care shall be taken while tapping so that the sewer main will not be fractured, and all broken pipe and mortar shall be removed from inside the sewer main. The tapping shall be only of sufficient size to permit the saddle to

fit snugly into the hole. The saddle shall be properly secured to the sewer main. In no case shall the building sewer pipe protrude into the sewer main. Where directed, a riser shall be constructed.

- .2 Pipe laying shall commence at the lowest point of the length being laid and the pipes shall be placed with the spigot ends pointing in the direction of the flow. Maintain minimum grade for 100mm and 150mm diameter sewer services at 2.0% and 1.0%, respectively. The end of the sewer shall be plugged or capped with a manufactured plug securely fastened in place and marked with a wooden marker stake.
- .3 Makeup required horizontal and vertical bends from 45° bends or less, separated by a straight section of pipe with a minimum length of four pipe diameters. Use long sweep bends where applicable. Service inspection chambers shall be installed 300mm from the property line within the right-of-way.

3.4 Trench Installation

- .1 Trenching and backfill:
 - .1 Do trenching and backfill work in accordance with Section 02315 - Trenching and Backfilling.
 - .2 Trench line and depth require approval prior to placing bedding material and pipe.
 - .3 Do not backfill trenches until pipe grade and alignment have been checked and accepted.
- .2 Pipe bedding:
 - .1 Pipe bedding shall be Class B as defined in Section 1.1 - Definitions. Bedding material shall be as specified in Section 2.0 - Products.
 - .2 Granular bedding:
 - .1 Place granular bedding material in uniform layers not exceeding 150mm compacted thickness for the full width of the trench up to a level of 300mm above the crown of the pipe to at least 95% Standard Proctor Density.
 - .2 Shape bed true to grade and to provide a continuous, uniform bearing surface for a barrel of pipe. Do not use blocks when bedding pipe.
 - .3 Shape transverse depressions as required to receive bell if bell and spigot pipe is used.
 - .3 Installation:
 - .1 The horizontal and vertical alignment of the centreline of the pipe shall

not be more than 75mm and 20mm, respectively, off the given line.

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

3.5 Auger Installation

- .1 When shown on the drawings or when directed, building services under existing or future pavement or through private property shall be installed in an auger hole.
- .2 The augering machine shall be aligned and set to the required grade. If the hole deflects from the desired course, another hole shall be bored in the location specified. Minimum allowable grades and maximum allowable bends shall be as specified for services laid in an open trench.
- .3 The auger hole shall be of sufficient size to allow the sewer service and water service to pass through unrestricted. Wherever possible, sewer and water services shall be installed in the same hole. The leading end of the sewer pipe shall be adequately plugged to prevent the entry of foreign material during installation. Fill the auger or borehole void with a dry or slurry mixture of sand.

3.6 Location

- .1 Sewer and water services shall be installed to the property line and marked accordingly. Curb stops and service inspection chambers shall be located 150mm inside the right-of-way. The water service shall be on the right of the sewer service at a clearance of 150mm when facing the lot being served. Stormwater service, if installed, shall be left of sanitary service.

END OF SECTION

1.0 GENERAL

1.1 Definitions

.1 Class B Bedding:

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

1.2 Samples

- .1 At least 2 weeks prior to commencing work, inform of the proposed source of bedding materials.
- .2 Provide a sieve analysis of the bedding materials for review.
- .3 Bedding material samples shall be submitted before being used.

1.3 Scheduling of Work

- .1 Schedule work to minimize interruptions to existing sewers.
- .2 Maintain existing sewer flows during construction.
- .3 Submit a schedule of expected interruptions for approval and adhere to the approved schedule.

2.0 PRODUCTS

2.1 Sanitary Sewers

- .1 Sanitary sewers shall be Polyvinyl Chloride (PVC) pipe, DR35, conforming to CAN B182.2 and ASTM D3034. The pipe shall be manufactured from PVC compounds conforming to ASTM D1784. Joints shall be rubber rings conforming to ASTM D1869 preset in the bell groove. Prefabricated PVC Tee branches shall be installed at all service connection locations (no saddles). The pipe age should not exceed two years at the time of installation.

2.2 Storm Sewers

- .1 Storm sewers shall be reinforced concrete pipe conforming to CAN A257.2 and ASTM C655 using flexible rubber gaskets meeting CAN A257.3 and ASTM C443 sulphate-resistant Portland cement to CAN A5.

OR

- .2 PVC gravity pipe with exterior reinforcing ribs conforming to ASTM F794, CSA B182.4 and UNI-B-9. The pipe is to have a minimum pipe stiffness of not less than 320kPa at 5% deflection when tested in accordance with ASTM D2412.

2.3 Catch Basin Leads

- .1 Catch basin leads shall be Polyvinyl Chloride (PVC) pipe, DR35, conforming to CAN B182.2 and ASTM D3034. The pipe shall be manufactured from PVC compounds conforming to ASTM D1784. Joints shall be rubber rings conforming to ASTM D1869 preset in the bell groove.

2.4 Manhole and Catch Basin Sections

- .1 Manhole and catch basins sections shall be precast reinforced concrete conforming to ASTM C478. All sanitary and storm manhole sections shall have confined rubber gasket joints meeting requirements of ASTM C443. Both the inside and outside of each joint shall be finished smooth with cement mortar. Manholes shall be 1,200mm diameter barrels complete with 20mm galvanized ladder rungs set at 400mm on centre. All manhole bases shall be pre-benched bases with all incoming and outgoing pipes factory installed. Catch basins shall be 900mm diameter barrels with Tee-Top slab and shall conform to ASTM C478.

2.5 Frame and Covers

- .1 Manhole frames and covers shall be Norwood Foundry No. F39 or approved equal in boulevard and landscaped areas. Manhole frames and covers shall be Norwood Foundry No. NF80 or approved equal in asphalt road areas. Frames and covers shall conform to ASTM A48 for Grey Iron Castings.
- .2 Catch basin frames and grates shall be Norwood Foundry No. K7 for rolled-faced curbs, Norwood Foundry F51 w/o side inlet for straight-faced curbs, and Norwood Foundry F38 for ditch/field inlets or approved equal. Frames and grates shall conform to ASTM A48 for Grey Iron Castings.

2.6 Concrete

- .1 Concrete for bedding, manholes, catch basins, concrete pipe and other appurtenances shall be sulphate-resistant ASTM Type 50. Cast-in-place concrete shall develop a compressive strength of not less than 25MPa in 28 days.

2.7 Bedding Material

- .1 Well-graded sand consisting of hard, durable particles free from clay lumps, cementation, organic material, frozen material and other deleterious materials.
- .2 The material shall meet the following gradation:

Sieve Size (x10 ⁻⁶ m)	Percent Passing (by weight)
12,500	100
5,000	95
80	2-10

- .3 The liquid limit shall not exceed 25, and the plasticity index shall not exceed 6. The Contractor shall provide a sieve analysis of the sand for the Engineer's approval.

2.8 Insulation

- .1 Any insulation that is used must be manufactured using a process that does not utilize ozone-depleting chemicals in any way.
- .2 For insulating pipes, use DOW HI-40 Styrofoam or a similar approved board.

3.0 EXECUTION

3.1 Preparation

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

3.2 Trenching and Backfill

- .1 Do trenching and backfill work in accordance with Section 02315 - Trenching and Backfilling.
- .2 Do not allow contents of any sewer or sewer connection to flow into the trench.
- .3 Trench line and depth require approval prior to placing bedding material and pipe.
- .4 Do not backfill trenches until pipe grade and alignment have been checked and accepted, and infiltration and exfiltration test results are within limits specified.

3.3 Pipe Bedding

- .1 Pipe bedding shall be Class B as defined in Section 1.1 - Bedding material shall be as specified in Section 2.0 -Products.
- .2 Granular Bedding:
 - .1 Place granular bedding material in uniform layers not exceeding 150mm compacted thickness for the full width of the trench up to a level of 300mm above the crown of the pipe to at least 95% Standard Proctor Density.
 - .2 Shape bed true to grade and to provide a continuous, uniform bearing surface for a barrel of pipe. Do not use blocks when bedding pipe.
 - .3 Shape transverse depressions as required to receive bell if bell and spigot pipe are used.

3.4 Pipe Installation

- .1 The horizontal alignment of the centreline of the pipe shall not be more than 75mm off the given line.
- .2 The vertical grade of the sewer main shall not deviate from the given grade by an amount greater than 20mm.
- .3 Handle pipe with approved methods. Do not use chains or cables passed through the pipe bore so that the weight of the pipe bears upon the pipe ends. Do not exceed the maximum joint deflection recommended by the pipe manufacturer. Install PVC pipe and fittings in accordance with CSA B181.12. Install concrete pipe as recommended in the "Concrete Pipe Installation Manual" as published by the American Concrete Pipe Association.
- .4 Lay and join pipes in accordance with the manufacturer's recommendations. Lay pipes on prepared bed, true to line and grade, with pipe invert smooth and free of sags or high points. Ensure the barrel of each pipe is in contact with the shaped bed throughout its full length. Commence laying at the lowest point of the length being laid and proceed in the upstream direction with bell socket ends of pipe facing upgrade.
- .5 Do not allow water to flow through pipe during construction, except as may be permitted by the Engineer.
- .6 Whenever work is suspended, install a removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.
- .7 Position and join pipes by approved methods. Do not use excavating equipment to force pipe sections together.
- .8 Pipe Jointing:
 - .1 Install gaskets in accordance with the manufacturer's recommendations.
 - .2 Support pipes with hand slings or cranes as required to minimize lateral pressure on the gasket and maintain concentricity until the gasket is properly positioned.
 - .3 Align pipes carefully before joining. Maintain pipe joints free from mud, silt, gravel and other foreign material.
 - .4 Avoid displacing the gasket or contaminating it with dirt or other foreign material. Gaskets so disturbed shall be removed, cleaned, lubricated and replaced before joining is attempted. Only the lubricant recommended by the rubbing ring manufacturer shall be applied to the rubber ring or ends of the pipe.
 - .5 Complete each joint before laying the next length of pipe. Minimize joint deflection after the joint has been made to avoid joint damage. Apply sufficient pressure in making joints to ensure that the joint is complete as

outlined in the manufacturer's recommendations.

- .6 At rigid structures, install pipe joints not more than 1.2m from the side of the structure.
- .7 Mortared concrete pipe joints:
 - .1 Pipe interior: Circular pipes 700mm diameter and larger and arch or elliptical pipes equivalent to 900mm diameter or larger shall have an interior gap between the ends of adjacent pipes filled with mortar. Apply mortar at least 7 days after backfilling has been completed to allow pipe settlement to occur. Finish the interior surface of the joint smoothly.
 - .2 Pipe exterior: for bell and spigot pipe, use mortar to seal outside of joints. Press and bed mortar into place. Allow mortar to set minimum of one hour before backfilling.
- .9 Plug lifting holes with approved prefabricated plugs set in non-shrink grout.
- .10 Cut pipes as required for special inserts, fittings or closure pieces in a neat manner, as recommended by the pipe manufacturer, without damaging the pipe or its coating and to leave a smooth end at right angles to the axis of the pipe.
- .11 Make watertight connections to manholes. Use non-shrink grout when suitable gaskets are not available.

3.5 Service Connections

- .1 Junctions and risers shall be installed in the sewer mains using prefabricated tee branches or wye branches.
- .2 Use prefabricated saddles or approved field connections for connecting pipes to existing sewer pipes. The joint of the saddle to pipe shall be structurally sound and watertight.
- .3 Service connection pipe shall not extend into the interior of the main sewer.

3.6 Appurtenances

- .1 Install all manholes, drop inlets, junctions, risers, catch basins and other appurtenances at the locations shown on the construction drawings and/or as directed. Installation shall be in accordance with the standard or special drawing for each appurtenance.
- .2 Maximum allowable tolerances for installed manhole and catch basins are:
 - .1 Horizontal: 10mm horizontal in 1.5m vertical.
 - .2 Vertical: ± 10 mm for any elevation shown.
- .3 A minimum of 3 courses of grade rings are required immediately beneath the manhole cover to allow for a minimum adjustment of 400mm and maximum adjustment of 800mm.

- .4 Confined rubber gasket joints conforming to ASTM C443 shall be used between barrels and all joints between barrels and grade rings. The joints shall be finished smoothly with cement mortar.
- .5 The channeled floor of the manholes shall be smooth and true to line and grade and shall be constructed of concrete shaped to provide a smooth, unobstructed flow. The benching shall be trowelled to a smooth finish. Branch lines entering the manhole shall be channeled to join the main line at an acute angle.
- .6 Sewer pipe into existing manholes must be grouted in. Since concrete will not bond to PVC pipes, it will be necessary to coat the PVC pipe with an approved cementing agent to which sand has been added to form a suitable surface to which the concrete will bond. All PVC pipe shall be connected in accordance with the ASTM Standard.
- .7 Break into existing manholes, catch basins or sewers as shown on the construction drawings. This work shall be performed in a workmanlike manner according to the dictates of good practice. Existing manhole floors shall be rechanneled and properly benched, the junction area shall be grouted to form a smooth joint, all debris, including concrete and excavated material, shall be removed, and the vicinity of the connection shall be left in a tidy, acceptable condition.

3.7 Testing

1. Sewer inspection by televising:
 - .1 **Contractor operating the CCTV must be PAC (Pipeline Assessment Certified) and he/she must present their certification to the Engineer prior to start of CCTV.**
 - .2 All sewers shall be inspected by camera after backfilling of the trench to finished grade.
 - .3 The inspection shall be made by employing television scanning equipment which shall be provided by the Contractor. The Contractor shall employ a qualified PAC closed circuit television Contractor acceptable to the Engineer to carry out the inspection.
 - .4 All television inspection shall be carried out in the presence of the Owner and/or the Engineer who shall be given at least 48 hours advance notice of any testing to be carried out. Television inspection shall be performed by the Contractor on all sewers unless otherwise directed.
 - .5 The closed circuit television Contractor shall provide all equipment and materials necessary to conduct the inspection as specified herein.
 - .6 **During the television inspection, the contractor will ensure the sanitary and storm pipe have been flushed out prior to performing the camera inspection.**
 - .7 **The Contractor shall ensure that there is a constant flow of water during**

the camera inspection. This is critical to indicate the location of the sags. If the camera inspection is carried out without the water running and/or the Engineer present, the work may be rejected by the Engineer.

- .8 The television equipment shall be a self-contained camera and monitoring unit connected by cable. It must be waterproof and be capable of lighting the entire pipe. Picture capabilities must be of quality to show the entire pipe periphery. There must be capability of providing measurement within the line to any accuracy of one third of a metre per kilometre. Picture quality must be such to produce a continuous 600 line resolution picture showing the entire periphery of the pipe.
- .9 The following capabilities and items must be available.
 - .1 Direct voice communication.
 - .2 A camera towing service.
 - .3 Self-contained electrical power.
 - .4 Proper safety equipment to protect employees and the general public.
- .10 The cameras rate of progress shall be uniform during inspection and shall not exceed 6 RN/mm.
 - .1 A television log shall be maintained during the inspection showing location of leak, fault, open joint, break, crack, collapse, settlement, obstruction, infiltration, or any other defect affecting the overall performance of the sewer line. The location of the defect shall be referenced from the manhole.
 - .2 A separate log shall be kept of service connections with comments of condition.
 - .3 Photographs shall be taken as directed or at the discretion of the television scanning operator. A minimum of one photo per manhole reach is required plus one of every deficiency.
 - .4 Manhole identity shall be noted clearly as indicated on the drawings.
- .11 A final typewritten report with the corresponding photograph secured properly and referenced to the text, along with a copy of the videotape, shall be submitted to the Engineer within two weeks after completion of the inspection.
- .12 The Contractor shall be responsible for all works performed by the subcontractor, for traffic control and any other related work incidental to the completion of television inspection.
- .2 Exfiltration test:
 - .1 If required by the Engineer, the Contractor shall conduct an exfiltration test.

- .2 Fill test section with water in such a manner as to allow displacement of air in line. Maintain under the nominal head for 24 hours to ensure absorption in pipe wall is complete before test measurements are commenced.
 - .3 Immediately prior to the test period, add water to the pipeline until there is a head of 1.0m over the interior crown of the pipe measured at the highest point of the test section or water in the manhole is 1.0m above the static groundwater level, whichever is greater.
 - .4 The duration of the exfiltration test shall be two hours.
 - .5 Water loss at the end of the test period shall not exceed the maximum allowable exfiltration over any section of pipe between manholes.
- .3 Infiltration test:
- .1 If required by the Engineer, the Contractor shall conduct an infiltration test.
 - .2 Conduct an infiltration test in lieu of an exfiltration test where the static groundwater level is 750mm or more above the top of the pipe measured at the highest point in line to be used.
 - .3 Do not interpolate a head greater than 750mm to obtain an increase in allowable infiltration rate.
 - .4 Install a watertight plug at the upstream end of the pipeline test section.
 - .5 Discontinue pumping operations for at least 72 hours before test measurements are to commence, and during this time, keep thoroughly wet at least one-third of pipe invert perimeter.
 - .6 Prevent damage to pipe and bedding material due to flotation and erosion.
 - .7 Place a 900 V-notch weir or other approved measuring device in the invert of the sewer at each manhole.
 - .8 Measure the rate of flow over a minimum of 1 hour, with recorded flow for each 5-minute interval.
- .4 Infiltration and exfiltration shall not exceed the following limits in litres per hour per 100 metres of pipe, including service connections:

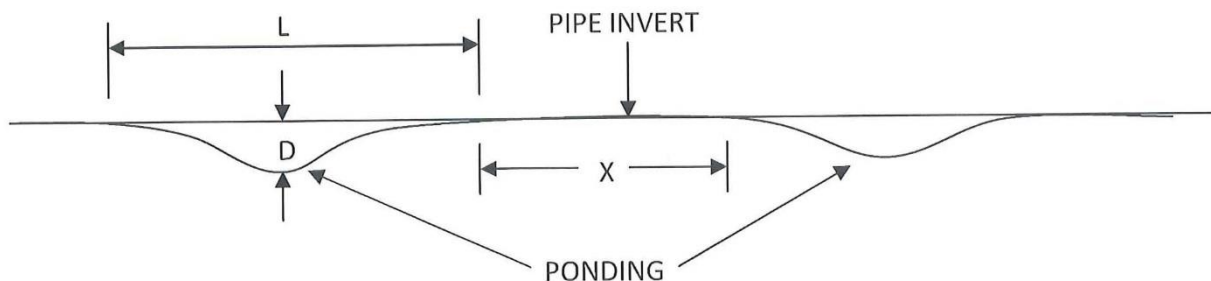
Nominal Pipe Ø (mm)	PVC Pipe	Concrete Pipe
10	3.88	25.5
12	4.62	30.0
15	5.51	34.0
20	7.45	41.5

Nominal Pipe Ø (mm)	PVC Pipe	Concrete Pipe
250	9.39	49.5
30	11.33	56.5
35	13.27	63.5
40	14.91	70.0
45	16.84	76.0
50	18.78	81.5
550	20.72	87.0
600	22.80	92.5
700	26.53	102.0
800	30.11	110.5
900	33.69	118.0
1,000	37.56	124.5
1,100	41.29	130.0
1,200	45.01	135.0

3.8 Acceptance

- .1 The location of all deficient work will be recorded and the Contractor will be required to repair, relay, restore or otherwise make good, to the satisfaction of the Engineer and Owner, any deficient work, including the repair of alignment problems, cracked or broken pipe, deformed pipe, leaks or any other faults not conforming with these specifications or the pipe manufacturers which the television inspection revealed.
- .2 Tolerance of Sags in PVC Sanitary/Storm Pipe:

Pipe Diameter (mm)	Maximum Allowable Depth (D) of Sag (mm)	Maximum Allowable Length (L) of Sag (m)	Minimum Allowable Distance (X) Between Sags (m)
100	10	1.5	5
150	10	1.5	5
200	20	2.0	10
250	20	2.5	20
300 and Larger	30	3.0	25



Any sags or ponding of water along the pipe will be repaired by excavating the pipe, realigning and compacting the subgrade or relaying the non-conforming section of the pipe if necessary. Any defects in the pipe or construction method revealed shall be corrected and CCTV for Engineers' review, approval, and acceptance. All costs associated with the retesting and the correction of defects shall be the responsibility of the contractor.

- .3 After the deficiencies are repaired and corrected and before final acceptance, the Owner reserves the right to have the faulty areas re-inspected at the Contractor's expense.

END OF SECTION

1.0 GENERAL

1.1 Aggregate Supply

- .1 To ensure product consistency, all aggregate material to be provided from the same source unless otherwise approved by the Engineer.

1.1 Samples

- .1 At least 2 weeks prior to commencing work, inform of proposed source of granular materials.
- .2 The Contractor shall provide a sieve analysis of the material for review, including fracture count, liquid limit, and plasticity index, per size of aggregate to be used.

1.2 Submissions

- .1 Granular base course shall be submitted before being used.
- .2 Preliminary review of the material as represented in the test results shall not constitute general acceptance of all material in the deposit or source of supply. Materials may be considered unsuitable even though particle sizes are within the limits of the gradation sizes required, if particle shapes are thin or elongated or any other characteristic precludes satisfactory compaction or if the material fails to provide a roadway suitable for traffic. Rejected material will not be paid for. The Engineer has the right to request additional testing if there are any concerns with the proposed aggregate.

2.0 PRODUCTS

2.1 Granular Base Course

- .1 Material for the granular base course shall consist of sound, hard, durable crushed rock or crushed gravel and shall not contain organic or soft, thin, elongated, or laminated materials, materials that break up when alternately frozen and thawed or wetted and dried, or other deleterious materials. Granular base course material shall be compacted to no less than 100% Standard Proctor Density.
- .2 Granular Base course material shall be consistent with the Alberta Transportation Specifications for Aggregate under the Designation 2 Class 20 and shall meet the following gradation when tested to ASTM C136 and ASTM C117 and give a smooth curve without sharp breaks when plotted on a semi-log grading chart.

Sieve Size (10 ⁻⁶ m) (CGSB 8-GP-2M)	Percent Passing (by weight)
25,000	100
20,000	100
16,000	84-94
10,000	63-86
5,000	40-67
1,250	20-43
630	14-34
315	9-26
160	5-18
80	2-10

- .3 At least 60 percent by weight of material retained on the 5,000 sieve shall have two or more fractured faces.
- .4 The liquid limit shall not exceed 25 and the plasticity index shall not exceed 6 for the portion of material passing the 315 micron sieve.

3.0 EXECUTION

3.1 Placing

- .1 The base material shall not be placed until the underlying course has been accepted. The granular material shall be placed in uniform layers not exceeding 150mm in thickness before compaction. The material shall be placed by mechanical spreaders or deposited in windrows and leveled with suitable equipment.

3.2 Compaction

- .1 Each layer of granular base course shall be compacted near the optimum moisture content to not less than 100% of the maximum dry density corrected for the stone content as determined by ASTM D698 Method A for the material used.
- .2 During compaction, the moisture content shall be maintained at the optimum moisture content as determined by ASTM D698. If the moisture content exceeds the optimum moisture content the material shall be aerated by mechanical means until the material has dried sufficiently to reach the optimum moisture content. Water shall be added if the moisture content is below optimum.

3.3 Testing Compaction, Proof Roll and Quality Control

- .1 Compaction results shall be based on a minimum of one density test per 1,500 square metres of road. Additional tests may be called for by the Engineer as deemed necessary.
- .2 Field density tests shall conform to ASTM D1556, ASTM D2167, or ASTM D6938 for comparison with a maximum density determined according to ASTM D698 Method A.

- .3 No movement while doing the roll test will be tolerated. In addition, (rebound) movement or rutting or cracking or lateral movement will be considered failure. All areas identified by the Engineer and/or Owner during the proof rolling will have to be rectified by the contractor and re-proof rolled at the Contractors expense.
- .4 The Contractor shall supply a legal loaded water truck for the granular base proof roll test. This test will be undertaken when the compaction of the granular base has been completed and shall be under the direction and in the presence of the Engineer and the Owner.
- .5 Under no circumstances shall the Contractor cover the granular base with asphalt base course, curb and gutter, or monolithic curb, gutter and sidewalk until all density test results and the granular base proof roll test performed in the presence of the Engineer are approved by the Engineer.
- .6 Compaction density testing may be waived by the Engineer upon satisfaction of the construction operations and results of the proof roll test.
- .7 The compacted lift thickness of a granular course shall not exceed 150mm, or as directed by the Engineer. The required density of granular base courses is shown in the following table:

Compacted Granular Base Course	Required Percentage of Maximum Density
Under roads, curb and gutter	100%
Under commercial or alley crossings	100%
Under asphalt or concrete walk, transit pads	97%
Under walk portion of monolithic walk	97%
Under curb ramps	97%
Under private crossings	97%
Under median or island strips	97%
As granular road	100%
As granular walkways	97%

3.4 Shaping and Finishing

- .1 The finished surface of the granular base course shall conform to approved grades and shall meet the Field Quality control standard in this section.

3.5 Inspection

- .1 Before acceptance, the granular base course surface shall be true to cross-section and grade, and shall conform to the density and bearing ratio requirements specified.
- .2 Field density and moisture content tests will be made by the Engineer to ensure that the material is satisfactory. Material not meeting the specification requirements will not be approved and shall be removed and replaced at the contractor's expense.

3.6 Field Quality Control

Check finished surface of granular base to ensure that it meets the following tolerances:

- .1 Surface Tolerance: 15mm maximum variation under 3m straightedge,
- .2 Grade Tolerance: 6mm maximum variation above designated elevation and 15mm maximum variation below designated elevation.

When tolerance is Exceeded:

- .1 Trim high spots and refinish surface within tolerance,
- .2 Add approved aggregate to low areas, scarify, blend, respreads and re-compact to required density and refinish surface. Alternatively, compensate low areas with extra thickness of subsequent granular base course.

END OF SECTION

1.0 GENERAL

1.1 Aggregate Supply

- .1 To ensure product consistency, all aggregate material to be provided from the same source unless otherwise approved by the Engineer.

1.1 Samples

- .1 At least 2 weeks prior to commencing work, inform of proposed source of granular materials.
- .2 The Contractor shall provide a sieve analysis of the material for review, including fracture count, liquid limit, and plasticity index, per size of aggregate to be used.

1.2 Submissions

- .1 Granular base course shall be submitted before being used.
- .2 Preliminary review of the material as represented in the test results shall not constitute general acceptance of all material in the deposit or source of supply. Materials may be considered unsuitable even though particle sizes are within the limits of the gradation sizes required, if particle shapes are thin or elongated or any other characteristic precludes satisfactory compaction or if the material fails to provide a roadway suitable for traffic. Rejected material will not be paid for. The Engineer has the right to request additional testing if there are any concerns with the proposed aggregate.

2.0 PRODUCTS

2.1 Granular Base Course

- .1 Material for the granular base course shall consist of sound, hard, durable crushed rock or crushed gravel and shall not contain organic or soft, thin, elongated, or laminated materials, materials that break up when alternately frozen and thawed or wetted and dried, or other deleterious materials. Granular base course material shall be compacted to no less than 100% Standard Proctor Density.
- .2 Granular Base course material shall be consistent with the Alberta Transportation Specifications for Aggregate under the Designation 2 Class 20 and shall meet the following gradation when tested to ASTM C136 and ASTM C117, and give a smooth curve without sharp breaks when plotted on a semi-log grading chart.

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- .3 At least 60 percent by weight of material retained on the 5,000 sieve shall have two or more fractured faces.
- .4 The liquid limit shall not exceed 25 and the plasticity index shall not exceed 6 for the portion of material passing the 315 micron sieve.

3.0 EXECUTION

3.1 Placing

- .1 The base material shall not be placed until the underlying course has been accepted. The granular material shall be placed in uniform layers not exceeding 150 mm in thickness before compaction. The material shall be placed by mechanical spreaders or deposited in windrows and leveled with suitable equipment.

3.2 Compaction

- .1 Each layer of granular base course shall be compacted near the optimum moisture content to not less than 100% of the maximum dry density corrected for the stone content as determined by ASTM D698 Method A for the material used.
- .2 During compaction, the moisture content shall be maintained at the optimum moisture content as determined by ASTM D698. If the moisture content exceeds the optimum moisture content the material shall be aerated by mechanical means until the material has dried sufficiently to reach the optimum moisture content. Water shall be added if the moisture content is below optimum.

3.3 Testing Compaction, Proof Roll and Quality Control

- .1 Compaction results shall be based on a minimum of one density test per 1,500 square metres of road. Additional tests may be called for by the Engineer as deemed necessary.
- .2 Field density tests shall conform to ASTM D1556, ASTM D2167, or ASTM D6938 for comparison with a maximum density determined according to ASTM D698 Method A.

- .3 No movement while doing the roll test will be tolerated. In addition, (rebound) movement or rutting or cracking or lateral movement will be considered failure. All areas identified by the Engineer and/or Owner during the proof rolling will have to be rectified by the contractor and re-proof rolled at the Contractors expense.
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- .5 Under no circumstances shall the Contractor cover the granular base with asphalt base course, curb and gutter, or monolithic curb, gutter and sidewalk until all density test results and the granular base proof roll test performed in the presence of the Engineer are approved by the Engineer.
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Under private crossings	97%
Under median or island strips	97%
As granular road	100%
As granular walkways	97%

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- .1 The finished surface of the granular base course shall conform to approved grades and shall meet the Field Quality control standard.

3.5 Inspection

- .1 Before acceptance, the granular base course surface shall be true to cross-section and grade, and shall conform to the density and bearing ratio requirements specified.
- .2 Field density and moisture content tests will be made by the Engineer to ensure that the material is satisfactory. Material not meeting the specification requirements will not be approved and shall be removed and replaced at the contractor's expense.

3.6 Field Quality Control

Check finished surface of granular base to ensure that it meets the following tolerances:

- .1 Surface Tolerance: 15mm maximum variation under 3m straightedge,
- .2 Grade Tolerance: 6mm maximum variation above designated elevation and 15mm maximum variation below designated elevation.

When tolerance is Exceeded:

- .1 Trim high spots and refinish surface within tolerance,
- .2 Add approved aggregate to low areas, scarify, blend, respreads and re-compact to required density and refinish surface. Alternatively, compensate low areas with extra thickness of subsequent granular base course.

END OF SECTION

1.0 GENERAL

1.1 Definitions

.1 Topsoil:

- .1 The top layer of soil containing organic material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

2.0 PRODUCTS

2.1 Topsoil

- .1 Topsoil must be free of subsoil, clay lumps, stones, live plants, roots, sticks or other extraneous matter.

2.2 Seed

- .1 Seed shall be Canada No. 1 Grade quality seed free of impurities and disease, and consisting of the following:

.1	Slender Wheat Grass	35%
.2	Fringed Brome	20%
.3	Northern Wheat Grass	15%
.4	Tufted Hairgrass	10%
.5	Rocky Mountain Fescue	10%
.6	Fowl Bluegrass	10%

2.3 Fertilizer

- .1 Fertilizer shall be granular water soluble type completely synthetic slow release with 35% of nitrogen content in water insoluble form.

2.0 EXECUTION

3.1 Topsoil

- .1 Seeding shall include the supply of suitable equipment to perform the Work, the supply and placement of the specified seed mixtures and fertilizer at locations specified in the Special Provisions or as directed by the Engineer.
- .2 Distribution of the seed and fertilizer shall be at a uniform rate and not less than the minimum specified rate of application. The Contractor's equipment shall be calibrated to distribute seed and fertilizer into the soil at not less than specified minimum rates of application. The equipment shall then cover the seed and fertilizer with a suitable covering of soil.
- .3 A 100mm layer of topsoil shall be placed on all areas as shown on the drawings, or as directed. After placement, disc and harrow topsoil thoroughly.

- .4 Do not perform work under adverse field conditions such as frozen soil, excessively wet or dry soil or soil covered with snow, ice or standing water.
- .5 Fine grade surface free of humps and hollows to smooth even grades. Cultivate final grade immediately prior to seeding.

3.2 Seeding

- .1 Seeding to take place before August 18th.
- .2 Contractor to select broadcast or drilled seed. Advise the Engineer prior to the start of seeding operations on the method of seed placement.
- .3 Seeding shall be done upon completion of topsoil placement.
- .4 Seeding shall be done to ensure that a satisfactory catch is obtained. In areas where seed fails to germinate for whatever reason, the Contractor shall re-cultivate and reseed until acceptable germination takes place.
- .5 The Contractor shall carry out whatever watering, fertilizing and maintenance necessary to achieve a uniform dense turf.
- .6 The following application rates are the minimum required;
 - .1 Broadcast Seeding: 7-15 kg/hectare
 - .2 Fertilizer 50 kg/hectare
- .7 Maintain seeded areas by fertilizing, watering and cutting until the time of acceptance. Cut grass whenever it reaches a height of 60 mm during this period.

4.0 MAINTENANCE DURING ESTABLISHMENT PERIOD

Perform following operations from time of seed application until acceptance by Engineer.

- .1 Water seeded area to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.
- .2 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.
- .3 Fertilize seeded areas after first cutting or approximately 6 weeks with an appropriate organic supplementary fertilizer (i.e. 27-14-0) at rate of 2.5 kg/100m². Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.

.4 Eliminate weeds by mechanical means. Contractor is responsible for cutting lawn until all areas have been accepted by the Engineer.

5.0 ACCEPTANCE

Seeded areas will be accepted by Engineer provided that:

.1 Areas are uniformly established and turf is free of rutted, eroded, bare or dead spots and free of weeds.

.2 Areas have been fertilized.

.3 Areas have been cut a minimum of once.

.4 Areas seeded in fall will be accepted in following summer, one month after start of growing season provided acceptance conditions are fulfilled.

6.0 MAINTENANCE DURING WARRANTY PERIOD

Perform following operations from time to time of acceptance until end of warranty period:

.1 Water seeded area to maintain optimum solid moisture level for continued growth of grass. Control watering to prevent washouts. Repair and reseed dead or bare spots to satisfaction of Engineer.

END OF SECTION

1.0 GENERAL

1.1 Scope

- .1 This section specifies the requirements for the installation of parking bumpers.

2.0 PRODUCTS

2.1 Precast Concrete

- .1 Cement: ASTM C150, Portland Type 1 – Normal, gray colour
- .2 Aggregate: ASTM C33, ASTM C330; water and sand
- .3 Reinforcing Steel: ASTM A615, deformed steel bars; unfinished
- .4 Air Entrainment Admixture: ASTM C260, 5 to 7 percent
- .5 Concrete Mix: Minimum 34 MPa, 28 days strength
- .6 Use rigid molds to maintain precast units uniform in shape, size, and finish

2.2 Dowels

- .1 Dowels: steel, unfinished; 12mm diameter, pointed tip

2.3 Adhesive

- .1 Adhesive: Epoxy type

3.0 INSTALLATION

3.1 General

- .1 Install units in alignment with the edge of the prepared gravel parking lot or as directed by the Engineer.
- .2 Install units without damage or shape or finish
- .3 Fasten units in place with 2 dowels per parking bumper

END OF SECTION

1.0 GENERAL

1.1 Scope

- .1 This section specifies the requirements for the installation of underground conduits.

2.0 PRODUCTS

2.1 Conduits

- .1 Rigid PVC conduit: to CSA C22.2 No. 211.2
- .2 Flexible PVC conduit: to CAN/CSA-C22.2 No 227.3

2.2 Conduit Fittings

- .1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.
- .2 Factory “ells” where 90-degree bends are required for NPS 1 25mm and larger conduits.
- .3 Watertight connectors and couplings for EMT. Set-screws are not acceptable.

2.3 Expansion Fittings for Rigid Conduit

- .1 Weatherproof expansion fittings with internal bonding assembly suitable for 100-200mm linear expansion between -30 to +30°C.
- .2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19mm deflection in all directions.
- .3 Weatherproof expansion fittings for linear expansion at entry to panel

2.4 Fish Cord

- .1 Polypropylene

3.0 INSTALLATION

3.1 General

- .1 Trenching and backfill work to be in accordance with Section 02315
- .2 Use epoxy-coated conduit underground in corrosive areas
- .3 Use rigid PVC conduit underground in corrosive areas.
- .4 Install fish cord in empty conduits
- .5 Slope conduits to provide drainage
- .6 Waterproof joints (PVC excepted) with a heavy coat of bituminous paint

END OF SECTION

APPENDIX A



STURGEON LAKE CREE NATION
CHILD AND FAMILY SERVICES
SOCIETY
SE19 70-23-5
LOT 5 PLAN 1115 RSA
STURGEON LAKE CFS TEMPORARY
MODULAR OFFICE COMPLEX

LEGEND:
 PROJECT LOCATION

PREPARED FOR


PREPARED BY

ENGINEERS • CONSULTANTS • GEOMATICS

SCALE 1:4,000
Figure 1
MANDATORY SITE VISIT
LOCATION MAP

Prime Contractor Agreement

Date:

Contract Description: Sturgeon Lake Cree Nation Child and Family Services Society
Sturgeon Lake CFS Temporary Modular Office Complex

Project No.: MISC - 0396

Award Date:

Completion Date: 16th August 2024

Contractors Name:

Effective June 1, 2018 Alberta Occupational Health & Safety Act (SA 2017 cO-2.1)

As per SA 2017 cO-2.1, Alberta Occupational Health & Safety Act, Section 10, (2), "The person in control of the work site shall designate in writing a person as the prime contractor of the work site." And (3) The name of the prime contractor must be posted in a conspicuous place at the work site.

The "Contractor" is required to fully comply with all Alberta Occupational Health and Safety Act, Regulation and Code. For this reason, this letter is to certify that the "Contractor" referenced above will be acting as the "Prime Contractor" for this contract.

The Contractor is the “Prime Contractor” as defined by Alberta Occupational Health and Safety Act , Regulation, Code as per:

Alberta Occupational Health & Safety Act, Section 10 – **Obligations of prime contractors**

(5) The Prime Contractor shall:

- (a) establish, as far as it is reasonably practicable to do so, a system or process that will ensure compliance with this Act, the regulations and the OHS code in respect of the work site,
- (b) coordinate, organize and oversee the performance of all work at the work site to ensure, as far as it is reasonably practicable to do so, that no person is exposed to hazards arising out of, or in connection with, activities at the work site,
- (c) conduct the prime contractor’s own activities in such a way as to ensure, as far as it is reasonably practicable to do so, that no person is exposed to hazards arising out of, or in connection with, activities at the work site,
- (d) consult and cooperate with the joint work site health and safety committee or health and safety representative, as applicable, to attempt to resolve any health and safety issues,
- (e) coordinate the health and safety programs of employers and self-employed persons on the work site, if 2 or more employers or self-employed persons or one or more employers and one or more self-employed persons on the work site have a health and safety program.
- (f) cooperate with any other person exercising a duty imposed by this Act, the regulations and the OHS code, and
- (g) comply with this Act, the regulations and the OHS code.

(6) If a requirement in this Act, the regulations or the OHS code imposes a duty on an employer or a self-employed person with respect to equipment, work site infrastructure or an excavation and the equipment or infrastructure is designed, constructed, erected or installed, or the excavation is conducted by or on behalf of a prime contractor, the prime contractor shall comply with the requirement as if the requirement were directly imposed on the prime contractor.

(7) Subsection (6) does not relieve the employer, self-employed person or prime contractor from fulfilling other responsibilities under this Act, the regulations and the OHS code. The Contractor shall be the "Prime Contractor" for the full duration from the issuance of "Notice to Proceed" through to the issuance of "Final Completion Certificate". He shall also be the Prime Contractor whenever the Contractor's personnel, equipment or subcontractors are on site between the period of issuance of the "Certificate of Construction Completion" and "Final Acceptance Certificate".

Establishment of joint work site health and safety committee – As per Part 3 of the Alberta Occupational Health and Safety Act section 16:

- (1) An employer shall establish a joint work site health and safety committee
 - (a) If the employer employs 20 or more workers and work is expected to last 90 days or more, or
 - (b) at any other work site designated by a Director.
- (2) If there are 20 or more workers in total from 2 or more employers or employers and self-employed persons or one or more employers and one or more self-employed persons at a work site and the work is expected to last 90 days or more, the **prime contractor** or, if there is no prime contractor, all employers and self-employed persons shall coordinate the establishment of a joint work site health and safety committee for that work site.

Section 17:

- (1) Unless a Director approves an alternative measure to ensure the health and safety of workers, an employer shall designate a worker appointed or selected under subsection (2) as a health and safety representative
 - (a) If the employer employs 5 to 19 workers and work is expected last 90 days or more, or
 - (b) At any other work site designated by a Director.
- (2) If there are 5 to 19 workers in total from 2 or more employers or employers and self-employed persons or one or more employers an one or more self-employed persons at a work site and the work is expected to last 90 days or more, the **prime contractor** or, if there is no prime contractor, all employers and self-

(3) employed persons shall coordinate the designation of a health and safety representative for that work site.

Employer and **Prime Contractor** to work with the committee or representative as per Alberta Occupational Health and Safety Act, Part 3, Section 21,27,28,29.

In the event that the Contractor refuses or fails to comply with an order under the Alberta Occupational Health and Safety Act, Regulation, Code thereunder and the performance of the work is stopped, the Owner may, upon written notice, hold the Contractor in default.

Contractor must allow access Authorized personnel such as but not limited to: Owner, Owner Representative(s) and Engineer personnel on site at all times. Authorized personnel must contact the contractor representative on site to make them aware of their presence and for them to sign on the contractor visitor acquittance list and the contractor safety "tail gates" as required.

(Contractors Representative: Print Name and Title)

(Signature)

(Date)

(Witness Signature)

(Date)

Permission for Land Use

Agreement made in triplicate this ____ day of _____ A.D. 20 ____.

Between:

(Name of Contractor)

(Company name)

AND

(Name of Land Owner)

(County)

I, _____ give permission to, _____
(land Owner name) (Contractor Company name)

to use my property located on _____ acres in the _____
(number) (1/4 section description)

to _____
(purpose of land occupation, ie: lay down area etc).

The aforesaid rights are granted upon the following terms, namely (list in details what has been agreed upon between the contractor and the land owner):

- 1.
- 2.
- 3.
- 4.
- 5.

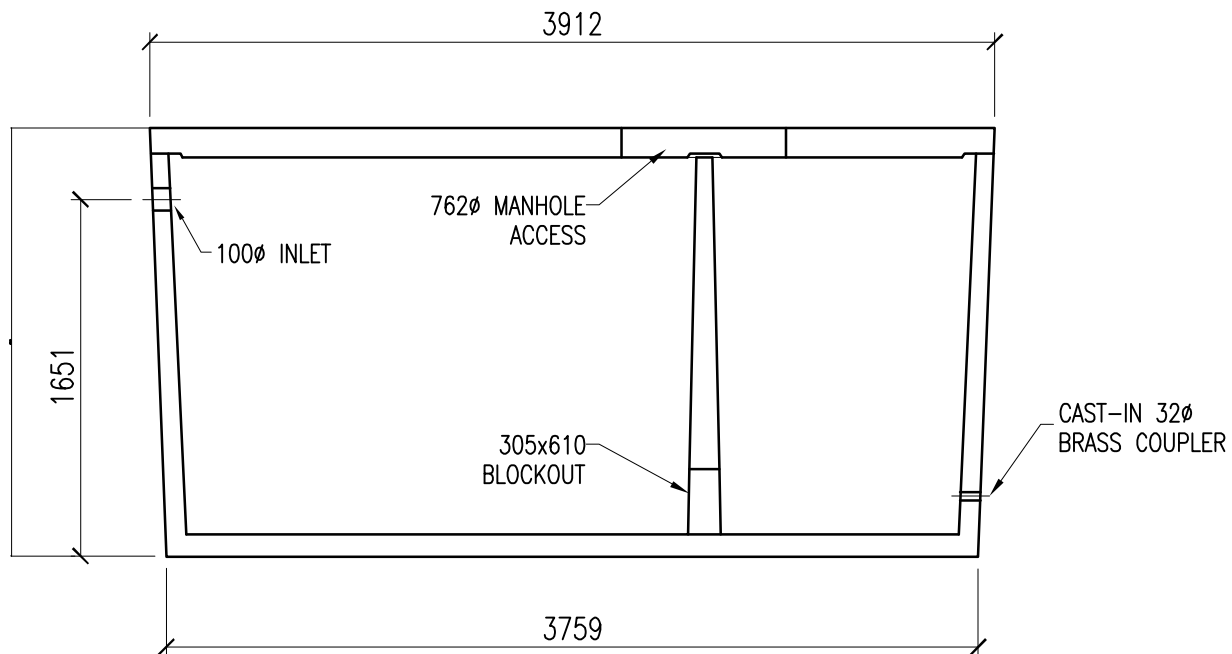
Note: Terms of the agreement must indicate what is agreed upon between both parties and restoration that is required after work is completed. A copy of this agreement must be provided to the Engineer. Contractor to note that the Municipality will be absolved of any responsibility towards potential claim that may occur between the land owner and the contractor.

(Land Owner name and signature)

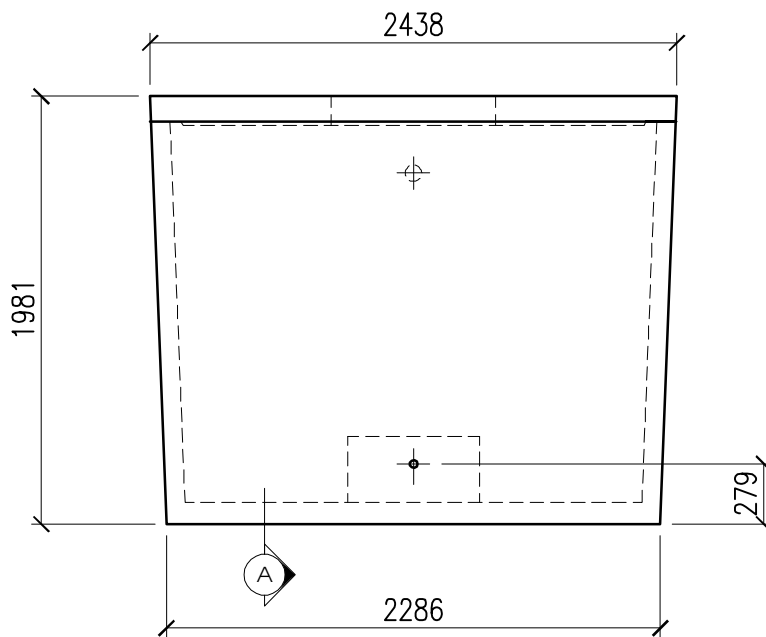
Date

(Contractor name and signature)

Date



SECTION A



END VIEW

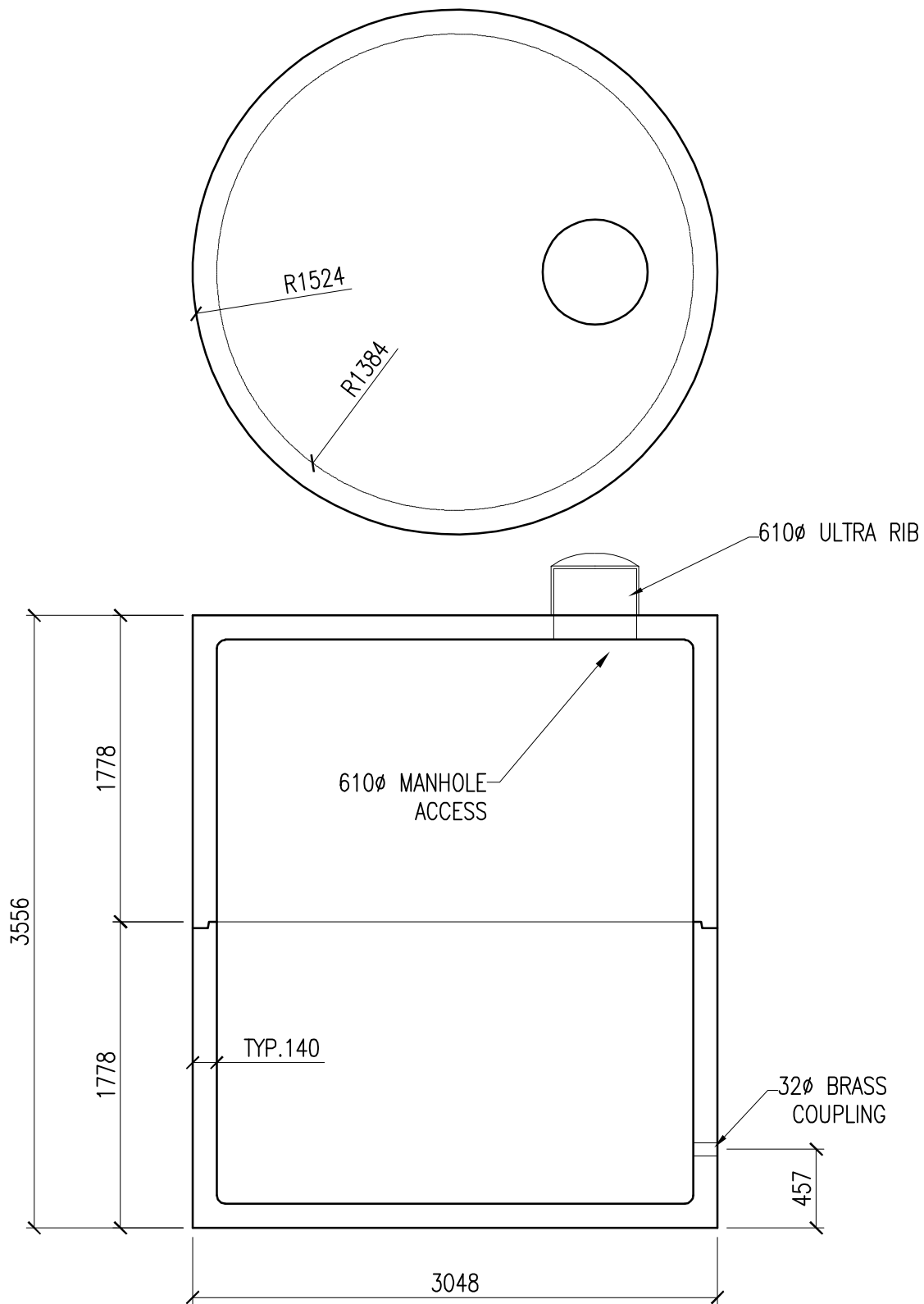
westcon
precast inc.

**M-3000
HOLDING TANK**

CONCRETE	RELEASE 15 MPa	28 day 35 MPa	AIR 6-8%	SLUMP 70mm	TYPE 50
LOWER	UPPER		TOTAL		
- kg	- kg		11,525 kg		
DATE: JAN. 2016	CODE: 0100		BY: CW		

DWG. NO.
W3-12

Rev. **O**



SECTION

westcon
precast inc.

**M-3700
HOLDING TANK**

CONCRETE	RELEASE 15 MPa	28 day 35 MPa	AIR 6-8%	SLUMP 70mm	TYPE 50
LOWER	UPPER		TOTAL		
- kg	- kg		11,365 kg		
DATE: JAN. 2016	CODE: 0100		BY: CW		

DWG. NO.
W3-13

Rev. **O**



There when you need us most

WT Series

4" SUBMERSIBLE PUMPS



Discharge Head: Precision machined, cast 304 stainless steel discharge head* provides a smooth flow transition with a minimum amount of restriction. Includes a built in check valve and cast rope loop.



Bearing: An enclosed urethane bearing, mounted in the polycarbonate top diffuser, offers excellent resistance to abrasives.



Diffuser Plate: Injection molded polycarbonate diffuser plates offer smoothness and high efficiency with high impact resistance.



Impellers: Glass reinforced noryl impellers offer high strength and optimal abrasion resistance without sacrificing the smoothness, efficiency, and balance associated with other types of injection molded plastics.



Bowls: The stamped 304 stainless steel bowls are corrosion and abrasive resistant.



Hex Shaft: Heavy duty 304 stainless steel, cold drawn, hex shaft, produced to rigid standards of straightness and precise length.



Coupling: 304 Stainless steel shaft coupling, secured to the pump shaft provides superior corrosion resistance.



Pump Housing: Thick wall, 304 stainless steel seamless pump housing accurately aligns the entire assembly while eliminating deterioration due to water conditions or electrolysis.

Motor Bracket: Precision machined, cast 304 stainless steel motor bracket fits all NEMA 4" submersible motors.

Intake Screen: 304 Stainless steel intake screen.

Cable Guard: A 304 stainless steel cable guard protects motor leads from abrasion and cutting (Not shown).



Bearing



Diffuser Plate

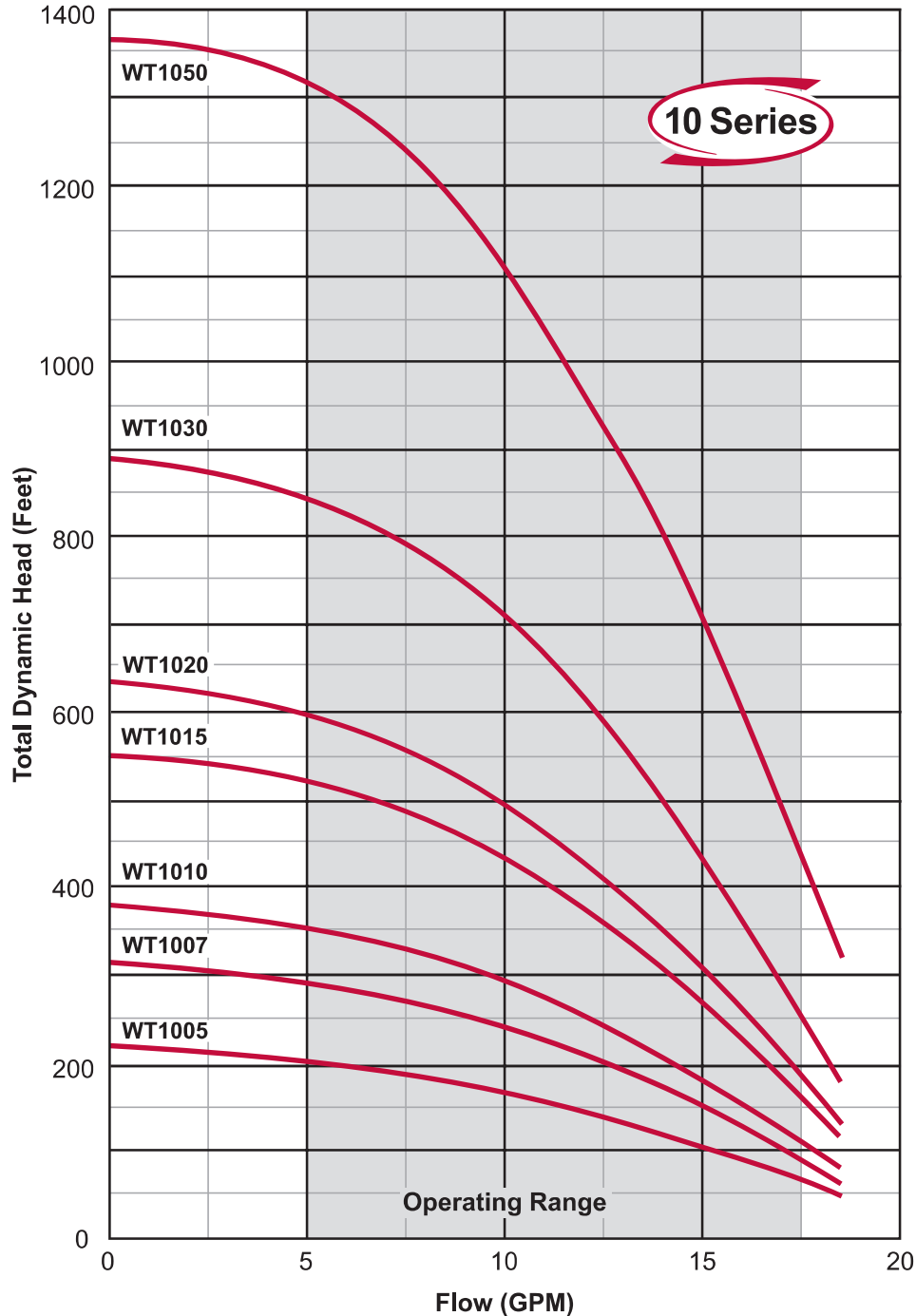
Series	*Discharge
WT05 - WT18	1 1/4" NPT
WT25	1 1/2" NPT
WT35 - WT80	2" NPT



There when you need us most

WT Series

4" SUBMERSIBLE PUMPS



MODEL NO.: WT10202C3

Series/Nominal Rated Flow (GPM)

Horsepower

Divide by 10 for Rated Motor Horsepower
(Example 15 ÷ 10 = 1.5 or 1 1/2HP)

Voltage

1 = 115V 8 = 200V 2 = 230V 4 = 460V 5 = 575V

Wire/Control

Blank = 2 wire C = Optional Control

Phase (PH)

Blank = 1PH 3 = 3PH

Note:

These curves are based on factory tests when pumping clear, fresh, non-aerated water at a temperature not exceeding 85°F.
Due to production tolerances, these curves can vary plus or minus five percent.



#270, 120 Pembina Road
Sherwood Park, Alberta
T8H 0M2
Phone: (780) 467-1334
Fax: (780) 467-1336

Project No.: T24 – 1001

ENC File: 628 – 105

March 25, 2024

SE Design & Consulting Inc.
713 Lakeshore Drive
Cold Lake, Alberta
T9M 0C4

Ph: (780) 594-5380; Email: steve.engman@sedesign.ca

Attention: Mr. Steve Engman, P.L.(Eng.), P.Tech.(Eng.)

Geotechnical Investigation Report
Sturgeon Lake Cree Nation Child & Family Services (CFS) Temporary Housing
Sturgeon Lake Cree Nation Reserve #154, Alberta

As requested, ENC Testing Inc. has completed a geotechnical investigation at the above noted site. Please find enclosed our report with respect to the above noted investigation. In brief, this report presents the geotechnical recommendations for design and construction aspects of this project.

We hereby give assurance that this geotechnical investigation enclosed was prepared by or under the direct supervision of this registered Professional, complying with the Alberta Building Code.

We trust this report meets your engineering design requirements. If you should have any questions or comments, please feel free to contact ENC Testing Inc.

Yours truly,
ENC Testing Inc.

A handwritten signature in blue ink that reads 'Nafisul Islam'.

Nafisul Islam, M.Eng., P. Eng.

Geotechnical Investigation Report
Sturgeon Lake Cree Nation Child & Family Services (CFS) Temporary Housing
Sturgeon Lake Cree Nation Reserve #154, Alberta

Prepared For:

SE Design & Consulting Inc.
713 Lakeshore Drive
Cold Lake, Alberta
T9M 0C4

Date of Report:
March 2024

Materials Testing by:
ENC Testing Inc.
Sherwood Park, Alberta

Geotechnical Investigation Report
Sturgeon Lake Cree Nation Child & Family Services (CFS) Temporary Housing
Sturgeon Lake Cree Nation Reserve #154, Alberta

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Geotechnical Investigation

Project: Sturgeon Lake Cree Nation Child & Family Services Temporary Housing
Location: Sturgeon Lake Cree Nation Reserve #154, Alberta
Client: SE Design & Consulting Inc.
Attention: Mr. Steve Engman, P.L.(Eng.), P.Tech.(Eng.)

1. INTRODUCTION

As requested, ENC Testing Inc. (ENC) has completed a geotechnical investigation made on the above noted site. In brief, this report presents the geotechnical recommendations for design and construction aspects of this project. The purpose of the investigation was to provide general soils information, address potential foundation options, provide foundation design parameters and address any site specific issues that may be encountered during construction.

ENC understood that the proposed development consisted of a temporary office building with an approximate footprint of 250m², without any basement, located within SE-19-70-23-W5M, Sturgeon Lake Cree Nation Reserve #154, Alberta. The preferred foundation for this temporary building is helical piles. There will be drive lanes and a parking lot developed within the lot. In the future the temporary structure might be removed and a permanent structure might be developed. ENC did not know any details about the future structure and general recommendations for such items were provided.

Written authorization signed by Mr. Steve Engman, P.L.(Eng.), P.Tech.(Eng.) was received through email on February 21, 2024. Fieldwork was completed on March 7, 2024. This geotechnical investigation was conducted as outlined in proposal S24-1001 dated January 10, 2024 and is subject to the terms and conditions contained therein.

Previous land utilization, environmental concerns, buried objects unless encountered, or other geotechnical issues not specifically noted are beyond the scope of this report. All recommendations are based on the soils encountered in the testholes. Should different soils be encountered between the testholes, additional recommendations may be provided. The recommendations provided apply only to the outlined structure. Other forms may require alternative recommendations.

2. SITE DESCRIPTION

The site is located north of Highway 43 approximately 800m along Sturgeon School Road in Sturgeon Lake Cree Nation Reserve #154, within SE-19-70-25-W5M. At the time of fieldwork, the site was a vacant, snow covered previously graded land. The existing surface gradation had a maximum elevation difference of 1.36m, as noted from the survey of testhole locations provided by the client. The surfaced sloped towards the east.



Picture 1: Facing east from the main access road

Utilities checked included electric power, telecommunication and gas service lines. Underground utilities found on site were avoided during testhole probing.

3. FIELD INVESTIGATION

The soil investigation was conducted using a track mounted CME 55 rig contracted from Frontier Enviro-Drilling Ltd. Six testholes to a maximum depth of 10.7m were drilled within the lot. The testholes were drilled in 1.5 metre increments. These are all recorded on the testhole logs and site plan in the Appendix. A continuous visual description was recorded on site, which included the soil types, depths, moistures, and other pertinent observations. Slightly disturbed samples were removed and collected at intervals of 0.75 metres from the auger for further testing at the laboratory. Standard Penetration Tests (SPT's) were conducted at selective depths to determine the soil strength.

Following the probing, piezometric standpipes were installed in two of the testholes, Testholes L1 and L2. The locations of the testholes were staked by the client. The client surveyed the testhole locations and provided the information to ENC.

4. LABORATORY TESTING

All samples returned to the laboratory were tested for moisture content. Five representative samples were further tested to determine the liquid and plastic limits of the Atterberg Limit series,

and three samples for the concentration of soluble soil sulphates. The results of all laboratory and field testing are provided on the attached testhole logs in the Appendix.

5. SUBSURFACE SOIL CONDITIONS

A detailed description of the soils encountered is found on the attached testhole logs in the Appendix. In general, the subsurface soil profile at this site may be described as clay fill over clay underlain by clay till over sandstone/clay shale bedrock.

5.1 Clay Fill

Clay fill was encountered in all of the testholes at grade and extended to depths ranging between 0.8m and 1.7m. The clay fill was silty, high plastic, damp to moist, medium brown-grey in colour, and contained traces of B-horizon organics and sulphates. Moisture contents within the clay fill varied between 20.5% and 29.7%, and averaged 24.7%. One pocket penetrometer test on a representative clay fill sample showed 400kPa, indicating very stiff to hard consistency.

An Atterberg Limit test on a representative clay fill sample from Testhole L2 at 0.8m showed a liquid limit of 77.5%, plastic limit of 25.5%, and plasticity index of 52.0%, indicating high plasticity.

At the time of fieldwork, the ground was frozen to depths ranging between 1.2m and 1.4m.

5.2 Clay

Clay was encountered in all of the testholes except Testhole L2 below the clay fill at depths ranging between 0.8m and 1.4m, and extended to depths ranging between 1.7m and 3.1m, where 3.1m was the termination depth of Testhole L6. The clay was silty, high plastic, very stiff to hard, damp to moist, medium brown-grey in colour, and contained traces of sulphates. Trace amounts of slickensides were noted in the clay layer. Moisture contents within the clay varied between 21.7% and 33.0%, and averaged 25.4%. The pocket penetrometer readings within the clay varied between 250kPa and in excess of 450kPa, and averaged 350kPa, indicating very stiff to hard consistency.

An Atterberg Limit test on a representative clay sample from Testhole L1 at 1.5m showed a liquid limit of 63.9%, plastic limit of 21.2%, and plasticity index of 42.7%, indicating high plasticity.

5.3 Clay Till

Clay till was encountered in all of the testholes except Testhole L6 at depths ranging between 1.7m and 2.4m, and extended to depths ranging between 5.8m and 7.0m. The clay till was silty, medium to high plastic, very stiff to hard, moist, medium brown-grey in colour, and contained traces of sand, coal and oxides. Moisture contents within the clay till varied between 16.2% and 33.1%, and averaged 21.3%. The pocket penetrometer readings within the clay till varied between 350kPa and in excess of 450kPa, and averaged 400kPa, indicating mainly hard consistency. SPT tests within the clay till layer varied between 17 to 32 blows per 300mm penetration, indicating very stiff to hard consistency.

An Atterberg Limit test on a representative clay till sample from Testhole L1 at 3.0m showed

a liquid limit of 52.5%, plastic limit of 17.7%, and plasticity index of 34.8%, indicating medium to high plasticity.

5.4 Sandstone / Clay Shale Bedrock

Sandstone bedrock was encountered in Testhole L1 at 5.8m and extended to 8.5m. The sandstone bedrock was weathered, clayey, medium plastic, very stiff, moist, and medium brown-grey in colour. Moisture contents within the sandstone varied between 19.3% and 24.4%, and averaged 21.6%. The pocket penetrometer readings within the sandstone varied between 275kPa and 350kPa, and averaged 295kPa, indicating very stiff consistency. An Atterberg Limit test on a representative sandstone sample from Testhole L1 at 7.6m showed a liquid limit of 47.6%, plastic limit of 17.0%, and plasticity index of 30.6%, indicating medium plasticity.

Clay shale bedrock was encountered in both of the deep testholes at 8.5m and 7.0m in Testholes L1 and L2 respectively, and extended to the termination depth of the testholes, the maximum being 10.7m. The clay shale bedrock was weathered, silty, high plastic, hard, damp, and medium grey in colour. Moisture contents within the clay shale varied between 20.3% and 28.4%, and averaged 24.3%. The pocket penetrometer readings within the clay shale varied between 425kPa and in excess of 450kPa, and averaged 440kPa, indicating hard consistency. SPT tests within the clay shale layer varied between 36 to 55 blows per 300mm penetration, indicating hard consistency.

An Atterberg Limit test on a representative clay shale sample from Testhole L2 at 8.4m showed a liquid limit of 58.1%, plastic limit of 20.2%, and plasticity index of 37.9%, indicating high plasticity.

6. GROUNDWATER CONDITIONS

Following drilling, groundwater readings and slough conditions were measured and piezometric standpipes were installed in two of the testholes. The water level was measured 7 days after drilling. Results are tabulated below:

Testhole Number (Probe Depth, m)	Ground Elevation at Testhole (m)	Depth Below Ground Surface at End of Drilling(m)		Below Ground Surface on March 14, 2024 (m)	
		Slough	Groundwater	Depth	Elevation
L1 (10.7)	695.63	No	Dry	4.10	691.53
L2 (10.4)	695.51	No	Dry	3.97	691.54

From the above Table, it can be seen that the shallowest groundwater level was noted at 3.9m. In terms of elevation, the shallowest groundwater was noted at 691.54m. It should also be noted that groundwater level may fluctuate on a seasonal or yearly basis, and after periods of heavy rainfall or extended dry weather. Water levels may vary between the testhole locations.

7. RECOMMENDATIONS

7.1 General Construction

1. ENC understood that the current structure will be temporary and the preferred foundation type is helical piles. Due to mainly hard subsurface soil consistencies, the installation of helical piles may be challenging. ENC will provide helical pile design parameters in this report, however, the helical pile contractor should be consulted to determine install ability of helical piles in this soil type. Apart from helical piles, cast in place straight shaft friction piles or cast in place end-bearing piles can be utilized for the proposed building.
2. The maximum depth of fill soil noted at the testhole locations was 1.7m. Fill soils of other depths can be present within the site other than the testhole locations. The history of the fill is unknown and therefore it should be considered as uncontrolled fill. Slabs on grade, for future structures, should not be placed on uncontrolled fill due to the possibility of differential movement causing cracks.
3. The foundation system of the future structures may consist of grade beams on strip or spread footings or piles. Cast in place straight shaft friction piles or cast in place end-bearing piles can be utilized for the proposed future structures.
4. It is recommended that all surface grading be sloped away from the buildings at a minimum grade of 10% for a distance of 3.0 metres. Where pavements are provided, this may be reduced to 2%. It is imperative that drainage be maintained during construction and over time.
5. It is recommended that all soil materials be tested by ENC Testing Inc. to verify adequate compaction, before additional materials are placed.
6. Allowance for or acceptance of differential movement between different foundation conditions within the structure, between any staging of construction, and between the structure and any slabs on grade must be made. In general, mixing of foundation types within the structure is not recommended.
7. The planting of large trees and landscaping should be designed in such a manner that desiccation or saturation of soil does not occur. Care should also be taken that excess water from sprinklers does not cause the subgrade soils to become saturated and eventually swell.
8. The following values correspond to ultimate limit states (ULS) and serviceability limits states (SLS) as defined in the Canadian Foundation Engineering Manual 4th Edition 2006, section 8.2 and can be used as such. Serviceability limit states are numerically equivalent to the working stress and should include both dead and live loads. The resistance factor (ϕ) from the Canadian Foundation Engineering Manual has been provided. The theoretical ULS value must not be used for purposes other than ULS design with the appropriate resistance and load factors. SLS design must be checked.

7.2 Helical Piles

1. As mentioned in Section 7.1, helical piles will be difficult to install into the hard sub surface soil and the helical pile contractor should be consulted about the install ability. If helical piles are chosen for this construction, single helix piles are recommended for this site.
2. The helix should be installed to below the frost depth to at least two times the diameter of the upper helix. The frost depth for this site can be considered to be 2.6m.
3. The shaft adhesion should only be used for a length = $H - D$, where H is the distance from the ground elevation to the top of the helix and D is the diameter of the helix. Considering the effects of frost and seasonal moisture changes, and the presence of fill materials, the friction value for the first 1.5 metres of pile, below existing grade, should not be considered in design. No frictional values should be considered within the fill depth. The shaft adhesion must only be considered with true helix piles.
4. The shaft adhesion values that may be used for design are as follows:

<u>Soil Stratum</u> Depths, metres	<u>Shaft Adhesion Value (kPa)</u>		
	SLS	Resistance Factor (ϕ)	Factored ULS
0 – 1.7 [†]	0	0	0
1.7 – 7.0	24	0.4	26
7.0 – 10.7	32	0.4	34
[†] Fill depth of 1.7m was encountered at Testhole L2 location			

5. The bearing values that may be used for design are as follows:

<u>Soil Stratum</u> Depths, metres	<u>End-Bearing Value (kPa)</u>		
	SLS	Resistance Factor (ϕ)	Factored ULS
3.0 – 7.0	450	0.4	540
7.0 – 10.7	675	0.4	810

6. To control movement, any contractor supplied torque based criteria must utilize a factor of safety of at least 3.0, and provide certified calibration to be supported by ENC Testing Inc.
7. Adjustment to compensate for any fill or site excavation must be made.
8. Some provisions should be made for the possible swelling of the subsoil beneath the grade beams and the effects of frost action. This can be done by providing a suitable 100 millimetre void.
9. It is recommended that pile installation be monitored on a full time basis by the party responsible for installed pile capacities and is required if ABC schedules are needed for the project.
10. Appropriate pile caps should be designed by a qualified engineer to transfer the load from the

grade beam to the piles.

7.3 Footings

1. A standard concrete footing foundation is considered geotechnically satisfactory for this project. The bearing values that may be used are as follows:

<u>Soil Stratum</u> Native Clay / Clay Till	<u>Bearing Value (kPa)</u>		
	SLS	Resistance Factor	factored ULS
Strip Footing	215	0.5	320
Spread Footing	265	0.5	400
†Fill depth of 1.7m was encountered at Testhole L2 location			

2. Footings must not be based within the existing fill. The maximum fill of 1.7m was noted at the testhole locations. Fill can extend to different depths within the site other than the testhole locations. Footings should be founded on the native clay / clay till. To provide frost cover and moisture protection, the footings should be placed at least 1.5 metres below finished grade within a continuously heated structure and 2.4 metres for a non-continuously heated structure or exterior isolated footings. Differential settlements are anticipated to be less than 25 millimetres.
3. Due to the nature of this soil, the footing excavations **must be inspected** by ENC Testing Inc. to verify the bearing resistance of undisturbed clay / clay till exposed at all footing locations **if ABC schedules are needed** for the project.
4. To ensure adequate performance of the foundation system, continuous footings should be designed as a beam with adequate reinforcing and should be integrated with the foundation walls, if applicable. Such design procedures would permit foundation components to withstand a small amount of differential movement induced by any soil volume changes.
5. Should any organic, soft, wet, or weak footing foundation areas, not shown by the testholes, be encountered during construction, ENC Testing Inc. should be contacted so that additional recommendations may be supplied.
6. No loose, disturbed, remoulded, or sloughed material should be allowed to remain in the open footing excavations. Hand cleaning is advised if an acceptable surface cannot be prepared by mechanical equipment. It is recommended that all bearing surfaces be inspected to verify the correct soil type, and to check for local pre-existing disturbances or soft areas.
7. Footing excavations should be protected from drying, rain, snow, freezing, and the ingress of groundwater. If groundwater is noted in the excavation, the undersigned should be contacted to assess the situation. Care should be taken during construction to prevent excessive changes in moisture content of this material. Where practical, weeping tile should be utilized to assist in control of infiltration water. Protection from desiccation is also recommended to minimize volume change. This is accomplished by not using below

slab hot air heating and keeping large deep-rooting trees a sufficient distance away from the building.

8. All interior backfill against foundation walls should be an inorganic material and should be compacted to an equivalent of at least 98% of the corresponding Standard Proctor Density (SPD) at optimum moisture content (OMC). The backfill should be placed in lifts not greater than 150 millimetres after compaction.
9. Surface grading of the fill around the proposed building should be made sloping away from the foundation walls. Exterior fill should be compacted, and be of low permeability materials. Lateral pressures on the foundation should be considered during backfill.
10. During winter construction, it is essential that all interior fill and load bearing materials remain frost-free. Should freezing of the foundation support soils occur, additional movements can be expected. Recommended winter construction practices, with respect to hoarding and heating of the forms and the fresh concrete, must be strictly followed. If doubts remain as to the suitability of the foundation during construction, the owner should consult ENC Testing Inc.

7.4 Cast in Place Piles

1. A cast in place concrete pile foundation system can be utilized for the structure. The structure may be founded on an adequately reinforced grade beam or pile cap supported by bored, cast in place, concrete friction piles or end-bearing piles.
2. The skin friction values that may be used are as follows:

<u>Soil Stratum</u> Depth, metres	<u>Skin Friction Value (kPa)</u>	
	Resistance Factor (ϕ)	Factored ULS
0 – 1.7 [†]	0	0
1.7 – 7.0	0.4	29
7.0 – 10.7	0.4	37
[†] Fill depth of 1.7m was encountered at Testhole L2 location		

3. For skin friction piles, the ultimate shaft resistance is mobilized with relatively small pile displacement, less than 10mm and as such, serviceability limit state (SLS) is not of a concern. No end-bearing resistance should be considered in design of skin friction piles.
4. Considering the effects of frost and seasonal moisture changes, the friction value for the first 1.5 metres of pile should not be considered in design for unheated or isolated piles. This may be reduced to 0.6 metres for interior piles of continuously heated buildings. No frictional values should be considered within the fill depth. Continuous flight auger (CFA) concrete piles may use the same friction values as these that are provided for cast in place piles.
5. The minimum length of pile should consider the frost heave force as described in Section 7.6.
6. The mixing of piles, pile types, or footings within one structural element is not recommended

as differential movements may occur.

7. The end-bearing values that may be used are as follows:

<u>Soil Stratum</u> Depth, metres	<u>End-Bearing Value (kPa)</u>		
	SLS	Resistance Factor (ϕ)	Factored ULS
3.0 – 7.0	450	0.4	540
7.0 – 10.7	675	0.4	810

8. Bell diameters should be a minimum of two and a maximum of three times the shaft diameter. The ratio of the depth to bell base and bell diameter should be minimum 2.5. Belled piles subjected to uplift should have reinforcement extending to the base of the bell.
9. Pile bells cannot be formed within sloughing layers. To provide adequate support for the roof of a bell where wet sloughing layers are encountered, the minimum distance from the underside of a sloughing layer to the top of the roof of a bell should be 0.6m. This may require altering the pile type or field alteration of bell elevation to confirm the bells are formed in acceptable bearing strata.
10. All pile holes must be clean and dry during and prior to placement of concrete. The pile concrete should be placed as soon as possible after the pile has been bored to minimize the potential of sloughing or ingressing groundwater.
11. Sloughing was not noted within the drilled testholes. However, a safer approach would be to have some casing on site and used where necessary. The piling contractor should make its own determination as to the need for casing and ability to provide a clean pile. It is noted that different piling equipment requires different conditions to maintain clean and open pile holes.
12. All pile holes should be carefully inspected to ensure that no water or slough material is present prior to concrete placement. Full time inspection by ENC Testing Inc. is recommended for all piles and is required should the client require ABC schedules.
13. Provisions should be made for the possible swelling of the subsoil and the effects of frost action by providing a suitable 100 millimetre void form beneath the grade beams.
14. It is recommended that all piles be adequately reinforced. Concrete for all piles should be adequately compacted.

7.5 Slabs on Grade

1. Uncontrolled fill soil was encountered and it extended to 1.7m. The fill can extend to different depths within the site other than the testhole locations. The slab can be constructed as a structurally supported floor slab leaving the existing fill in place or if it is desired and the owner is willing to accept the risk of potential slab movements, a slab on grade can be constructed ensuring construction supervision and following the recommendations below.

2. The existing fill soil is considered as a non-engineered fill and therefore should be removed from within the footprint of the structure. The existing clay fill soil should be excavated and selectively stockpiled by removing all organics and deleterious materials.
3. Following stripping, proof rolling should be conducted to verify that no soft areas exist. Should any organic or other soft or deleterious materials be found, it is recommended that they be removed and replaced with clay, compacted to 96% of the corresponding Standard Proctor Density (SPD) 2 - 4% over Optimum Moisture Content (OMC). The selectively stockpiled clay fill can be reused to raise the subgrade with moisture conditioning to within 2 - 4% percent above the OMC and compacted to 96% of SPD in lifts not greater than 150mm in compacted thickness. Imported clay fill, where needed, should also be compacted to the 96% SPD at 2 - 4% over OMC. The final 150mm lift should be compacted to 98% of SPD at 0 – 2% over OMC.
4. Care should be taken during construction not to excessively dry or wet any of these materials. As moisture change of the supporting soil occurs, change in the volume of supporting materials will occur, with accompanying movement of the slab. It is recommended that the soil be placed at moisture content slightly over optimum moisture to reduce the potential for swelling.
5. A layer of clean granular material, 150 millimetres minimum, should be placed immediately below the slab on grade. This material should be compacted to an equivalent of at least 98% of the corresponding SPD at OMC.
6. A non-deteriorating vapour barrier should be placed beneath the concrete floor to reduce desiccation of the subgrade material. It is assumed that crack control reinforcing and joints will be utilized.
7. Radon is a natural carcinogenic gas which can build up under the building floor slab and migrate into the building through any pores. To eliminate radon gas, a prevention system can be designed below the slab on grade. The prevention system can consist of either 100mm or 150mm thick clean, coarse, aggregate meeting size #5 as defined in ASTM C-33/C33M-16, “Standard Specification for Concrete Aggregate”. If 150mm thick rock layer is chosen then the granular material layer mentioned in item 5 can be eliminated otherwise it should be in place. In either option, a layer of geotextile (Nilex 4551 or similar) should be placed below the radon rock layer (i.e., on top of the prepared subgrade if 150mm thick rock layer is chosen or on top 20mm crushed gravel layer if 100mm thick rock layer is chosen) to prevent fines contamination to the radon rock layer. A 10mm vapor barrier should be provided on top of the radon rock layer and the vapor barrier mentioned in item 6 can be eliminated. Proper design of the radon mitigation such as eliminate barriers to sub slab airflow, radon suction pits, radon vent pipes, suction fan, sealing radon entry routes should be designed by a Certified Mitigation Professional.
8. It is recommended that provisions for slab movement be designed into the structure. It is

recommended that grade-supported floor slabs be structurally separated from other components of the proposed structure. Alternatively, the slab can be tied into the grade beam at all points provided that a construction joint or cut is placed parallel to the grade beam at a distance of approximately 2.0m. The slabs should contain sufficient reinforcing to control cracking due to vertical movement caused by shrinkage and swelling of the underlying material. Other slab movement provisions may include adjustments for slab-supported equipment and space over partitions.

9. In such areas as furnace rooms, where there is an intense concentrated heat, adequate provisions should be made to protect the supporting subsoil from excessive desiccation. These areas should be well insulated so that soil volume changes beneath the floor slabs may be kept to a tolerable amount. Under slab air heating is not recommended.
10. Trees can affect the long term stability of foundations. The planting of large trees and landscaping should be designed in such a manner that desiccation or saturation of soil does not occur. Care should also be taken that excess water from sprinklers does not cause the subgrade soils to become saturated and eventually swell.
11. Any areas with concrete floor slabs that will be exposed to deep frost penetration below the slabs are expected to move; hence, should not be rigidly attached to the structure, and should contain sufficient reinforcing to control crack width and vertical movements across the cracks and joints.

7.6 Frost Protection

1. Buried water lines should have a minimum frost cover of 3.0m if granular backfill is used. For cohesive backfill, the frost cover should be a minimum of 2.6m.
2. If less than the required soil cover is used, the pipes should be protected with insulation to avoid frost effects.
3. The design of piles should consider the adfreeze force. An adfreeze force of 65kPa along the upper 2.6m of the pile should be considered. The resistance to the adfreeze force will be the dead load acting on the pile, the weight of the pile and the resistance from below the frost zone of the pile.

7.7 Trench Excavation and Backfill

1. The trench locations were not defined, but the subsurface soil conditions encountered in the test holes are considered to be fair for the installation of underground utilities. Groundwater was noted at 3.9m 7 days after drilling. Excavations greater than 3.9m can experience groundwater ingress. A sump and pump should be able to dewater the excavation for a short term period.
2. The presence of traces of slickensides within the clay will require special caution and a flatter cutback angle to avoid catastrophic slope failure. The short term excavations that

are deeper than 1.5m should have the sides shored and braced, or the slopes cut no steeper than 1.0H:1.5V within the clay fill and 1.0H:1.0V within the clay layer. The clay till layer can also be cut at a slope of 1.0H: 1.5V. If the required amount of sloping is not possible due to space or other limitations, shoring should be provided. The Occupational Health and Safety Act, General Safety Regulation should be strictly followed, except where superseded by this report. Please note that OH&S permits a vertical portion at the bottom of the trench, and this is not recommended in sands and silts.

3. Long open trenches are not recommended as the sidewalls will fail over time. Prior to allowing workers to enter, and particularly after periods of rain, construction excavations should be carefully observed for evidence of instability such as cracks, bulging, or soil loss from seepage areas. Small earth falls from the side slopes are a potential source of danger to workers and must be guarded against. Evidence of excavation instability or seepage should be corrected prior to allowing worker access. Loose soil blocks, cobbles and the like should be removed from the excavation slopes prior to worker entry.
4. To minimize pipe loading, trench widths should be minimal but compatible with safe construction operations. The trench width must be wide enough to accommodate pipe bedding and compaction equipment.
5. The moisture content of the existing fill and clay / clay till in the testholes within the upper 3.0m ranged between 18.8% and 33.0%, and averaged 23.4%. Depending on the season of construction slight moisture conditioning may be required to achieve optimum moisture content for best compaction.
6. To overcome utility installation difficulties, it is recommended that a washed or screened rock and geotextile separator be utilized for the pipe bedding in areas of poor pipe bedding conditions. The washed rock and geotextile should surround the entire pipe with the exact dimensions determined in the field during construction. It is recommended that soft un-compactable material be replaced by washed rock to a minimum depth of 150 millimetres below the pipe. Depending upon the conditions of soil at the pipe base, additional rock may be required.
7. Pipe bedding should adhere to the supplier's specifications. The backfill material beneath and up to the middle of the pipe should be an approved bedding sand material where conditions allow. This material should be hand placed and hand tamped with care taken to fill the underside of the pipe.
8. Minimum trench compaction recommendations are 98% of the corresponding Standard Proctor Density. A 150 millimetre maximum lift thickness should be used throughout. This degree of compaction should be readily achievable with some of the subsurface soils encountered in the testholes; however, drying or mixing may be required.
9. Bedding first lifts will require lighter and smaller compaction equipment to avoid damage to the pipe installed. Ideally, each lift should be tested, the thickness determined and

approval received before additional material is placed.

10. It should be noted that the ultimate performance of the trench backfill is directly related to the consistency and uniformity of the backfill compaction, as well as the underground contractor's construction procedures. In order to achieve this uniformity, the lift thickness and compaction criterion should be strictly enforced, including near the pipe zone. Sand, utilized to protect fragile pipe must also be compacted.
11. Temporary surcharge loads, such as spill piles, should not be allowed to within 2.0 metres of an unsupported excavation face while mobile vehicles should be kept back at least 1.0 metre. All excavations should be checked regularly for signs of sloughing or failures, especially after rainfall periods.

7.8 Grade Construction for Roadways

The fill soil within the drilled testholes extended to a maximum depth of 1.7m. Fill soil can be present to a different depth at locations other than the testhole locations within the pavement's footprint. The fill soil is considered non-engineered and can cause excessive settlement when pavement loads are applied on it. The best option to avoid settlement, particularly differential settlement, is to excavate and remove all existing fill soil within the pavement area.

If the removal of all of the fill soil becomes expensive and the owner is willing to accept the unknown risk of settlement, the other option includes leaving the fill in place for the parking areas and conduct a proof roll to identify soft spots. Heavy duty pavement area should be constructed by removal of all existing fill.

Option One – Removal of all existing fill

1. This option includes removal of all existing fill soils from within the pavement areas. The existing fill soil should be excavated and selectively stockpiled, removing all organics and deleterious material, for reuse.
2. Following excavation, the exposed native subgrade should be scarified to a minimum depth of 150mm, moisture conditioned within 0 to 2% above the OMC and recompacted to 98% of SPD. The subgrade should be then proof rolled to identify any soft spots. Soft spots, if identified, should be over excavated to underlying competent soil or to a maximum depth of 600mm. The over excavation should be recompacted to 98% SPD at $\pm 2\%$ OMC with fill soil.
3. Additional fill, where required, can consist of clay fill. The fill should be clean of organics and any deleterious materials and should be compacted to 98% of SPD within $\pm 2\%$ OMC in compacted thicknesses of 150mm.

Option Two – Retention of the existing fill – Parking lot area

1. If the above ‘Option One’ becomes expensive and if the client is willing to accept the unknown risk of settlement and increased periodic maintenance costs, only for the parking lot areas, the existing fill soil may be retained. The subgrade material should be scarified to 150mm depth, moisture-adjusted to $\pm 2\%$ of OMC, and re-compacted to 100% of the SPD. A proof roll should be conducted to identify soft spots. Soft spots, if identified, should be over excavated to underlying competent soil or to a maximum depth of 600mm. The over excavation should be recompacted to 98% SPD at $\pm 2\%$ OMC with fill soil.
2. Fill should be placed where required and compacted to 98% SPD within $\pm 2\%$ OMC in compacted thicknesses of 150mm. The final 150mm lift should be compacted to 100% of SPD at $\pm 2\%$ of OMC.

Once either of the above two options are adopted and completed, the following are the recommendations for the pavement.

7.9 Pavement

1. Design the surface to achieve slopes at least 2% in both cross and longitudinally draining directions before reconstruction.
2. Rain will greatly reduce subgrade strength. Drainage is paramount and measures should be taken to minimize the detrimental effects of precipitation.
3. All designs for heavy duty (truck areas) support structures are based on a single axle, dual tire axle producing 3.0×10^5 Equivalent Single Axle Loads (ESALs) over a 20 years design life. For the ‘cars and light truck’ areas, this value was taken as 3.0×10^4 .
4. It is noted that any pavement structure can be punched with heavy loads, both static and moving. This will be more severe where the subgrade becomes saturated. Concrete pads are recommended anywhere point loads will occur, such as at garbage pickup bins and trailer drop areas.

5. Pavement structure for light duty car and light truck areas on clean subgrade:

75 millimetres of Asphaltic Concrete or Superpave on
250 millimetres of 20mm Crushed Gravel on
300 millimetres subgrade preparation

Proof rolling is recommended to confirm all soft areas have been removed.

6. Pavement structure for heavy duty truck parking and driveway:

120 millimetres of Asphaltic Concrete or Superpave on
300 millimetres of 20mm Crushed Gravel on
300 millimetres subgrade preparation

7. Concrete slab structure for heavy duty truck parking and driveway:
 - 175 millimetres of Portland Cement Concrete on
 - 175 millimetres of 20mm Crushed Gravel on
 - 300 millimetres subgrade preparation
8. If the roadways are not paved at this time and only gravel pavement is constructed, the following gravel thicknesses can be provided:
 - Parking Lot Areas:
 - 300 millimetres of 20mm Crushed Gravel on
 - 300 millimetres subgrade preparation
 - Heavy Duty Access Road Area:
 - 450 millimetres of 20mm Crushed Gravel on
 - 300 millimetres of subgrade preparation
9. All granular layers should be compacted to 100% of SPD and all asphalt concrete paving lifts should be compacted to a minimum of 98% Marshall density or 94% Maximum Theoretical Density (MTD).

7.10 Concrete

Three soluble sulphate tests on representative samples showed moderate to severe potential for sulphate attack. Based on CSA A23.1-14 Table 1, a concrete classification of Class S-2 should be adopted. Therefore, CSA HS or HSb cement at a maximum water/cementing material ratio of 0.45 should be used for concrete. CSA A23.1-14 Table 2 specifies air entrained concrete with a minimum 56 - day compressive strength of 32 MPa for a Class S-2 exposure. Concrete should be air entrained where freeze-thaw will occur.

7.11 Seismic Analysis

This investigation explored the soil to a maximum depth of 10.7m. Seismic site classification requires the strength of 30m of soil be looked at. Based on the soil strength encountered within the explored depth and reasonably assuming the soil strength to be greater with increasing depth, the seismic site classification for this site is “C” according to the 2014 Alberta Building Code (ABC) Table 4.1.8.4.A.

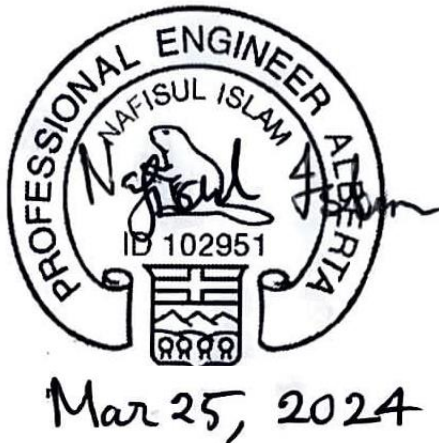
8. CLOSURE

This geotechnical investigation report was prepared for the exclusive and confidential use of SE Design & Consulting Inc. and their agents, and applies only to the subject project. The recommendations given are based on the subsurface soil conditions encountered during testhole boring, current construction techniques, and generally accepted engineering practices. Soil conditions are known only at the test boring locations.

Due to the geological randomness of many soil formations, no interpolation of soil conditions between or away from the testholes has been made or implied. No other warranty, expressed or implied, is made. Should other soils be encountered during construction or other information pertinent to the structures become available, the recommendations may be altered or modified in writing by the undersigned.

We trust this information is satisfactory for your current needs. If you should have any further questions, please contact our office.

Respectfully yours,
ENC Testing Inc.



PERMIT TO PRACTICE	
ENC TESTING INC.	
RM SIGNATURE:	<u>Nafisul Islam</u>
RM APEGA ID #:	<u>102951</u>
DATE:	<u>Mar 25, 2024</u>
PERMIT NUMBER: P007111	
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)	

Nafisul Islam, M. Eng., P. Eng.

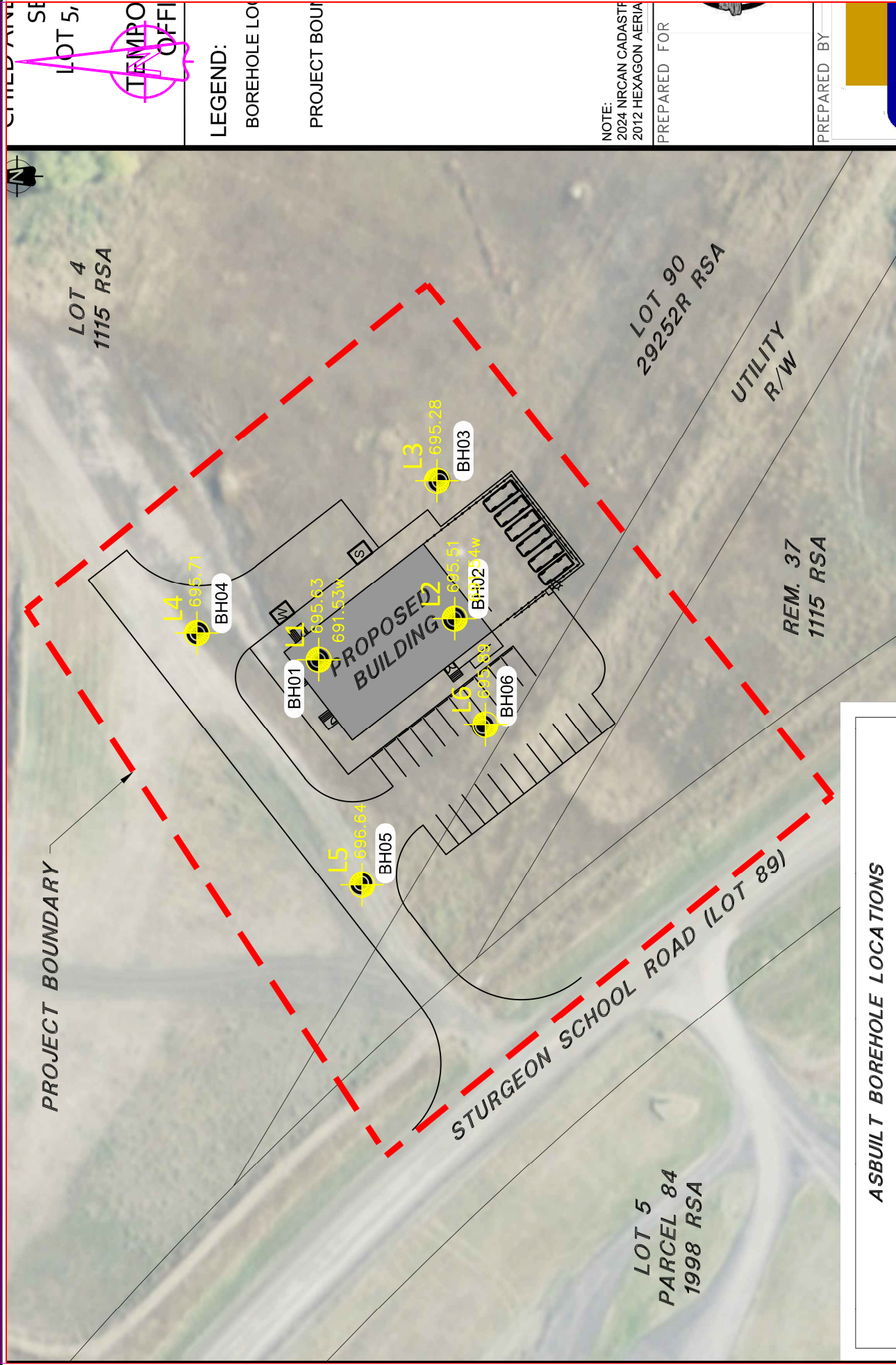
A P P E N D I X

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Site Plan – Figure A1

Logs of Testholes L1 – L6

UCS Soil Classification Chart
with Atterberg Test result plotted



ASBUILT BOREHOLE LOCATIONS

Site Plan Showing Approximate Testhole Locations

Client: **SE Design & Consulting Inc.** Date: **March 20, 2024**

Project: **Child & Family Services Housing, Sturgeon Lake Cree Nation Reserve #154, AB.**

Drawn by: **NI** Checked by: **LR** Scale: **NTS** Figure: **A1**

LEGEND

TESTHOLE

NUMBER
Elev.
Groundwater Elev.



[illegible]



ENC Testing Inc.
#270, 120 Pembina Road
Sherwood Park, Alberta T8H 0M2
Telephone: 780-467-1334
Fax: 780-467-1336

TESTHOLE L2

PAGE 1 OF 1

CLIENT SE Design and Consulting Inc.

DATE DRILLED 2024-03-07

PROJECT NAME Child & Family Services Temporary Housing

GROUND ELEVATION 695.51

PROJECT LOCATION Sturgeon Lake Cree Nation, AB

GROUND WATER LEVELS:

PROJECT NUMBER T24-1001

AT END OF DRILLING Dry

DRILLING METHOD Solid Stem Auger

AFTER DRILLING ON 2024-03-14

LOGGED BY KR REVIEWED BY NI

THE WATER LEVEL IS 3.97 m / Elev 691.54 m

TESTHOLE LOCATION 11U 468936.58m E / 6102581.72m N

LEGEND SAMPLE TYPE: SPT SOLID STEM AUGER
SULPHATE: MODERATE
WELL BACKFILL: BENTONITE DRILL CUTTINGS SLOTTED PIPE

ENC TESTHOLE LOG OPT/SPT T24-1001 SE DESIGN CFS TEMPORARY HOUSING STURGEON LAKE CREE NATION GPJ GINT STD CANADA LAB.GDT 3-19-24

DEPTH (m)	U.S.C.S.	GRAPHIC LOG	ELEVATION (m)	DEPTH (m)	MATERIAL DESCRIPTION	SULPHATE	SAMPLE TYPE	SPT BLOW (N)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			WELL DIAGRAM
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0														
1	FILL				(FILL) CLAY FILL, silty, high plastic, hard, damp, medium brown-grey, trace B-horizon organics and sulphates -- frost encountered to 1.2m					24.5	77.5	25.5	52.0	
2			693.8	1.7	(CI) CLAY TILL, silty, medium plastic, very stiff to hard, moist, medium brown-grey, trace sand, coal and oxides				400	23.3				
3									425	20.0				
4									425	20.1				
5	CI							32	425	16.6				
6					-- dark brown-grey at 5.5m				450+	16.3				
7									400	18.6				
8									350	20.8				
9	CH								375	31.1				
10			688.5	7.0	(CH) CLAY SHALE, silty, high plastic, hard, damp, medium grey -- water ingressing at 8.5m			36	375	29.6				
11									450+	21.4				
12									450	20.4				
13									425	28.4	58.1	20.2	37.9	
14									450	25.9				
15									450	24.0				
16			685.1	10.4	End of testhole at 10.4m No slough Standpipe Installed Dry after drilling Water at 3.97m on 2024-03-14 at 7 days			38	450+	28.2				



ENC Testing Inc.
#270, 120 Pembina Road
Sherwood Park, Alberta T8H 0M2
Telephone: 780-467-1334
Fax: 780-467-1336

TESTHOLE L3

PAGE 1 OF 1

CLIENT SE Design and Consulting Inc.

DATE DRILLED 2024-03-07

PROJECT NAME Child & Family Services Temporary Housing

GROUND ELEVATION 695.28

PROJECT LOCATION Sturgeon Lake Cree Nation, AB

GROUND WATER LEVELS:

PROJECT NUMBER T24-1001

AT END OF DRILLING ---

DRILLING METHOD Solid Stem Auger

AFTER DRILLING ON ---

LOGGED BY KR REVIEWED BY NI

THE WATER LEVEL IS ---

TESTHOLE LOCATION 11U 468959.21m E / 6102584.15m N

LEGEND SAMPLE TYPE:  SOLID STEM AUGER

SULPHATE:

WELL BACKFILL:

ENC TESTHOLE LOG OPT/SPT T24-1001 SE DESIGN CFS TEMPORARY HOUSING STURGEON LAKE CREE NATION GPJ GINT STD CANADA LAB.GDT 3-19-24

DEPTH (m)	U.S.C.S.	GRAPHIC LOG	ELEVATION (m)	DEPTH (m)	MATERIAL DESCRIPTION	SULPHATE	SAMPLE TYPE	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	ATTERBERG LIMITS		
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0					(FILL) CLAY FILL, silty, high plastic, moist, medium brown-grey, trace B-horizon organics and sulphates							
1	FILL						A		24.3			
			694.1	1.2	-- frost encountered to 1.2m							
2	CH				(CH) CLAY, silty, high plastic, very stiff to hard, moist, medium brown-grey, trace slickensides and sulphates		A	450+	26.0			
			692.8	2.4	(CI) CLAY TILL, silty, medium plastic, very stiff, moist, medium brown-grey, trace sand, coal and oxides		A	350	24.5			
3	CI											
			692.2	3.0			A	350	21.8			
4					End of testhole at 3.0m No standpipe installed							



ENC Testing Inc.
#270, 120 Pembina Road
Sherwood Park, Alberta T8H 0M2
Telephone: 780-467-1334
Fax: 780-467-1336

TESTHOLE L4

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CLIENT SE Design and Consulting Inc.

DATE DRILLED 2024-03-07

PROJECT NAME Child & Family Services Temporary Housing

GROUND ELEVATION 695.71

PROJECT LOCATION Sturgeon Lake Cree Nation, AB

GROUND WATER LEVELS:

PROJECT NUMBER T24-1001

AT END OF DRILLING ---

DRILLING METHOD Solid Stem Auger

AFTER DRILLING ON ---

LOGGED BY KR REVIEWED BY NI

THE WATER LEVEL IS ---

TESTHOLE LOCATION 11U 468934.21m E / 6102623.82m N

LEGEND SAMPLE TYPE:  SOLID STEM
AUGER

SULPHATE:

WELL BACKFILL:

ENC TESTHOLE LOG CPT/SPT T24-1001 SE DESIGN CFS TEMPORARY HOUSING STURGEON LAKE CREE NATION GPJ GINT STD CANADA LAB.GDT 3-19-24

DEPTH (m)	U.S.C.S.	GRAPHIC LOG	ELEVATION (m)	DEPTH (m)	MATERIAL DESCRIPTION	SULPHATE	SAMPLE TYPE	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	ATTERBERG LIMITS		
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0					(FILL) CLAY FILL, silty, high plastic, damp, medium brown-grey, trace B-horizon organics and sulphates							
1	FILL				-- frost encountered to 1.2m		A		29.7			
2	CH		694.3	1.4	(CH) CLAY, silty, high plastic, hard, damp, medium brown-grey, trace slickensides and sulphates		A	450+	27.7			
3	CI		693.7	2.0	(CI) CLAY TILL, silty, medium plastic, hard, moist, medium brown-grey, trace sand, coal and oxides		A	425	20.8			
4			692.7	3.0	End of testhole at 3.0m No standpipe installed		A	425	20.7			



ENC Testing Inc.
#270, 120 Pembina Road
Sherwood Park, Alberta T8H 0M2
Telephone: 780-467-1334
Fax: 780-467-1336

TESTHOLE L5

PAGE 1 OF 1

CLIENT SE Design and Consulting Inc.

DATE DRILLED 2024-03-07

PROJECT NAME Child & Family Services Temporary Housing

GROUND ELEVATION 696.64

PROJECT LOCATION Sturgeon Lake Cree Nation, AB

GROUND WATER LEVELS:

PROJECT NUMBER T24-1001

AT END OF DRILLING ---

DRILLING METHOD Solid Stem Auger

AFTER DRILLING ON ---

LOGGED BY KR REVIEWED BY NI

THE WATER LEVEL IS ---

TESTHOLE LOCATION 11U 468893.10m E / 6102596.95m N

LEGEND SAMPLE TYPE:  SOLID STEM
AUGER

SULPHATE:

WELL BACKFILL:

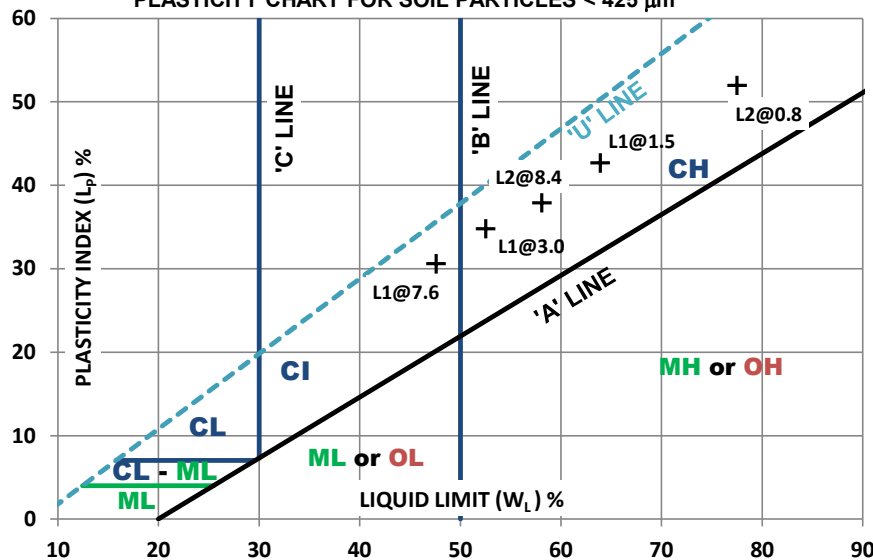
ENC TESTHOLE LOG OPT/SPT T24-1001 SE DESIGN CFS TEMPORARY HOUSING STURGEON LAKE CREE NATION GPJ GINT STD CANADA LAB.GDT 3-19-24

DEPTH (m)	U.S.C.S.	GRAPHIC LOG	ELEVATION (m)	DEPTH (m)	MATERIAL DESCRIPTION	SULPHATE	SAMPLE TYPE	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	ATTERBERG LIMITS		
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0					(FILL) CLAY FILL, silty, high plastic, damp, medium brown-grey, trace B-horizon organics and sulphates							
1	FILL						A		20.5			
2	CH		695.5	1.1	(CH) CLAY, silty, high plastic, hard, moist, medium brown-grey, trace slickensides and sulphates -- frost encountered to 1.2m		A	400	21.7			
3	CI		694.2	2.4	(CI) CLAY TILL, silty, medium plastic, hard, moist, medium brown-grey, trace sand, coal and oxides		A	450	25.3			
4			693.6	3.0	End of testhole at 3.0m No standpipe installed		A	450+	18.8			

[illegible]

MODIFIED (BY PFRA, 1985) **UNIFIED CLASSIFICATION SYSTEM FOR SOILS**

MAJOR DIVISION			GROUP SYMBOL	ENC SYMBOL	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA			
COARSE-GRAINED SOILS (MORE THAN HALF BY WEIGHT LARGER THAN 75 μm)	GRAVELS ≥ 50% > 4.75 mm	CLEAN GRAVELS WITH FEW OR NO FINES	GW		WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	Determine percentages of gravel and sand from grain size curve. Depending on percentages of fines (fraction smaller than 75 μm) coarse grained soils are classified as follows: Less than 5% GW, GP, SW, SP; More than 12% GM, GC, SM, SC 5% to 12% Borderline cases requiring the use of dual symbols	$C_u = \frac{D_{60}}{D_{10}} > 4; C_c = \frac{(D_{30})^2}{(D_{10})(D_{60})} = 1 - 3$		
		POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	GP		POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES		NOT MEETING ALL GRADATION REQUIREMENTS FOR GW		
		GRAVELS WITH SIGNIFICANT AMOUNT OF FINES	GM		SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES		ATTERBERG LIMITS BELOW 'A' LINE, Ip < 4	ABOVE 'A' LINE 4 < Ip < 7, ARE BORDERLINE CASES REQUIRING USE OF DUAL SYMBOLS	
		CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES	GC		CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES		ATTERBERG LIMITS ABOVE 'A' LINE, Ip > 7		
	SANDS ≥ 50% < 4.75 mm	CLEAN SANDS WITH FEW OR NO FINES	SW		WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES		$C_u = \frac{D_{60}}{D_{10}} > 6; C_c = \frac{(D_{30})^2}{(D_{10})(D_{60})} = 1 - 3$	NOT MEETING ALL GRADATION REQUIREMENTS FOR SW	
		POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	SP		POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES			ABOVE 'A' LINE 4 < Ip < 7, ARE BORDERLINE CASES REQUIRING USE OF DUAL SYMBOLS	
		SANDS WITH SIGNIFICANT AMOUNT OF FINES	SM		SILTY SANDS, SAND-SILT MIXTURES				ATTERBERG LIMITS BELOW 'A' LINE, Ip < 4
		CLAYEY SANDS, SAND-CLAY MIXTURES	SC		CLAYEY SANDS, SAND-CLAY MIXTURES			ATTERBERG LIMITS ABOVE 'A' LINE, Ip > 7	
FINE-GRAINED SOILS (MORE THAN HALF BY WEIGHT SMALLER THAN 75 μm)	SILTS (BELOW 'A' LINE - NEGLIGIBLE ORGANIC CONTENT)	WL < 50%	ML		INORGANIC SILTS & VERY FINE SANDS, ROCK FLOUR, SILTY / CLAYEY FINE SANDS, CLAYEY SILTS WITH SLIGHT PLASTICITY	CLASSIFICATION IS BASED ON PLASTICITY CHART (SEE BELOW)	<div></div> <div>#270, 120 Pembina Road Sherwood Park, AB T8H 0M2</div>		
		WL > 50%	MH		INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS				
	CLAYS (ABOVE 'A' LINE - NEGLIGIBLE ORGANIC CONTENT)	WL < 30%	CL		INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY, OR SILTY CLAYS, LEAN CLAYS				
		30% < WL < 50%	CI		INORGANIC CLAYS OF MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS				
		WL > 50%	CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS				
	ORGANIC CLAYS & SILTS (BELOW 'A' LINE)	WL < 50%	OL		INORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW AND MEDIUM PLASTICITY				
		WL > 50%	OH		ORGANIC CLAYS OF HIGH PLASTICITY, ORGANIC SILTS				
HIGHLY ORGANIC SOILS		OR		PEAT OR OTHER HIGHLY ORGANIC SOILS	STRONG COLOR OR ODOR, OFTEN FIBROUS TEXTURE				

PLASTICITY CHART FOR SOIL PARTICLES < 425 μm 

ADDITIONAL DESCRIPTORS

FRACTION	SIEVE SIZE		RANGES, ADJECTIVES
	PASSES	RETAINS	
BOULDER COBBLE	900 mm 300 mm	300 mm 75 mm	> 35 % and 21 – 35 % ~ y* 10 – 20 % some >0 – 10 % trace
GRAVEL COARSE FINE	75 mm 19 mm	19 mm 4.75 mm	
SAND COARSE MEDIUM FINE	4.75 mm 2.0 mm 425 mm	2.0 mm 425 mm 75 mm	
SILT / CLAY	75 mm	* GRAVELLY, SANDY, SILTY, CLAYEY ADJECTIVES AS ABOVE	