



an Englobe company

Town of Drumheller
2022 Utility Upgrades

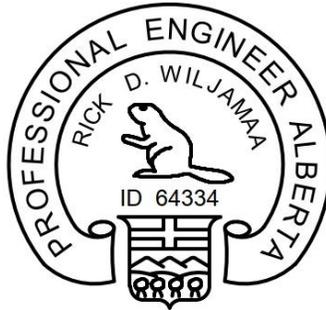
2450-057-00

August 2022

Proud of Our Past... Building the Future

Town of Drumheller

2022 Utility Upgrades



Rick Wiljamaa, P.Eng.
Project Manager

PERMIT TO PRACTICE MPE ENGINEERING LTD.	
Signature _____	
APEGA ID _____	73165
Date _____	August 2, 2022
PERMIT NUMBER: P 3680	
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)	

Prepared by MPE Engineering Ltd.

CONFIDENTIALITY AND © COPYRIGHT

These documents are for the sole use of the Engineer, and of the Owner, Contractor, Subcontractors and Suppliers having a Contract for the execution of the Work covered in the Contract Documents, in whole or in part. The Contract Documents contain proprietary and confidential information that shall not be reproduced in any manner or disclosed to or discussed with any other parties without the expressed written permission of the Engineer. Information in these documents is to be considered the intellectual property of the Engineer in accordance with Canadian copyright law.

PREAMBLE

The format of these Specifications is based on "MasterFormat" published jointly by Construction Specifications Canada and The Construction Specifications Institute. This Table of Contents generally reflects the "MasterFormat" division and section arrangement.

Where it is indicated that a division of "MasterFormat" is "Not Used", or where a division heading is omitted entirely, this means only that the division has not been included in the Specification. It does not necessarily mean that the work normally specified in that division is not required.

MasterFormat
 Broadscope
 Heading

Section Section
 Number Title

DIVISION 0 – BIDDING REQUIREMENTS

INSTRUCTION	00005	Certification Page
TO BIDDERS	00010	Table of Contents
	00200	Instructions to Bidders
	00210	Bid Security
	00250	Pre-Bid Meeting
INFORMATION AVAILABLE TO BIDDERS	00300	Information Documents
BID FORM	00431	Schedule of Prices

DIVISION 0 – CONDITIONS OF CONTRACT

AGREEMENT FORM	00525	Agreement Form
DEFINITIONS	00571	Definitions and Interpretation
BONDS	00612	Contract Performance Security
	00616	Security for Payment of Claims
CERTIFICATES	00625	Insurance Conditions
	00630	Payment Conditions
	00630A	Statutory Declaration Form
GENERAL CONDITIONS	00725	General Conditions
SUPPLEMENTARY CONDITIONS	00800	Supplementary Conditions

DIVISION 1 – GENERAL REQUIREMENTS

SUMMARY OF WORK	01110	Summary of Work
PERMANENT SERVICE LINES	01114	Permanent Service Lines and Connections
MEASUREMENT AND PAYMENT	01275	Measurement Rules
	01280	Measurement and Payment Schedule
MANAGEMENT AND COORDINATION	01311	Management and Co-ordination
CONTRACT MEETINGS	01312	Contract Meetings
SUBMITTALS	01330	Submittals
	01340	Shop Drawings, Product Data and Samples
ENVIRONMENTAL MANAGEMENT	01391	Environmental Protection
MANAGEMENT AND COORDINATION	01410	Regulatory Requirements
	01411	Work Site Safety
QUALITY CONTROL AND QUALITY ASSURANCE	01452	Quality Control and Quality Assurance
CONSTRUCTION FACILITIES	01510	Existing and Temporary Utilities
	01552	Existing and Temporary Roads
PRODUCTS	01601	Products and Execution
	01621	Product Options and Substitutions
SITE ENGINEERING	01722	Site Surveying
CONTRACT CLOSEOUT	01742	Final Clean-Up
	01775	Contract Acceptance Procedures
	01785	Contract Record Documents

DIVISION 2 – SITE WORK

	02130	Site Clearing and Grubbing
	02137	Demolition, Removal and Salvage
	02139	Cold Milling Asphalt Pavement
	02140	Care of Water
	02200	Stripping
	02201	Topsoil Placement
	02202	Earthwork and Granular Material Testing
	02210	Excavation

02250	Compacted Earth Fill
02255	Erosion and Sediment Control
02265	Granular Materials
02270	Subgrade Preparation
02271	Geotextile Fabric
02272	Sub-base Granular Materials
02273	Base Granular Materials
02274	Proof Rolling
02319	Trench Excavating and Backfilling
02420	Pipe Bursting
02429	Directional Drilling
02512	PVC Pipe and Fittings
02513	HDPE Pipe and Fittings
02515	Valves and Valve Boxes
02516	Couplings
02517	Cathodic Protection
02518	Water Service Connections
02519	Hydrant
02520	Hydrostatic Pressure Testing
02521	Flushing and Disinfection
02522	Thrust Blocking
02743	Bituminous Prime Coat, Tack Coat, Fog Coat
02744	Hot Mix Asphaltic Concrete
02746	Appurtenance Adjustment
02761	Pavement Markings
02771	Concrete Sidewalks, Curb & Gutters and Swales
02920	Grass Seeding
02922	Sodding
02951	Restoration of Sitework

CONTRACT DRAWINGS – ISSUED SEPARATELY

END OF TABLE OF CONTENTS

1. BID SUBMISSION

- .1 Bidders must submit bids through the Online Bidding System (<https://mpe.bidsandtenders.ca/>).
- .2 Bidders may submit bids only before the time and date set by for receiving bids on the Online Bidding System.
- .3 The time as indicated by the declining time clock on the Online Bidding System shall be the official time for closing. Bids submitted after the Online Bidding System closing time will not be allowed by the Online Bidding System.
- .4 Hard copy, oral, telephone, telegram, fax, or e-mail bids will not be accepted nor acknowledged.
- .5 The foregoing states the date and time before which bids will be received hereinafter called the “bid closing time”.
- .6 Bids shall be prepared and submitted and the bidding process will be administered in accordance with these bidding requirements.

2. SUMMARY

- .1 The intent of this bid call is to solicit and receive formal offers for:
2022 Utility Upgrades
- .2 Refer to Section 01110 - Summary of Work for a summary of the Project, including requirements pertaining to Contract Time.

3. BASIS OF BID - UNIT PRICE

- .1 Bids shall be on a unit price basis.
- .2 The unit prices, lump sums and allowances stated in the Bid Form and Schedule of Prices shall form the basis of the bid price.
- .3 Make entries in the Bid Form and Schedule of Prices in figures only. Ensure that figures are legible.
- .4 Where, in the Owner’s opinion, there is a question as to the legibility of figures entered by the Bidder, the Owner will make a determination as to legibility. The Owner may, at the Owner’s sole discretion, declare as invalid and reject any bid that contains figures which, in the Owner’s opinion, are illegible or open to dispute.
- .5 Extensions of unit prices and addition of extended unit prices, lump sums and allowances entered in the Schedule of Prices will be checked by the Owner. If arithmetical errors are discovered, the unit prices shall be considered as representing the Bidder's intentions and the unit price extensions and the total amount entered in the Bid Form and Schedule of Prices will be corrected by the Owner. The Bidder shall be bound to such corrected amounts.

- .6 If no unit price is stated for an item, but an extended amount is stated, a unit price determined by dividing the extended amount by the estimated quantity shall be considered as representing the Bidder's intentions.
- .7 The total amount of the bid shall be the arithmetically correct sum of the arithmetically correct unit price extensions, lump sums and allowances in the Bid Form and Schedule of Prices.
- .8 Each unit price stated in the Bid Form and Schedule of Prices shall be a reasonable price for that item of work.
- .9 Unless otherwise indicated, quantities specified in the Bid Form and Schedule of Prices are estimated quantities and shall not be considered as actual quantities of work to be performed. Subject to Contract terms, unit prices stated in the Bid Form and Schedule of Prices shall be applied to actual quantities of work performed as measured in accordance with the Contract.
- .10 Taxes will be automatically applied to the Total Contract Amount in the Summary Table of the Schedule of Prices on the Online Bidding System. Each unit price stated in the Bid Form and Schedule of Prices should not include taxes. The Bidder is responsible for verifying the Total Contract Amount stated in the Summary Table prior to submission.

4. SUFFICIENCY OF BID

- .1 The submission of a bid shall constitute an incontrovertible representation by the Bidder that:
 - .1 The Bidder has complied with all bidding requirements,
 - .2 The Bidder is qualified and experienced to perform the Work in accordance with the Bid Documents,
 - .3 The bid is based upon performing the Work in accordance with the Bid Documents, without exception, and
 - .4 The price or prices stated in the bid cover all the Bidder's obligations under the Contract and all matters and things necessary for the performance of the Work in accordance with the Bid Documents.

5. BID DOCUMENTS

- .1 The Bid Documents are the documents issued or made available to Bidders by the Owner for the purpose of preparing a bid. The Bid Documents consist of the following:
 - .1 Instructions to Bidders.
 - .2 Bid Security.
 - .3 Pre-Bid Meeting.
 - .4 Bid Form Supplements.

- .5 Agreement Form.
- .6 Definitions.
- .7 Payment Conditions.
- .8 Contract Performance Security.
- .9 Security for Payment of Claims.
- .10 Insurance Conditions.
- .11 General Conditions of Contract.
- .12 Supplementary Conditions.
- .13 Specifications, Divisions 1 to 16 inclusive.
- .14 Drawings.
- .15 Addenda issued during the bid period.
- .16 Contract Information Documents.

6. BID FORM SUPPLEMENTS

- .1 Prepare and submit the Bid Form and Schedule of Prices on the Online Bidding System.
- .2 The Owner may, after bid closing time and before contract award, require any Bidder to submit, in a form prescribed by or acceptable to the Owner, supplementary information about any aspect of the Bidder's bid which, in the Owner's opinion, is necessary for bid evaluation purposes.

7. BID WITHDRAWAL AND ACCEPTANCE

- .1 A bid may be withdrawn through the Online Bidding System at any time before the bid closing time.
- .2 Withdrawn bids may be resubmitted in accordance with these bidding requirements providing the resubmitted bid is received through the Online Bidding System as indicated in 1.1, before the bid closing time.
- .3 A bid may not be withdrawn at or after bid closing time and shall be open to acceptance by the Owner until:
 - .1 Some other Bidder has entered into a contract with the Owner for the Work, or
 - .2 60 days after the bid closing time,whichever occurs first.

- .4 The 60 day period referred to above shall commence at midnight of the date of the bid closing and shall terminate at midnight of the 60th day thereafter. If the 60th day falls on a statutory holiday, such day, and any subsequent contiguous holidays, shall be omitted from the computation.
- .5 The 60 day acceptance period referred to above may be extended at the Owner's request and subject to the Bidder's written agreement to the extension.
- .6 The Contract shall be established upon the Owner issuing to the successful Bidder, a letter accepting the bid without qualification or, if the letter accepting the bid contains one or more qualifications, upon the Bidder's written acceptance of all such qualifications.
- .7 The lowest or any bid will not necessarily be accepted and the Owner may reject any and all bids.
- .8 The Owner may negotiate contract terms with the Bidder submitting the lowest valid bid, provided that the negotiated changes to the Bid Documents result in either no change to the bid price or a reduced bid price. Such changes may be formalized in the form of a Post-Bid Addendum that, upon written acceptance by the Bidder, shall form part of the Contract Documents.

8. BID OPENING

- .1 Bids will be opened on the Online Bidding System immediately after the bid closing time.
- .2 The name of each Bidder and the bid price will be displayed. The displaying of a bid price shall not be considered a representation or warranty that the price is correct or that the bid is valid.

9. IRREGULARITIES

- .1 A bid that is informal, incomplete, qualified, non-compliant with the requirements of the Bid Documents, or otherwise irregular in any way, may be declared invalid and rejected.
- .2 The Owner may accept or waive a minor and inconsequential irregularity, or where practicable to do so, the Owner may, as a condition of bid acceptance, request a Bidder to correct a minor and inconsequential irregularity with no change in the bid price.
- .3 The determination of what is, or is not, a minor and inconsequential irregularity, the determination of whether to accept, waive or require correction of an irregularity, and the final determination of the validity of a bid, shall be at the Owner's sole discretion.
- .4 Discrepancies between words and figures will be resolved in favour of words.

10. SAFETY PREQUALIFICATION

- .1 Prime contract Bidders should possess a valid Certificate of Recognition (COR) or Temporary Letter of Certification (TLC) as issued by the Alberta Construction Safety Association (ACSA) or another certifying organization authorized to issue CORs.

- .2 Prospective Bidders who do not possess a COR, and wish to obtain information about obtaining a COR or TLC, are advised to contact:

The Alberta Construction Safety Association online at <http://www.youracsa.ca/>.

11. AVAILABILITY OF BID DOCUMENTS

- .1 Bid Documents are available on the Online Bidding System at <https://mpe.bidsandtenders.ca/>.
- .2 A Bid Document deposit is not required.
- .3 The Owner will assume no responsibility or liability for the completeness of any Bid Documents obtained from a source other than the Online Bidding System.

12. EXAMINATION OF BID DOCUMENTS AND THE SITE

- .1 Bidders shall, before submitting a bid:
 - .1 Examine and read the Bid Documents thoroughly,
 - .2 Visit the site and its surroundings and other locations to become familiar with local and other conditions affecting the Work,
 - .3 Consider the effect of regulatory requirements applicable to the Work,
 - .4 Study and correlate Bidder's Site observations with the Bid Documents,
 - .5 Immediately notify the Owner of all perceived omissions and discovered conflicts, errors and discrepancies in the Bid Documents, and
 - .6 Understand the Bid Documents and be competent to undertake and complete the Work.
- .2 Refer to Section 00300 – Information Documents which identifies available information pertaining to the Project and specifies the status of and the extent, if any, to which the Bidder may rely upon such Information Documents.
- .3 Before submitting a bid, each Bidder shall, at the Bidder's expense, make or obtain any additional examinations, investigations, explorations, tests and studies and obtain any additional information and data which pertain to the conditions at, under, or contiguous with the site, which may affect performance of the Work and which the Bidder deems necessary to determine its bid for performing the Work in accordance with the Bid Documents. Bidders shall obtain the Owner's prior approval for access to the site for the purpose of carrying out any such activities. Bidders shall restore the site to a condition acceptable to the Owner upon completion of such activities.
- .4 Lands upon which Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by the Contractor in performing the Work are identified in the Bid Documents. Additional lands and access thereto required for performance of the Work shall be provided by Contractor.

- .5 When Section 00250 - Pre-Bid Meeting, is included in the Bid Documents, a pre-bid meeting is arranged by the Owner to take place during the bid period. The date and time of the meeting will be indicated on the Online Bidding System.

13. BID SECURITY

- .1 Provide and submit the bid security specified in Section 00210 - Bid Security.

14. CONSENT OF SURETY

- .1 Provide and submit a Consent of Surety Form in the amount equal to fifty (50%) percent of the Contract sum.

15. CONTRACT PERFORMANCE SECURITY

- .1 Provide and include in the bid price for the security specified in Section 00612 - Contract Performance Security.

16. SECURITY FOR PAYMENT OF CLAIMS

- .1 Provide and include in the bid price for the security specified in Section 00616 - Security for Payment of Claims.

17. EVIDENCE OF ABILITY TO PROVIDE SECURITY

- .1 The Owner may, after the bid submission and before the contract award, require a Bidder to submit evidence of the Bidder's ability to provide the security specified in the Bid Documents.

18. ALLOWANCES

- .1 Include in the bid price all allowances specified in Section 01280.

19. PRODUCT OPTIONS AND SUBSTITUTIONS

- .1 Product options: Comply with the requirements of Section 01621.
- .2 Substitutions:
 - .1 Comply with the requirements of Section 01621.
 - .2 Where products are specified by a proprietary specification, and substitutions are permitted, Bidders may base their bids on a named product or manufacturer or on unnamed substitutions, subject to the requirements specified for substitutions in Section 01621.
 - .3 During the bid period, it is the sole responsibility of each Bidder to determine whether a substitution meets the requirements specified in Section 01621.

- .4 The Owner will not consider requests for approval of substitutions from Bidders during the bid period.
- .5 Substitutions will be evaluated and approved or rejected by the Owner after the contract award.
- .3 Product Acceptability:
 - .1 The Owner may, after the bid submission and before the contract award, require any Bidder to submit proof that a product proposed for use complies with the requirements of the Bid Documents. Such proof shall be in the form of product data as specified in Section 01621.
 - .2 Should the Owner determine that a proposed product does not meet the requirements of the Bid Documents, the Bidder shall propose a product which, in the Owner's opinion, does meet requirements of Bid Documents, otherwise such Bidder's bid may be declared invalid and rejected.

20. AGREEMENT

- .1 The successful Bidder will be required to enter into a formal Agreement with the Owner for the performance of the Work.

21. DIVISION OF WORK

- .1 Work specified in the Specifications is divided into Divisions and Sections for reference purposes only. Except as may be otherwise specified in the Bid Documents, the division of the Work among the Contractor, Subcontractors, Sub-subcontractors and suppliers is the Bidders' responsibility.

22. INTERPRETATION AND MODIFICATION OF BID DOCUMENTS

- .1 Submit questions about the meaning and intent of the Bid Documents to the Owner at the office identified under "Inquiries". Interpretations and modifications considered necessary by the Owner in response to such questions will be issued by the Owner in writing in the form of an Addendum.
- .2 Addenda may also be issued by the Owner to modify the Bid Documents as deemed necessary by the Owner.
- .3 Submit questions as early as possible in the bid period. The Owner may not respond to questions received too close to the bid closing time to permit issuance of an Addendum.
- .4 Submit inquiries as early as possible in the bid period. If an inquiry requires an interpretation or modification of the Bid Documents, but is received too close to the bid closing time to permit issuance of an Addendum, the Owner may be unable to respond to that inquiry.
- .5 Any replies to inquiries or interpretations or modifications of the Bid Documents made verbally, by e-mail, or by any manner other than in the form of a written Addendum, shall not be binding.

23. ADDENDA

- .1 Addenda, when issued, will become part of the Bid and Contract Documents.
- .2 Each Bidder shall ascertain before bid submission, that it has received all Addenda issued by the Owner, and shall indicate in the Bid Form, the Addendum number(s) of all Addenda received.
- .3 During the Bid period, all Addenda issued by the Owner will be published on the Online Bidding System.
- .4 Bidders who have obtained Bid Documents from any another source may not automatically receive addenda.

24. INQUIRIES

- .1 Direct inquiries during bid period to:

Derek Veldman, E.I.T.

MPE Engineering Ltd.
Suite 320, 6715 – 8 Street NE
Calgary, AB T2E 7H7

Tel: 403-219-6305

Email: dveldman@mpe.ca

END OF SECTION

1. TYPE AND AMOUNT OF BID SECURITY

- .1 Provide bid security in the form of a digital bid bond (e-bond) in an amount not less than 10% of the bid price.
- .2 Submit bid security with bid on the Online Bidding System. Bids not accompanied by bid security will be rejected.

2. BID BONDS

- .1 Bid bonds shall be in accordance with the Canadian Construction Documents Committee (CCDC) Standard Form of Bid Bond, CCDC Document No. 220.
- .2 Bid bonds shall be issued by a duly incorporated surety company authorized to transact business of suretyship in the Province of Alberta.
- .3 Bid bonds shall be properly electronically executed by both the Bidder and the surety.

3. DEFAULT BY BIDDER

- .1 If a Bidder whose bid is accepted by the Owner in writing, without qualification, and within the acceptance period specified in the Bid Documents, refuses or fails within 21 days after the date of issuance of the written acceptance of the bid:
 - .1 To sign a formal Agreement with the Owner for the performance of the Work, and
 - .2 To provide contract performance security, or security for payment of claims, or both, if and as required by the Bid Documents,

the Bidder shall be liable to the Owner for the difference between the amount of its bid and the greater amount for which a contract for the Work is entered into with some other Bidder, up to the maximum amount of the bid security provided.

END OF SECTION

1. PRE-BID MEETING AND SITE INSPECTION

- .1 A pre-bid meeting and site inspection will be held at the time and place specified on the Online Bidding System.
- .2 Purpose is to provide bidders an opportunity to familiarize themselves with the Work and with existing conditions. Owner's representative(s) will be present.
- .3 This meeting will be Bidders' only opportunity to inspect the site in the presence of the Owner's Representative.
- .4 Site access not restricted.
- .5 All prime contract and major subcontract Bidders are strongly advised to attend. Others are invited to attend.
- .6 No information provided by the Owner or any of his representatives at the pre-bid meeting and site inspection shall be binding, unless such information is included in an Addendum.

END OF SECTION

1. CONTRACT INFORMATION DOCUMENTS

- .1 Contract Information Documents listed in 3.1 are incorporated into the Contract.
- .2 The Bidder is entitled to rely upon the factual information or factual data contained in Contract Information Documents, or parts thereof, which have been obtained principally for the purposes of study and design and believed to be correct, within normal limits inherent in gathering such information and data, but the Bidder shall draw its own conclusions from such factual information or factual data and shall not rely on opinions or interpretations contained therein.
- .3 Contract Information Documents shall not be considered a representation or warranty that information contained therein is complete or appropriate for construction.
- .4 Information contained in Contract Information Documents may be time sensitive and dates and times shall be considered when interpreting such information.
- .5 The Bidder is encouraged to obtain specialist advice with respect to Contract Information Documents. The Owner assumes no responsibility for such interpretations and conclusions.

2. OTHER INFORMATION DOCUMENTS

- .1 Other Information Documents means information documents not listed in 3.1 herein, and are not part of the Contract Documents.
- .2 The Bidder is not entitled to rely upon the factual information or factual data in any Other Information Documents, nor any opinions or interpretations contained therein. Other Information Document shall not be considered accurate, complete, or appropriate.
- .3 Other Information Documents are made available to the Bidder for the purpose of providing the Bidder with access to the information available to the Owner.

3. LIST OF OTHER INFORMATION DOCUMENTS

- .1 The following Other Information Documents are incorporated into the Contract Documents as appendices and are made available to the Contractor:
 - .1 Not Applicable

END OF SECTION

2450-057-00

- .1 The Schedule of Prices must be completed on the Online Bidding System.

END OF SECTION

2450-057-00

AGREEMENT BETWEEN (Town of Drumheller) AND (Contractor)

This Agreement made on the day of 20.....:

between

Town of Drumheller, hereinafter called the "Owner"

and

.....
(Name of Contractor)

.....
(address)

.....
(city, prov, postal code)

hereinafter called the "Contractor"

witnesses: that the parties agree as follows:

ARTICLE 1: THE WORK

The Contractor shall perform the Work required by the Contract Documents for:

2022 Utility Upgrades

and do and fulfill everything required by this Agreement.

ARTICLE 2: CONTRACT DOCUMENTS

The Contract Documents referred to in Article 1 of this Agreement shall be as defined in the Contract Documents. Terms used in the Contract Documents which are defined in the Definitions and Interpretation Section shall have the meanings designated therein.

2450-057-00

ARTICLE 3: CONTRACT TIME

The Contractor shall attain Substantial Performance of the Work by the following date:

.....15th.....day ofOctober..... 2022.....:

The Contractor shall attain Total Performance of the Work by the following date:

.....1st.....day ofNovember..... 2022.....:

ARTICLE 4: CONTRACT PRICE

The Contract Price is dollars

and cents.

(\$.....) in Canadian funds (**GST in**).

ARTICLE 5: TAXES AND DUTIES

Unless otherwise stated in the Contract Documents, the Contractor shall pay all government sales taxes, customs duties and excise taxes with respect to the Contract.

Any increase or decrease in costs to the Contractor due to changes in such taxes and duties, after the closing date of the Tender submissions, shall increase or decrease the Contract Price accordingly.

Where an exemption from or recovery of government sales taxes, duties or excise taxes is applicable to the Contract, the procedure shall be as established in the Payment conditions and other applicable provisions in the Contract Documents.

ARTICLE 6: PAYMENT

The Owner shall make payment in Canadian funds to the Contractor on account of the Contract Price in accordance with the Payment Conditions and other applicable provisions in the Contract Documents.

The Owner shall hold back an amount equal to 10% from each progress payment as provided for in the Payment Conditions of the Contract Documents.

ARTICLE 7: RIGHTS AND REMEDIES

The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law. No action or failure to act by the Owner or Contractor shall constitute a waiver of any right or duty afforded any of them under the Contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

ARTICLE 8: LANGUAGE AND LAW OF THE CONTRACT

The language of the Contract is English and the Contract shall be construed and interpreted accordingly. The law prevailing in the Province of Alberta, Canada shall govern the interpretation of the Contract.

ARTICLE 9: SUCCESSION

The Contract Documents are to be read into and form part of this Agreement and the whole shall constitute the Contract between the parties and subject to law and the provisions of the Contract Documents shall ensure to the benefit of and be binding upon the parties hereto, their respective heirs, legal representatives, successors and permitted assigns.

ARTICLE 10: NOTICES

Notices to be given under the Contract shall be addressed to the parties as follows:

The Owner at:

Town of Drumheller
224 Centre Street
Drumheller, AB
T0J 0Y4

Telephone: 403-823-6300

The Owner's Representative at:

MPE Engineering Ltd.
Suite 320, 6715 – 8 Street NE
Calgary, AB
T2E 7H7

Telephone: 403-250-1362

The Contractor at:

Contractor's Name
Address
City, Prov
Postal Code

Telephone: xxx-xxx-xxxx

1. DEFINITIONS

In the Contract, the following terms shall have the meanings assigned to them:

- .1 "Additional Instruction" means a written instruction, issued by the Owner to the Contractor, clarifying or finalizing requirements of the Contract Documents and not involving a change in the Contract Price or the Contract Time.
- .2 "Agreement Form" means the document which, when executed by the Owner and the Contractor, formalizes the Contract.
- .3 "Bid" means the Contractor's priced offer to the Owner for the performance of the Work in accordance with the provisions of the Contract, as accepted by the Letter of Acceptance.
- .4 "Certificate of Total Performance" means the certificate issued by the Owner's Representative, when to the best of his knowledge, information and belief, the entire Work has been performed to the requirements of the Contract Documents, except for defects in the Work not discovered by the Owner's Representative and the making good of faulty workmanship or materials during the maintenance period.
- .5 "Certificate of Warranty Performance" means the certificate issued by the Owner's Representative following a period of twelve (12) months from the date of the Certificate of Substantial Performance, or, if a Certificate of Substantial Performance is not issued, following a period of twelve (12) months from the date of the Certificate of Total Performance, which twelve (12) month period is hereafter referred to as the "maintenance period", certifying that to the best of his knowledge, information and belief the performance of the Work (except for defects in the Work not discovered by the Owner's Representative) has been completed.
- .6 "Change Order" means a written instruction, issued by the Owner to the Contractor on or after the date of execution of the Agreement Form, authorizing or ordering a Change in the Work or a change in the Contract Price or the Contract Time or any combination thereof.
- .7 "Change in the Work" means an addition to, deletion from or other modification of the Work consistent with the scope and intent of the Contract.
- .8 "Construction Equipment" means equipment, appliances and things required for the performance of the Work, but does not include Permanent Work or Temporary Work.
- .9 "Contemplated Change" means a written communication, issued by the Owner to the Contractor on or after the date of execution of the Agreement Form, containing a contemplated Change in the Work and requiring the Contractor to submit a quotation for executing such contemplated change, including the Contractor's proposed changes to either or both the Contract Price or the Contract Time.
- .10 "Contract" means the undertaking by the Owner and the Contractor to perform their respective duties, responsibilities and obligations as prescribed in the Contract Documents and represents the entire agreement between the Owner and the Contractor. The Contract Documents form the Contract.

- .11 "Contract Deficiency" means a deficiency in the Work, or part thereof, for which the Contractor is responsible under the Contract and includes a deficiency in any design for which the Contractor is responsible.
- .12 "Contract Documents" means: - the Letter of Acceptance; - the executed Agreement Form; - Instructions to Bidders, completed Bid Form, Schedule of Prices, and Supplements to Bid Form; - Information Documents specifically incorporated into the Contract Documents; - Definitions and Interpretation, Payment Conditions, Security Conditions, Insurance Conditions, General Conditions, Supplementary Conditions; - the Specifications; - the Drawings; - Addenda; - and such other documents as may be identified as Contract Documents, and shall include amendments thereto made pursuant to the provisions of the Contract.
- .13 "Contract Price" means the total amount payable by the Owner to the Contractor under the Contract as stated in the Agreement Form, including authorized adjustments thereto.
- .14 "Contract Time" means the period of time specified in the Contract for attainment of substantial Performance of the Work, including authorized adjustments thereto.
- .15 "Contractor" means the person, firm or corporation contracting directly with the Owner to perform the Work.
- .16 "Cost Plus Work" means a contractual arrangement that prescribes the cost of the work plus an allowance for overhead and profit, as expressly defined in the Contract, as payment for performance of the item of work to which it relates.
- .17 "Day" means a calendar day.
- .18 "Drawings" means the graphic and pictorial portions of the Contract Documents showing the design, location or dimensions of the Work, generally including plans, elevations, sections, details and diagrams.
- .19 "Engineer" means the person or persons named in these Contract Documents as the Owner's representative. Words importing persons shall include firms, corporations and joint ventures.
- .20 "Information Documents" means information of any type and in any form related to the Project and identified in the Contract Documents as such, but which does not form part of the Contract unless specifically incorporated therein.
- .21 "Invention" means any new and useful practice, process, machine, device, manufacture or composition of matter, or any new and useful improvement thereof.
- .22 "Letter of Acceptance" means the formal acceptance by the Owner of the Contractor's Bid, including any modifications to the Bid agreed to by the Owner and the Contractor and incorporated therein.
- .23 "Lump Sum Work" means a contractual arrangement that prescribes a lump sum as payment for performance of the item of work to which it relates.
- .24 "Online Bidding System" means the Bids&Tenders Online Bidding System available at <https://mpe.bidsandtenders.ca/>.

- .25 "Other Contractor" means any person, firm or corporation employed by or having a separate contract with the Owner for work related to the project other than that required by the Contract Documents.
- .26 "Owner" means the Owner as named elsewhere in these Contract Documents and includes a person acting for, or in place of, the Owner.
- .27 "Owner's Representative" means the employee or Engineer identified in writing by a duly authorized officer to represent the Owner under the Contract.
- .28 "Permanent Work" means any structure, Product or thing constructed, manufactured or installed in the performance of the Work, but does not include Temporary Work.
- .29 "Products" means material, components, elements, machinery, equipment, fixtures, systems and other items forming the Work or part thereof but does not include Construction Equipment. "Products" is synonymous with "Materials".
- .30 "Project" means the total construction of which the Work to be provided under the Contract may be the whole or a part.
- .31 "Regulatory Requirements" means laws, ordinances, rules, regulations, orders, codes, and other legally enforceable requirements in effect and applicable to the performance of the Work.
- .32 "Schedule of Prices" means the completed Schedule of Prices submitted by the Contractor with his Bid, as accepted by the Letter of Acceptance.
- .33 "Site" means the designated Site or location of the Work and any other places as may be specifically designated in the Contract as forming part of the Site.
- .34 "Specifications" means that portion of the Contract Documents comprising Divisions 1 to 16 of the specification format including the General Requirements and technical specifications.
- .35 "Subcontractor" means a person, firm or corporation having a contract with the Contractor for the performance of a part of the Work at the Site.
- .36 "Sub-subcontractor" means a person, firm or corporation having a contract with a Subcontractor for the performance of a part of the Work at the Site.
- .37 "Substantial Performance of the Work" means the time when the prerequisites to Substantial Performance of the Work required by the Contract are fulfilled and the Work is ready for use or is being used for the purpose intended and the state of the work is so declared, in writing, by the Owner.
- .38 "Supplier" means a person, firm or corporation having a contract with the Contractor, a Subcontractor or a Sub-subcontractor for the supply of goods or services to be incorporated into or utilized in the performance of the Work.
- .39 "Temporary Work" means site offices, temporary structures, facilities and controls and other temporary things required for the performance of the Work, but does not include Construction Equipment.

- .40 "Total Performance of the Work" means the time when the prerequisites to Total Performance of the Work required by the Contract are fulfilled and the entire Work, except those items arising from the warranty provisions of the Contract, has been performed to the requirements of the Contract Documents and is so declared, in writing, by the Owner.
- .41 "Unit Price" means the amount payable by the Owner to the Contractor under the Contract for a single unit of each separately identified item of work for which a unit price is prescribed as the basis of payment, as stated in the Schedule of Prices.
- .42 "Unit Price Work" means a contractual arrangement that prescribes the product of a Unit Price multiplied by a number of units of measurement of a class as payment for performance of the item of work to which it relates.
- .43 "Warranty Performance of the Work" means the time when the prerequisites to Warranty Performance of the Work required by the Contract are fulfilled and all items arising from the warranty period or periods required by the Contract have been corrected by the Contractor and the state of the Work is so declared, in writing, by the Owner.
- .44 "Work" means the total construction and related services required by the Contract Documents.

2. INTERPRETATION

The Contract shall be interpreted as follows:

- .1 The Contract Documents are complementary, and what is required by any one shall be as binding as if required by all.
- .2 Words importing the singular also include the plural and the masculine includes the feminine and vice-versa where the context requires.
- .3 "Herein", "hereby", "hereof", "hereunder" and similar expressions refer to the Contract as a whole and not to a particular part thereof, unless the context indicates otherwise.
- .4 Words and abbreviations which have well known technical meanings are used in the Contract in accordance with such recognized meanings.
- .5 Words importing persons or parties shall include firms and corporations and any organization having legal capacity.
- .6 In the interest of brevity, the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an", but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.
- .7 The imperative mood is used extensively in the Contract Documents, particularly the Specifications. Such language is always directed to the Contractor, and it is the Contractor's responsibility to perform the Work specified in the imperative mood, unless specifically stated otherwise.

- .8 Unless the context indicates otherwise, where a term is defined in the Contract Documents, other parts of speech or grammatical forms of the same word or expression have corresponding meanings.
- .9 Unless the context indicates otherwise, all monetary amounts shall be interpreted as amounts in the lawful currency of Canada.
- .10 When provision is made for the giving or issue of any notice, consent, approval, certificate or determination by any person, unless otherwise specified, such notice, consent, approval, certificate or determination shall be in writing and the words "notify", "certify" or "determine" shall be construed accordingly. Any such consent, approval, certificate or determination shall not unreasonably be withheld or delayed.
- .11 When provision is made for a communication to be "written" or "in writing" this means any handwritten, typewritten or printed communication, including facsimile transmissions.
- .12 Except in relation to a change in the Contract Time, any period of time in the Contract within which the Owner or the Contractor is to take action or decide anything may be extended by agreement, notwithstanding that the period of time has expired.
- .13 The term "including" or "includes" shall be construed as inclusive and not exclusive, and shall be interpreted to mean including but not necessarily limited to the items referred to.
- .14 In the event of ambiguities, discrepancies and conflicts between the several documents forming the Contract Documents the following order of precedence shall apply:
 - .1 Executed Agreement Form.
 - .2 Letter of Acceptance.
 - .3 Addenda.
 - .4 Supplementary Conditions.
 - .5 Conditions of Contract, including General, Payment, Security and Insurance Conditions.
 - .6 Specifications.
 - .7 Drawings.
 - .8 Drawings of larger scale shall govern over those of smaller scale of the same date.
 - .9 Figured dimensions shown on a Drawing shall govern even though they may differ from dimensions scaled on the same Drawing.

Notwithstanding the foregoing, documents of later date shall always govern over the documents amended.

END OF SECTION

1. TYPE AND AMOUNT OF SECURITY

- .1 Contractor shall provide security for performance of the Contract in the form of a Performance Bond for 50% of the Contract Price. Bond to be submitted as a digital bond (e-bond).
- .2 Security in the form of a bank letter of credit is not acceptable.
- .3 Submit security to the Owner within 21 days after date of issuance of Letter of Acceptance.

2. SURETY BOND

- .1 Performance bond shall be in accordance with the Canadian Construction Documents Committee (CCDC) Standard Form of Performance Bond, CCDC Document No. 221. Consign performance bond to the Owner.

END OF SECTION

1. TYPE AND AMOUNT OF SECURITY

- .1 Contractor shall provide security for payment to claimants for labour and material used or reasonably required for use in the performance of the Contract. Such security shall be in the form of a Labour and Material Payment Bond for 50% of the Contract Price. Bond to be submitted as a digital bond (e-bond).
- .2 Security in the form of a bank letter of credit is not acceptable.
- .3 Submit security to Owner within 21 days after date of issuance of Letter of Acceptance.

2. SURETY BOND

- .1 Labour and Material bond shall be in accordance with the Canadian Construction Documents Committee (CCDC) Standard Form of Labour and Material, CCDC Document No. 222. Consign Labour and Material Bond to the Owner.

END OF SECTION

1. RELATED REQUIREMENTS

- .1 Hold Harmless Agreement: General Conditions.

2. GENERAL REQUIREMENTS FOR INSURANCE

- .1 Without restricting the generality of the hold harmless provisions of the General Conditions of Contract and without limiting the obligations or liabilities under the Contract, Contractor shall, provide, maintain, and pay for the insurance coverages specified in this Section.
- .2 Form: Insurance policies shall be placed with Insurers, licensed to conduct business in the Province of Alberta, who comply with the Insurance Act (Alberta) and be in forms acceptable to the Owner.
- .3 Duration: Unless otherwise specified, required insurance coverages shall be maintained continuously from date of commencement of the Work until date of Total Performance of the Work.
- .4 Waiver of Recourse and Subrogation: Contractor waives all rights of recourse and subrogation against Owner for damages to Contractor's property.
- .5 Notice of Change to Policy: Each required policy shall be endorsed to provide the Owner with not less than 30 days' advance written notice of cancellation or material change restricting coverage.
- .6 Proof of Insurance: Prior to commencement of any activities on site, Contractor shall provide Owner with proof that insurance coverages are in effect and meet specified conditions. In addition, Contractor shall at any time upon request, promptly file certified true copy of any insurance policy and shall otherwise provide proof of any required insurance, in a form acceptable to the Owner.
- .7 Subcontractors' Insurance: Contractor shall ensure that Subcontractors provide their own General Liability Insurance, Automobile Liability Insurance, where such risks exist, Aircraft and Watercraft Liability Insurance, and Other Insurance equivalent to that specified herein. With respect to General Liability Insurance, Contractor may alternatively provide such insurance on a wrap-up basis insuring himself, his Subcontractors, and anyone employed directly or indirectly by himself or his Subcontractors to perform a part of the Work.

3. GENERAL LIABILITY INSURANCE

- .1 General Liability Insurance shall be in the name of the Contractor. The policy shall include the Owner and the Owner's Representative as Additional Insured with respect to liability arising from the Contractor's operations with regard to the work. The limits shall not be less than five million dollars inclusive per occurrence. The insurance coverage shall include at least the following extensions: Premises, Property and Operations; Occurrence basis, Owners/Contractors' protective, Products and Completed Operations; Blanket Contractual; Employees as Additional Insureds: Broad Form Property Damage; Broad Form Loss of Use; Personal Injury; Incidental Malpractice; Contingent Employers'

Liability; Cross Liability/Severability of Interests; Non-Owned Automobile Liability including Endorsement Form 96; Intentional Injury to protect persons or property, X-plate/unlicensed/specially licensed vehicles; Attached Machinery; Voluntary Medical Payments. To achieve the desired limit, umbrella or excess liability insurance may be used. The Policy shall be endorsed to provide the Owner with not less than 30 days' notice in writing in advance of any cancellation or change or amendment restricting coverage.

4. AUTOMOBILE LIABILITY INSURANCE

- .1 Automobile Liability Insurance in respect of licensed vehicles shall have limits of not less than five million dollars inclusive per occurrence for bodily injury, death, and damage to property, in the following forms endorsed to provide the Owner with not less than fifteen (15) days' written notice in advance of any cancellation or change or amendment restricting coverage:
 - .1 Standard Owner's Form SPF #1 Automobile Policy providing Third Party Liability and Accident Benefits Insurance and covering licensed vehicles owned or operated by or on behalf of the Contractor.

5. AIRCRAFT AND WATERCRAFT LIABILITY INSURANCE

- .1 Aircraft and Watercraft Liability Insurance with respect to owned or non-owned aircraft or watercraft if used directly or indirectly in the performance of the Work, including use of additional premises, shall be subject to limits of not less than two million dollars inclusive per occurrence for bodily injury, death and damage to property including loss of use thereof and limits of not less than one million dollars for Aircraft Passenger Hazard. Such insurance shall be in the form acceptable to the Owner. The policies shall be endorsed to provide the Owner with not less than thirty (30) days' written notice in advance of cancellation, change or amendment restricting coverage.

6. COURSE OF CONSTRUCTION AND BOILER INSURANCE

- .1 All Risk Property Insurance shall be in the joint names of the Contractor and the Owner, insuring not less than the sum of the Contract Price and the full value, as stated in the General Requirements, of products that are specified to be provided by the Owner for incorporation into the Work. The insurance coverage shall be maintained continuously until ten (10) days after the date of the Certificate of Total Performance.
- .2 Boiler Insurance insuring the interests of the Contractor, the Owner and the Owner's Representative for not less than the replacement value of boilers and pressure vessels forming part of the Work. The insurance coverage shall be maintained continuously from the commencement of use or operation of the property insured and until ten (10) days after the date of the Certificate of Total Performance.
- .3 Should the Owner wish to use or occupy part or all of the Work, he shall give thirty (30) days' written notice to the Contractor of the intended purpose and extent for such use or occupancy. Prior to such use or occupancy the Contractor shall notify the Owner in writing of the additional premium cost, if any, to maintain such insurance which shall be

at the Owner's expense. If because of such use or occupancy the Contractor is unable to provide coverage, the Owner, upon written notice from the Contractor and prior to such use or occupancy, shall assume the responsibility to provide, maintain and pay for Property and Boiler Insurance insuring the full value of the Work, as in (a) and (b) above, including coverage for such use or occupancy and the Contractor shall refund to the Owner the unearned premiums applicable to the Contractor's Policies upon termination of coverage.

.4 The Policies shall provide that, in the event of a loss or damage, payment shall be made to the Owner and the Contractor as their respective interests may appear. The Contractor shall act on behalf of the Owner and himself for the purpose of adjusting the amount of such loss or damage payment with the Insurers. When the extent of the loss or damage is determined, the Contractor shall proceed to restore the Work. Loss or damage shall not affect the rights and obligations of either party under the Contract except that the Contractor will be entitled to such reasonable extension of time for completion of the Work as the Owner's Representative may decide.

.5 Payment for Loss or Damage:

.1 When the property insurance has been obtained by the Contractor in accordance with the requirements of this Section: The Contractor shall be entitled to receive from the payments made by the Insurer the amount of his interest in the restoration of the work. In addition, the Contractor shall be entitled to receive from the Owner (in addition to the amount due under the Contract) the amount in which the Owner's interest in the restoration of the Work has been appraised, such amount to be paid upon receipt of payment or payments from the Insurer in accordance with the Owner's Representative's certificates for payment.

.2 When the property insurance has been obtained by the Owner pursuant to the terms of the Contract Documents: The Contractor shall be entitled to receive from the payments made by the Insurer the amount of the Contractor's interest in the restoration of the Work. In addition, the Contractor shall be entitled to receive from the Owner (in addition to the amount due under the Contract) the amount in which the owner's interests in the restoration of the Work has been appraised, such amount to be paid as the restoration of the Work proceeds and in accordance with the requirements of Contract Documents.

.6 The Contractor shall be responsible for deductible amounts under the policies.

7. CONTRACTORS' EQUIPMENT INSURANCE

.1 All Risks Contractors' Equipment Insurance covering construction machinery and equipment owned or rented and used by the Contractor and/or Subcontractors for the performance of the Work, including Boiler Insurance on temporary boilers and pressure vessels, shall be in the form acceptable to the Owner.

8. OTHER INSURANCE

- .1 Contractor shall provide, maintain and pay for any additional insurance required to be provided by law, or which he considers necessary to cover risks not otherwise covered by insurance specified in the Contract Documents.

END OF SECTION

1. FEDERAL GOODS AND SERVICES TAX

- .1 Monies payable by the Owner to the Contractor shall be inclusive of the Federal Goods and Services Tax (GST).

2. BASIS OF PAYMENT

- .1 Payment for Lump Sum Work shall be based on the prices in the Contract and, when required by the Contract, the approved schedule of values for such work.
- .2 Payment for Unit Price Work shall be based on the Unit Prices in the Contract.
- .3 Payment for Cost Plus Work shall be based on the cost of such work, as specified herein, plus a fee in the amount of 10% of the cost of such work for the Contractor's overhead and profit except that no fee shall be applied to the cost of Construction Equipment when such cost is based on rates which already include the Contractor's overhead and profit.
- .4 The cost of Cost Plus Work shall be computed as the sum of the following cost elements as applicable to such work:
 - .1 Cost of labour (other than labour costs included in other cost elements) comprised of payroll costs for employees in the direct employ of the Contractor. Such employees shall include the superintendent and foremen at the Site. Payroll costs shall include salary, fringe benefits and statutory charges paid by Contractor. Fringe benefits shall include health care, vacations with pay, sick time allowance, and pension plan, life and disability insurance, dental and medication plan contributions. Statutory charges shall include contributions for Canada Pension Plan, Workers' Compensation, statutory holidays and Unemployment Insurance. Labour rates shall be consistent with rates actually paid for equivalent job classifications in the normal performance of Lump Sum Work or Unit Price Work or, if there are no such equivalencies, under a schedule of job classifications and labour rates agreed upon by the Owner and the Contractor, if possible before labour costs are incurred.
 - .2 Cost of Products supplied and incorporated into Permanent Work, including cost of transportation and storage thereof and Supplier's site services required in connection therewith. Cash discounts shall accrue to the Contractor. Trade discounts, rebates and refunds and returns from sale of surplus Products shall accrue to the Owner.
 - .3 Cost of Construction Equipment:

Cost of Construction Equipment shall be paid at the rates specified in the current edition of the Equipment Rental Rates Guide published by the Alberta Roadbuilders and Heavy Construction Association, hereinafter called the "Rates Guide", subject to the following:

 - .1 Rates specified in the Rates Guide shall be deemed to include all overhead and profit, regardless of whether Construction Equipment is provided by the Contractor, Subcontractors or Sub-subcontractors.

- .2 Rates specified in the Rates Guide shall be deemed to include cost of owning, operating, loading, unloading, assembling, erecting, and dismantling.
 - .3 When applicable rates are not included in the Rates Guide, costs shall be paid at the rates agreed upon by the Owner and the Contractor, if possible before such costs are incurred.
 - .4 Cost of moving Construction Equipment to and from the Site shall not be payable, unless such cost is solely attributable to the Work and is approved as such by the Owner.
 - .5 Except for Construction Equipment traveling under its own power, travel time for Construction Equipment shall not be payable. Unless otherwise approved by the Owner, Construction Equipment shall be moved by the most economical method.
- .5 Cost of Temporary Work, including cost of transportation and maintenance thereof, used and consumed in the performance of the Work and the cost less fair market value of such work used but not consumed which shall remain the property of the Contractor.
- .6 Cost of special services, including the cost of architects, engineers, specifiers, surveyors, testing laboratories and inspection agencies.
- .7 Supplemental costs, including:
- .1 Travel and subsistence costs of Contractor's employees;
 - .2 Statutory charges, including fees, cost of permits and licenses and custom duties;
 - .3 Cost of rights-of-way and other land related costs;
 - .4 Royalty payments and patent license fees;
 - .5 Deposits lost for causes other than the Contractor's fault or negligence.
- .8 Subcontract and Sub-subcontract costs, including payments made by the Contractor to Subcontractors and by Subcontractors to Sub-subcontractors in accordance with the requirements of such contracts. Subcontractors' and Sub-subcontractors' costs and fee for overhead and profit for Cost Plus Work to be performed under such contracts shall be determined in the same manner as the Contractor's cost and fee.
- .9 With respect to Cost Plus Work:
- .1 Costs payable by Owner shall be directly related to or shall have been necessarily and properly incurred in the performance of such work.
 - .2 Overhead shall include the Contractor's costs related to the operation and maintenance of his head office and branch offices, administration at head office and branch offices, general management, legal, audit and accounting services, buying organization, corporate tax, financing and other bank charges, company directors, salaries and other compensation of personnel stationed off-site, design of Construction Equipment and Temporary Work, supervision, planning and scheduling of work, expendable and unexpendable small tools, including maintenance thereof, clean up and recruitment and training of site staff.

- .3 Contractor shall obtain the Owner's prior approval to subcontract or enter into other agreements for Cost Plus Work.
- .4 Costs claimed for delay or extension of the contract will be considered only if the Contractor has clearly demonstrated the work delayed or extended the critical path of the project.
- .5 The Owner may refuse to pay all or part of the cost of any Work item under any cost element, where the item in question was, in the Owner's opinion, unsuitable for the Work performed.

3. MEASUREMENT FOR PAYMENT

- .1 Unless otherwise specified in the Contract, the Owner shall measure the Work for the purpose of determining payment to the Contractor in accordance with the measurement provisions of the Contract.

4. PROGRESS PAYMENTS

- .1 Prior to Substantial Performance of the Work, the Owner shall make monthly payments to the Contractor.
- .2 Within 7 days after the end of each monthly payment period, the Contractor shall submit to the Owner:
 - .1 Completed Statutory Declaration Form, at and after the second monthly payment period,
 - .2 Workers' Compensation Board verification that the Contractor's account is in good standing,
 - .3 Any data requested by the Owner to assist the Owner to determine the amount due and payable to the Contractor, and
 - .4 For Products stored by the Contractor on the Site for incorporation in Permanent Work but not incorporated in such Work, proof of purchase price and delivery to the Site, along with a statement of the quantity of such Products and the Schedule of Prices item to which the Products relate.
- .3 The Owner shall, within 45 days after the end of each monthly payment period and subject to having received within the time specified any required information referred to in clause 4.2, pay to the Contractor the amount which the Owner determines to be due and payable to the Contractor, up to the end of the monthly payment period in respect of:
 - .1 The value of Work executed;
 - .2 The value of Work executed pursuant to authorized Changes in the Work;
 - .3 The value of Products stored by the Contractor on the Site for incorporation in Permanent Work but not incorporated in such Work;

- .4 Adjustments due to changes in Regulatory Requirements or price fluctuation provisions of the Contract, if applicable;
- .5 Any other amount determined by the Owner; and
- .6 Subject to:
 - .1 any deductions under clause 10;
 - .2 any withholdings under clause 11; and
 - .3 retention of the holdback amount calculated by applying the holdback percentage referred to in clause 5 to the amount payable to the Contractor under clause 4.3 after any deductions and withholdings.
- .4 For Unit Price Work, Owner may, at his discretion, make partial payment based on partial completion of the scope of a single unit of an item of Work.
- .5 If, after receipt of a progress payment from the Owner, the Contractor disagrees with the amount of such payment, such amount shall nevertheless be considered to be correct unless the Contractor, within 7 days after such receipt, notifies the Owner of the respects in which such payment is claimed by him to be incorrect. On receipt of such notice, the Owner shall review the amount of the payment and either confirm or vary it. If the Owner varies the payment, such variance shall be added to the next progress payment.
- .6 Notwithstanding the terms of this clause or any other clause of the Contract, no amount shall be paid by the Owner until the contract security and proof of insurance, if required under the Contract, have been provided by the Contractor.

5. HOLDBACK

- .1 The Owner shall hold back the percentage specified in the Agreement Form from each progress payment referred to in clause 4.
- .2 Forty-five (45) days after the date of a Certificate of Substantial Performance, if issued, the Owner will pay to the Contractor, the unpaid balance of holdback moneys then due, provided:
 - .1 Third party claims, received by the Owner pursuant to the Builders' Lien Act or applicable requirements of the Contract have been resolved, or addressed and a course of action agreed to by the Owner and the Contractor,
 - .2 The Contractor has submitted to the Owner, within 7 days after the date of Substantial Performance, a letter of clearance from the Workers' Compensation Board and a completed Statutory Declaration Form,
 - .3 The Contractor has submitted to the Owner, a letter from the Contractor's Surety (if any) approving the release of the holdback,
 - .4 The Contractor has submitted to the Owner, all Record Documents, showing changes as constructed, Operating and Maintenance Manuals, guarantees, warranties, certificates, reports, spare parts and spare material required by the Contract Documents,

- .5 The Contractor has submitted to the Owner, a statement verifying that "all payment quantities on the completed portion of the Contract have been accepted; and all claims, all demands for Extra Work, or otherwise, under or in connection with the completed portion of the Contract have been presented to the Owner's Representative".
- .3 Forty-five (45) days after the date of Total Performance, the Owner will pay to the Contractor, the unpaid balance of holdback moneys then due, provided:
 - .1 Third party claims, received by the Owner pursuant to the Builders' Lien Act or applicable requirements of the Contract have been resolved, or addressed and a course of action agreed to by the Owner and the Contractor,
 - .2 The Contractor has submitted to the Owner, within 7 days after the date of Substantial Performance, a letter of clearance from the Workers' Compensation Board and a completed Statutory Declaration Form,
 - .3 The Contractor has submitted to the Owner, a letter from the Contractor's Surety (if any) approving the release of the holdback,
 - .4 The Contractor has submitted to the Owner, all Record Documents, showing changes as constructed, Operating and Maintenance Manuals, guarantees, warranties, certificates, reports, spare parts and spare material required by the Contract Documents,
 - .5 The Contractor has submitted to the Owner, a statement verifying that "all payment quantities on the completed portion of the Contract have been accepted; and all claims, all demands for Extra Work, or otherwise, under or in connection with the completed portion of the Contract have been presented to the Owner's Representative".

6. FINAL PAYMENT

- .1 Upon the accepted date of Total Performance, the Owner will pay to the Contractor the unpaid balance of any monies then due under the Contract, PROVIDED THAT the Owner's Representative may withhold, or on account of subsequently discovered evidence, nullify the whole or any part of any certificate to such an extent as may be necessary to protect the Owner from loss on account of:
 - .1 The Contractor's unsatisfactory prosecution of the Work.
 - .2 Defective or damaged Work requiring correction or replacement.
 - .3 Claims or liens filed or reasonable evidence indicating the probable filing of claims or liens.
 - .4 Failure of the Contractor to make payments promptly to subcontractors or for materials or labour.
 - .5 A reasonable doubt that the Contract can be completed for balance unpaid.

- .6 Damage to an Other Contractor's Work which has not been settled which may result in the Other Contractor whose Work has been damaged bringing action against the Owner. In case of action, the Contractor will bear the expense of same.
- .7 When the above conditions are resolved to the satisfaction of the Owner, payment shall be made for the amounts withheld because of them.
- .2 If the final statement is considered by the Contractor to be incorrect, the Contractor shall submit to the Owner a notice of claim, including substantiation, notwithstanding the time provisions of clause 10 of the General Conditions.
- .3 If the Owner does not receive a notice of claim pursuant to clause 6.2 within the time specified, the final statement shall be considered correct.
- .4 The final payment shall represent full and final settlement of all monies due to the Contractor pursuant to the Contract except with respect to unresolved claims, if any.

7. OWNER'S LIABILITY

- .1 After the final payment issued has been made, the Owner shall not be liable to the Contractor for any matter or thing arising out of or in connection with the Contract, except as may be provided elsewhere in the Contract, unless the Contractor shall have made a claim in respect therefore prior to or within the time specified in the Builders' Lien Act.

8. DELAY IN MAKING PAYMENT

- .1 In respect of progress payments, payment after Substantial Performance of the Work, payment of holdback, and final payment, the Owner shall pay the Contractor an amount that the Owner considers to be due to the Contractor, pursuant to the Contract, within the time specified.

9. RIGHT OF SET-OFF

- .1 Without limiting any right of set-off, deduction or recovery given or implied by law or elsewhere in the Contract, the Owner may set off any amount payable to the Owner by the Contractor, or recoverable from the Contractor by the Owner, under the Contract or under any other current contract against any amount payable to the Contractor under this Contract.
- .2 For the purposes of these Payment Conditions, "other current contract" means a contract between the Owner and the Contractor under which the Contractor has an undischarged obligation to perform or supply work, labour, or material, or in respect of which the Owner has, since the date of execution of the contract agreement, exercised any right to take the work that is the subject of the contract out of the Contractor's hands.

10. DEDUCTIONS FROM PAYMENTS

- .1 Owner may deduct from any amount claimed by or payable to Contractor:

- .1 An amount at least equal to the value, as determined by Owner, of Work not in accordance with Contract Documents,
- .2 The amount of any unresolved third party claim submitted pursuant to the Builders' Lien Act or applicable requirements of the Contract,
- .3 The amount of any unpaid and overdue statutory account related to the Contract and of which the Owner has received notice and which is enforceable against the Owner,
- .4 The amount of any overpayment made by the Owner to the Contractor, and
- .5 Any other amount recoverable by the Owner from the Contractor under the Contract.

11. WITHHOLDING OF PAYMENT

- .1 Owner may withhold all or part of any amount payable to Contractor in order to protect the Owner or third parties from loss due to Contractor's:
 - .1 Failure to make payments properly to Subcontractors or for labour, materials or equipment,
 - .2 Failure to ensure that Subcontractors make payments properly to Sub-subcontractors or for labour, materials or equipment,
 - .3 Inability to complete the Work within the Contract Time,
 - .4 Inability to complete the Work for the unpaid balance of the Contract Price,
 - .5 Persistent failure to perform the Work in accordance with the Contract Documents.
- .2 When the causes for withholding payment pursuant to 11.1 are removed to the Owner's satisfaction, the Owner shall pay the Contractor the amount previously due and payable with the next progress payment.

12. TITLE TO AND ACCEPTANCE OF WORK

- .1 Contractor warrants that title to work and Products covered by any payment made by the Owner to the Contractor will pass to the Owner, at the time of payment, free and clear of all claims, interests and encumbrances.
- .2 Contractor further warrants that Products stored at the Site and for which payment has been received, shall not be removed from the Site and shall be kept secure and protected.
- .3 Payments made by Owner shall not be construed as an acceptance that the Work, Products, or any part thereof is complete, is satisfactory or is in accordance with the Contract Documents.

END OF SECTION

Statutory Declaration of Payment Distribution

Identification of Contract

Contract Name (location and description of the Work as it appears in the Contract Documents)	
	Date of This Application for Payment
	Month Day Year
	Date of Last (Immediate Preceding) Application for Payment
	Month Day Year

Identification of Declarant (person making the declaration)

Full Name of Declarant	Position or Title (of office held with Contractor)	
Business Name (Name of Contractor)		
Business Address		
City or Town	Province	Postal Code

Declaration

I, the undersigned, solemnly declare that as of the date of this application for payment:

- .1 all the Contractor's lawful obligations to subcontractors and suppliers, in respect of work contracted for and performed before the date of the last (immediate preceding) application for payment, are fully discharged, except for (i) hold back monies properly retained, and (ii) payments deferred by agreement;
- .2 all the Contractor's lawful obligations to workers, in respect to work contracted for, are fully discharged;
- .3 all assessments and payments required to be made by the Contractor under law have been made in full; and that
- .4 I am an authorized signing officer of the Contractor and have personal knowledge of the contract identified and the facts stated in this statutory declaration.

I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath.

Making a false or fraudulent declaration is a contravention of the Criminal Code of Canada, and could carry, upon conviction, penalties including fines, imprisonment, or both.

Signature of declarant

Attestation (to be completed by a person empowered to receive declarations, e.g. Commissioner of Oaths, Notary Public, etc.)

DECLARED before me at _____ this _____ day of _____ 20 _____

City/Town and Province

_____ Signature of person before whom declaration is made	_____ Authority to receive solemn declarations	_____ Expiry date
_____ Name (please print)	<p>Any changes or corrections on this Statutory Declaration must be initialed by the person before whom the declaration is made.</p>	

- 1. OWNER AND OWNER'S REPRESENTATIVE**
 - 1.1 Owner's Duties and Authority
 - 1.2 Owner's Representative
 - 1.3 Appointment of Assistants
 - 1.4 Instructions in Writing
 - 1.5 Owner Interpreter of Contract
 - 1.6 Owner's Determinations
 - 1.7 Owner's Review

- 2. ASSIGNMENT, SUBCONTRACTING AND NOMINATION**
 - 2.1 Assignment
 - 2.2 Subcontracting
 - 2.3 Nominated Subcontractors and Suppliers

- 3. DOCUMENTS**
 - 3.1 Property and Use of Contract Documents
 - 3.2 Reporting of Conflicts, Errors and Discrepancies
 - 3.3 Disruption of Progress
 - 3.4 Additional Instructions
 - 3.5 Forms

- 4. GENERAL OBLIGATIONS**
 - 4.1 Contractor's Responsibilities
 - 4.2 Contract Security
 - 4.3 Site Operations and Methods of Construction
 - 4.4 Differing Physical Conditions or Obstructions
 - 4.5 Climatic and Weather Conditions
 - 4.6 Contractor's Superintendence
 - 4.7 Contractor's Employees
 - 4.8 Owner May Object
 - 4.9 Safety, Security and Protection of the Environment

- 4.10** Owner's Responsibilities for Safety
- 4.11** Care of Work
- 4.12** Responsibility to Rectify Loss or Damage
- 4.13** Hold Harmless Agreement
- 4.14** Regulatory Requirements
- 4.15** Artifacts and Fossils
- 4.16** Patent Rights
- 4.17** Royalties
- 4.18** Other Contractors
- 4.19** Permanent Work Designed by Contractor
- 4.20** Records and Audit
- 4.21** Record of Labour and Construction Equipment
- 4.22** Customs
- 4.23** Urgent Remedial Work

- 5. QUALITY OF PRODUCTS AND WORK**
 - 5.1 Products and Workmanship
 - 5.2 Cost of Samples
 - 5.3 Cost of Tests Provided For
 - 5.4 Cost of Tests Not Provided For
 - 5.5 Inspection and Testing
 - 5.6 Dates for Inspection and Testing
 - 5.7 Rejection
 - 5.8 Cost for Inspection and Testing
 - 5.9 Independent Inspection
 - 5.10 Examination of Work Before Covering Up
 - 5.11 Uncovering and Making Openings
 - 5.12 Removal of Improper Work or Products

6. COMMENCEMENT, COMPLETION, CONTRACT TIME AND DELAYS

- 6.1 Commencement of Work
- 6.2 Possession of Site and Access to Site
- 6.3 Contract Time
- 6.4 Extension of Contract Time
- 6.5 Contractor to Provide Notification and Details
- 6.6 Interim Determination of Extension of Time
- 6.7 Rate of Progress
- 6.8 Substantial Performance of the Work
- 6.9 Substantial Performance of Part or Parts of Work
- 6.10 Total Performance of the Work
- 6.11 Warranty Performance of the Work
- 6.12 Acceleration
- 6.13 Damages for Delay

7. WARRANTY

- 7.1 Warranty Period
- 7.2 Completion of Outstanding Work
- 7.3 Remedying Defects
- 7.4 Contractor's Failure to Carry Out Instructions
- 7.5 Contractor to Search

8. CHANGES AND VARIATIONS

- 8.1 Changes in the Work
- 8.2 Instructions for Changes in the Work
- 8.3 Valuation of Changes in the Work
- 8.4 Impact of Changes in the Work
- 8.5 Quantity Variations

9. CHANGES IN COST AND REGULATORY REQUIREMENTS

- 9.1 Increase or Decrease in Cost
- 9.2 Changes in Regulatory Requirements

10. CLAIMS

- 10.1 Notice of Claims
- 10.2 Contemporary Records
- 10.3 Substantiation of Claims
- 10.4 Payment of Claims
- 10.5 Obligations to and Claims of Third Parties
- 10.6 Claims Against Owner Only

11. RELEASE FROM PERFORMANCE

- 11.1 Frustration
- 11.2 Removal of Construction Equipment on Termination
- 11.3 Payment if Contract Terminated

12. SUSPENSION AND TERMINATION BY OWNER

- 12.1 Suspension of Work
- 12.2 Owner's Determination Following Suspension
- 12.3 Suspension Lasting More Than 91 Days
- 12.4 Termination of Contract

13. DEFAULT OF CONTRACTOR

- 13.1 Default
- 13.2 Valuation at Date of Termination
- 13.3 Payment After Termination
- 13.4 Assignment of Benefit of Agreement

14. DEFAULT OF OWNER

- 14.1 Failure of Owner to Pay
- 14.2 Removal of Construction Equipment
- 14.3 Payment on Termination
- 14.4 Contractor May Suspend Work
- 14.5 Resumption of Work

15. SETTLEMENT OF DISPUTES

- 15.1 Disputes
- 15.2 Notice of Dispute
- 15.3 Negotiated Settlement
- 15.4 Mediation
- 15.5 Arbitration

1. OWNER AND OWNER'S REPRESENTATIVE

1.1 OWNER'S DUTIES AND AUTHORITY

- .1 The Owner shall carry out the duties and exercise the authority specified in the Contract.

1.2 OWNER'S REPRESENTATIVE

- .1 The Owner shall appoint a representative, who shall, unless the Contractor is expressly advised otherwise by the Owner, have full authority to act on behalf of and bind the Owner under the Contract.

1.3 APPOINTMENT OF ASSISTANTS

- .1 The Owner's Representative may appoint any number of persons to assist him in carrying out his duties. He shall notify the Contractor of the names, duties and scope of authority of such persons.
- .2 The failure of any assistants appointed pursuant to clause 1.3.1 to disapprove any work shall not prejudice the authority of the Owner to disapprove such work and to give instructions for the rectification thereof.

1.4 INSTRUCTIONS IN WRITING

- .1 The Contractor shall take instructions only from the Owner or any assistants appointed pursuant to clause 1.3. Instructions given by the Owner shall be in writing, provided that if the Owner considers it necessary to give any instruction orally, the Contractor shall comply with such instruction. Confirmation in writing of such oral instruction given by the Owner, whether before or after the carrying out of the instruction, shall be deemed to be an instruction within the meaning of this clause. Provided that if the Contractor, within 7 days, confirms in writing to the Owner any oral instruction of the Owner and such confirmation is not contradicted in writing within 7 days by the Owner, it shall be deemed to be an instruction of the Owner.

1.5 OWNER INTERPRETER OF CONTRACT

- .1 The Owner in the first instance shall be the interpreter of the Contract and the judge of the Contractor's performance.

1.6 OWNER'S DETERMINATIONS

- .1 When the Owner is required to exercise his discretion by giving his decision, opinion or consent, or expressing his satisfaction or approval, or determining value, or otherwise taking action which may affect the rights and obligations of the Contractor he shall exercise such discretion within the terms of the Contract after due consultation with the Contractor and shall promptly notify the Contractor of such decision, opinion, consent, approval or determination.

1.7 OWNER'S REVIEW

- .1 Any review, comment, consent, acceptance or approval, or lack thereof, by the Owner, shall not relieve the Contractor of any of its responsibilities or liabilities under the Contract.

2. ASSIGNMENT, SUBCONTRACTING AND NOMINATION

2.1 ASSIGNMENT

- .1 The Contractor shall not assign the Contract, either in whole or in part, without the previous written consent of the Owner, which consent, notwithstanding other provisions of the Contract, shall be at the Owner's sole discretion.
- .2 The Owner shall not be bound by any assignment by the Contractor of any monies payable or to become payable to the Contractor under the Contract, without the written consent of the Owner, which consent:
 - .1 Will not be given for a general assignment of book debts, but
 - .2 May, at the Owner's sole discretion, be given for a specific assignment of all or part of monies payable to the Contractor under the Contract, subject however, in all cases, to the provisions of the Financial Administration Act (Alberta).

2.2 SUBCONTRACTING

- .1 The Contractor:
 - .1 Shall not sublet the Contract as a whole,
 - .2 Shall not subcontract any part of the Work without the Owner's prior consent, which shall not be unreasonably withheld,
 - .3 Shall provide such details of any Subcontractor he wishes to engage as the Owner may require,
 - .4 Shall contract with those Subcontractors proposed by him and accepted by the Owner and such Subcontractors shall not be changed without the Owner's prior consent.
- .2 The Owner may, for reasonable cause, object to the use of a proposed Subcontractor and require the Contractor to contract with another Subcontractor.
- .3 If the Owner requires a change from a proposed Subcontractor, the Contract Price shall be adjusted by any difference in cost and markup occasioned by such required change, except where such change is required due to the Contractor's default or negligence, in which case there shall be no change in the Contract Price.
- .4 The Owner may, upon reasonable request and at his discretion, provide to a Subcontractor information as to the percentage or quantity of the Subcontractor's work for which payment has been approved.
- .5 Nothing contained in the Contract shall create a contractual relationship between a Subcontractor and the Owner and subcontracting part of the Work shall not relieve the Contractor from any liability or obligation under the Contract and he shall be responsible for the acts, defaults and neglects of any Subcontractor, his agents, servants or workers as fully as if they were his own.
- .6 The Contractor shall enter into contracts or written agreements with his Subcontractors to require them to perform their work in accordance with the Contract, and the Contractor

shall incorporate the terms and conditions of the Contract Documents, to the extent that they apply, into all subcontracts.

2.3 NOMINATED SUBCONTRACTORS AND SUPPLIERS

- .1 A nominated Subcontractor or nominated Supplier means a person, firm or corporation with whom the Contract requires the Contractor to enter into a contract for the performance of a subcontract or the supply of things related to the Work.
- .2 Nothing contained in the Contract shall create a contractual relationship between the Owner and a nominated Subcontractor or nominated Supplier and such nomination shall not relieve the Contractor from any liability or obligation under the Contract and he shall be responsible for the acts, defaults and neglects of any nominated Subcontractor or nominated Supplier, his agents, servants or workers as fully as if they were his own.

3. DOCUMENTS

3.1 PROPERTY AND USE OF CONTRACT DOCUMENTS

- .1 The Contract Documents are the sole property of the Owner and unless it is necessary for the purposes of the Contract, the Contract Documents shall not, without the consent of the Owner, be used by or communicated to a third party by the Contractor.

3.2 REPORTING OF CONFLICTS, ERRORS AND DISCREPANCIES

- .1 If the Contractor finds a conflict, error or discrepancy in the Contract Documents, the Contractor shall so report to the Owner in writing at once and, before proceeding or continuing with the Work affected thereby, shall obtain a written interpretation or clarification from the Owner; however, the Contractor shall not be liable to the Owner for failure to report any conflict, error or discrepancy in the Contract Documents unless the Contractor had actual knowledge thereof or should reasonably have known thereof.
- .2 The Contractor shall obtain from the Owner any dimensions required but not indicated in figures in the Contract Documents nor calculable from figures in the Contract Documents. Scaling of Drawings, for any purpose, shall be at the Contractor's risk.

3.3 DISRUPTION OF PROGRESS

- .1 The Contractor shall notify the Owner when planning or execution of the Work is likely to be delayed or disrupted unless any further document or instruction required of the Owner under the Contract is issued by the Owner within a reasonable time. The notice shall include details of the document or instruction required and of why and by when it is required and of any delay or disruption likely to be suffered if it is late.
- .2 If, by reason of any failure or inability of the Owner to issue, within a reasonable time, any document or instruction for which notice has been given by the Contractor in accordance with clause 3.3.1, the Contractor suffers delay or incurs costs then the Owner shall determine:
 - .1 Any extension of time to which the Contractor is entitled under clause 6.4, and
 - .2 The amount of such costs, which shall be added to the Contract Price.

- .3 If the failure or inability of the Owner to issue any documents or instruction is caused in whole or in part by the failure of the Contractor to submit documents, which he is required to submit under the Contract, the Owner shall take such failure by the Contractor into account when making his determination pursuant to clause 3.3.2.

3.4 ADDITIONAL INSTRUCTIONS

- .1 The Owner shall have authority to issue to the Contractor, from time to time, such Additional Instructions as may be necessary for the proper performance of the Work. The Contractor shall carry out and be bound by such Additional Instructions.

3.5 FORMS

- .1 Forms to be used pursuant to the Contract or as otherwise may be required for the administration of the Contract shall be as prescribed or approved by the Owner.

4. GENERAL OBLIGATIONS

4.1 CONTRACTOR'S RESPONSIBILITIES

- .1 The Contractor shall, with due care and diligence, design, to the extent provided for by the Contract, execute and complete the Work and remedy any defects therein in accordance with the provisions of the Contract. This shall include the provision of superintendence, labour, Products, Construction Equipment, Temporary Work and all other things, whether of a temporary or permanent nature, required in and for such design, execution, completion and remedying of any defects. The Contractor shall comply with and adhere strictly to the Owner's instructions on any matter, whether mentioned in the Contract or not, concerning the Work.

4.2 CONTRACT SECURITY

- .1 The Contractor shall, if required by the Bid Documents, provide either or both contract performance security or security for payment of claims for labour and material.
- .2 Surety bonds shall be issued by a duly incorporated surety company authorized to transact business of suretyship in the Province of Alberta.
- .3 The Owner may, for reasonable cause, object to use of the surety company proposed by the Contractor, and may require the Contractor to provide a surety bond issued by another surety company acceptable to the Owner, with no change in Contract Price.

4.3 SITE OPERATIONS AND METHODS OF CONSTRUCTION

- .1 The Contractor shall be fully responsible for the adequacy, stability and safety of all Site operations and methods of construction.
- .2 The Contractor shall submit at such times and in such detail as the Owner may require such information pertaining to the methods of construction (including Temporary Work and the use of Construction Equipment) which the Contractor proposes to use and such calculations of stresses, strains and deflections that will arise, in the Permanent Work or any part thereof, from the use of such methods during execution of the Work.

- .3 The Owner shall, on request from the Contractor, provide to the Contractor such design criteria relevant to the Permanent Work or any Temporary Work designed by the Owner as may be necessary to enable the Contractor to comply with clause 4.3.2.
- .4 For the purposes of this clause, "method of construction" means a method, means, technique, sequence or procedure of construction.

4.4 DIFFERING PHYSICAL CONDITIONS OR OBSTRUCTIONS

- .1 If, during the execution of the Work, the Contractor encounters physical obstructions or physical conditions, including sub-surface obstructions or conditions, other than weather conditions or conditions due to weather conditions, on the Site, which, in his opinion, differ substantially from those indicated in the Contract and which were not reasonably foreseeable, the Contractor shall as soon as possible give notice thereof to the Owner. On receipt of such notice, the Owner shall, if in his opinion such obstructions or conditions differ substantially from those indicated in the Contract Documents and could not have been reasonably foreseen, determine:
 - .1 Any extension of time to which the Contractor is entitled under clause 6.4, and
 - .2 The amount of any costs, valued in accordance with clause 8.3, which may have been incurred by the Contractor by reason of such obstructions or conditions having been encountered, which shall be added to the Contract Price.
- .2 A determination by the Owner pursuant to clause 4.4.1 shall take account of:
 - .1 The time of the Contractor's notice to the Owner of a differing physical condition or obstruction,
 - .2 Any instruction which the Owner may have issued to the Contractor in connection therewith, and
 - .3 Any proper and reasonable measures acceptable to the Owner, which the Contractor may have taken in the absence of specific instructions from the Owner.

4.5 CLIMATIC AND WEATHER CONDITIONS

- .1 The relevant climatological records and related information published by the Canadian Climate Centre of Environment Canada, for one or more locations in the vicinity of the Site, shall be used as a basis for any evaluations and determinations concerning climate and weather.

4.6 CONTRACTOR'S SUPERINTENDENCE

- .1 The Contractor shall provide all necessary superintendence during the execution of the Work and as long thereafter as the Owner may consider necessary for the proper fulfilling of the Contractor's obligations. The Contractor, or a competent and authorized representative approved of by the Owner, which approval may at any time be withdrawn, shall give his whole time to the superintendence of the Work. Such authorized representative shall receive, on behalf of the Contractor, instructions from the Owner.

- .2 If approval of the Contractor's representative is withdrawn by the Owner, the Contractor shall, as soon as is practicable, after receiving notice of such withdrawal, remove the representative from the Work and shall not employ him again on the Work in any capacity and shall replace him by another representative approved by the Owner.

4.7 CONTRACTOR'S EMPLOYEES

- .1 The Contractor shall provide on the Site in connection with the execution and completion of the Work and the remedying of any defects therein:
 - .1 Technical assistants who are skilled and experienced in their respective trades and such foremen and others as are competent to give proper superintendence of the Work, and
 - .2 Labour as is necessary for the proper and timely fulfilling of the Contractor's obligations.

4.8 OWNER MAY OBJECT

- .1 The Owner may object to and require the Contractor to remove forthwith from the Site any person who, in the opinion of the Owner, misconducts himself, or is incompetent or negligent in the proper performance of his duties, or whose presence is otherwise considered by the Owner to be undesirable, and such person shall not be allowed on the Site without the consent of the Owner.

4.9 SAFETY, SECURITY AND PROTECTION OF THE ENVIRONMENT

- .1 The Contractor shall, throughout the execution of the Work and the remedying of any defects therein:
 - .1 Have full regard for the health and safety of all persons upon the Site and keep the Site and the Work, to the extent that they are under his control, in an orderly state appropriate to the avoidance of danger to such persons, and
 - .2 Provide and maintain at his own cost all temporary facilities and controls when and where necessary or required by the Owner or by any duly constituted authority, for the protection of the Work or for the safety and convenience of the public or others, and
 - .3 Take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or any other causes arising as a consequence of his methods of operation.
- .2 The Contractor shall appoint a person at the Site who shall manage an accident prevention program. This person shall be Contractor's superintendent unless another person is appointed and approved by the Owner.

4.10 OWNER'S RESPONSIBILITIES FOR SAFETY

- .1 If under clause 4.18 the Owner carries out work on the Site with his own workers he shall, in respect of such work and subject to clause 4.9:

- .1 Have full regard to the safety of all persons upon the Site, and
 - .2 Keep the Site in an orderly state appropriate to the avoidance of danger to such persons.
- .2 If under clause 4.18 the Owner contracts with Other Contractors on the Site he shall require them to have the same regard for safety and avoidance of danger.

4.11 CARE OF WORK

- .1 The Contractor shall take full responsibility for the care of the Work from the date of commencement of Work at the Site until the date of issue of the Certificate of Substantial Performance of the Work, when the responsibility for such care shall pass to the Owner, provided that:
- .1 Except where otherwise specified in the Contract, if the Owner accepts a Certificate of Substantial Performance for part of the Permanent Work the Contractor shall cease to be liable for the care of that part from the date of issue of such certificate, then the responsibility for the care of that part shall pass to the Owner, and
 - .2 The Contractor shall take full responsibility for the care of any outstanding Work which he undertakes to finish during the warranty period until such outstanding Work has been completed.

4.12 RESPONSIBILITY TO RECTIFY LOSS OR DAMAGE

- .1 If there is any loss or damage to the Work, or any part thereof, or to Products for incorporation therein, during the period for which the Contractor is responsible for the care thereof, from any cause whatsoever, the Contractor shall, at his own cost, rectify such loss or damage so that the Work conforms with the provisions of the Contract to the satisfaction of the Owner. The Contractor shall also be liable for any loss or damage to the Work occasioned by him in the course of any operations carried out by him for the purpose of complying with his obligations under the warranty provisions of the Contract.

4.13 HOLD HARMLESS AGREEMENT

- .1 The Contractor shall hold harmless the Owner from any and all third party claims, demands, or actions for which the Contractor is legally responsible, including those arising out of negligence, willful harm, or crimes by the Contractor or the Contractor's employees or agents. This hold harmless shall survive the Contract.

4.14 REGULATORY REQUIREMENTS

- .1 The Contractor shall conform in all respects, including by the giving of all notices and the paying of all fees, with the provisions of:
- .1 Any Regulatory Requirements, and
 - .2 The rules and regulations of all public bodies and companies whose property or rights are affected or may be affected in any way by the Work, and the Contractor shall keep the Owner indemnified against all penalties and liability of every kind for breach of any such provisions.

- .2 The Owner shall be responsible for obtaining any planning, zoning or other similar permission required for the Project to proceed.
- .3 Without limiting the Contractor's obligations under clause 4.14.1, the Contractor shall:
 - .1 Comply with all requirements of and pay all fees in connection with the Workers' Compensation Act (Alberta),
 - .2 Comply with the Occupational Health and Safety Act (Alberta) and all safety requirements as contained in the regulations thereto,
 - .3 Ensure that wages, hours of work and other conditions of employment of all persons employed by the Contractor in the performance of any work required by the Contract are in compliance with the requirements of the Employment Standards Code (Alberta), the Labour Relations Code (Alberta) and any other applicable law, rule, regulation or order, and
 - .4 Pay all fees and charges levied by a municipal authority in respect of applicable permits and licences.

4.15 ARTIFACTS AND FOSSILS

- .1 Coins, fossils, artifacts, structures and other remains or things of geological or archaeological interest discovered on the Site shall, as between the Owner and the Contractor, be deemed to be the property of the Owner. The Contractor shall take reasonable precautions to prevent his workers or any other persons from removing or damaging any such article or thing and shall, immediately upon discovery thereof and before removal, inform the Owner of such discovery and carry out the Owner's instructions for dealing with same. If, by reason of such instructions, the Contractor suffers delay or incurs costs then the Owner shall determine:
 - .1 Any extension of time to which the Contractor is entitled under clause 6.4, and
 - .2 The amount of such costs, which shall be added to the Contract Price.

4.16 PATENT RIGHTS

- .1 The Contractor shall indemnify the Owner from and against all claims and proceedings for or on account of infringement of any patent rights, design trademark or name or other protected rights in respect of any Product, Construction Equipment, Temporary Work or other thing used for or in connection with or for incorporation in the Work and from and against all damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto, except where such infringement results from compliance with the design or specification provided by the Owner.

4.17 ROYALTIES

- .1 Except as otherwise provided in the Contract, the Contractor shall be liable for all tonnage and other royalties, rent and other payments or compensation, if any, for obtaining stone, sand, gravel, clay or other materials required for the Work.
- .2 The Contractor shall be liable for all payments or other compensation, if any, levied in relation to the dumping of all or part of any waste materials.

4.18 OTHER CONTRACTORS

- .1 The Contractor shall, in accordance with the requirements of the Owner, afford all reasonable opportunities for carrying out their work to:
 - .1 Any Other Contractors of the Owner and their workers,
 - .2 The workers of the Owner, and
 - .3 The workers of any duly constituted authorities who may be employed in the execution on or near the Site of any work not included in the Contract or of any contract which the Owner may enter into in connection with or ancillary to the Work.
- .2 Pursuant to clause 4.18.1 and except as may be provided in the Contract, the Contractor shall, on the request of the Owner:
 - .1 Make available to any person referred to in clause 4.18.1, any roads or ways for the maintenance of which the Contractor is responsible, or
 - .2 Permit the use, by any such persons, of Temporary Work or Construction Equipment on the Site, or
 - .3 Provide any other service for any such person, the Owner shall determine an addition to the Contract Price in accordance with clause 8.3.

4.19 PERMANENT WORK DESIGNED BY CONTRACTOR

- .1 Where the Contract provides that part of the Permanent Work shall be designed by the Contractor, he shall submit to the Owner, for review:
 - .1 Such drawings, specifications, calculations and other information as is necessary for the Owner's review, and
 - .2 Operation and maintenance manuals, as applicable, together with drawings of the Permanent Work as completed, in sufficient detail to enable the Owner to operate, maintain, dismantle, reassemble and adjust the Permanent Work incorporating that design, and such design and any alterations thereto shall be performed by a qualified design professional licensed to practice in Alberta.
- .2 The Contractor shall not commence any work to which the information referred to in clause 4.19.1 relates unless such information has been reviewed by the Owner, and the Contractor shall not thereafter alter such design without the Owner's review.

4.20 RECORDS AND AUDIT

- .1 With respect to Cost Plus Work, the Contractor shall:
 - .1 Keep accurate records of estimated and actual costs, payments made and time spent;
 - .2 Keep record copies of bids, quotations, contracts, correspondence, invoices, receipts and vouchers related thereto;

- .3 Make such records available for inspection and audit by the Owner for a period of at least 2 years after the date of Total Performance of the Work;
 - .4 Provide the Owner with copies and extracts therefrom when requested by the Owner; and
 - .5 Afford facilities for audit and inspection by the Owner at mutually agreeable times and places.
- .2 The Contractor shall cause Subcontractors and other persons directly or indirectly controlled by or affiliated with the Contractor and persons directly or indirectly having control of the Contractor to comply with clause 4.20.1 as if they were the Contractor.

4.21 RECORD OF LABOUR AND CONSTRUCTION EQUIPMENT

- .1 The Contractor shall, if required by the Owner, deliver to the Owner a record in detail, in such form and at such intervals as the Owner may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such information respecting Construction Equipment as the Owner may require.

4.22 CUSTOMS

- .1 With respect to the importation and re-export of Construction Equipment, Temporary Work, Products and other things required for the Work, the Contractor shall:
- .1 Be liable for all applicable customs, import duties, taxes and brokerage fees, and
 - .2 Be responsible for obtaining clearance through Customs. If requested by the Contractor, the Owner may assist in obtaining such clearance.

4.23 URGENT REMEDIAL WORK

- .1 If, due to any accident, or failure, or other event occurring to, in, or in connection with the Work, or any part thereof, either during the execution of the Work, or during the warranty period, any remedial or other work is, in the opinion of the Owner, urgently necessary for the safety of the Work, persons or property and the Contractor is unable or unwilling at once to do such work, the Owner may employ other persons or contract with other firms or corporations to carry out such work as the Owner may consider necessary.
- .2 If the work or repair done by the Owner pursuant to clause 4.23.1 is work which, in the opinion of the Owner, the Contractor was liable to do at his own cost under the Contract, then all costs consequent thereon or incidental thereto shall be determined by the Owner and shall be recoverable from the Contractor by the Owner.

5. QUALITY OF PRODUCTS AND WORK

5.1 PRODUCTS AND WORKMANSHIP

- .1 Products and workmanship shall be:
- .1 Of the respective kinds described in the Contract, and

- .2 Subjected from time to time to such tests as the Owner may require at the place of manufacture, fabrication or preparation, or on the Site or at such other place or places as may be specified in the Contract, or at all or any of such places.
- .2 The Contractor shall:
 - .1 At his cost provide all things necessary for examining, measuring, and testing Products including labour, electricity, fuels, stores, apparatus and instruments, and
 - .2 Supply samples of materials, before incorporation in the Work, for testing as may be selected and required by the Owner.

5.2 COST OF SAMPLES

- .1 All samples shall be supplied by the Contractor at his own cost if the supply thereof is provided for in the Contract.

5.3 COST OF TESTS PROVIDED FOR

- .1 The cost of making any test shall be borne by the Contractor if such test is:
 - .1 Specified in the Contract to be performed by the Contractor, or
 - .2 In cases of a test under load or of a test to ascertain whether the design of any finished or partially finished work is appropriate for the purposes which it was intended to fulfill, specified in the Contract in sufficient detail to enable the Contractor to price or allow for the same in his Bid.

5.4 COST OF TESTS NOT PROVIDED FOR

- .1 If the Owner requires any test which is not provided for in the Contract and such test shows the Products or workmanship not to be in accordance with the Contract, then the cost of such test shall be borne by the Contractor, but in any other case clause 5.4.2 shall apply.
- .2 Where, pursuant to clause 5.4.1, this clause applies, the Owner shall determine:
 - .1 Any extension of time to which the Contractor is entitled under clause 6.4, and
 - .2 The amount of any costs incurred by the Contractor, which shall be added to the Contract Price.

5.5 INSPECTION AND TESTING

- .1 The Owner shall at reasonable times have access to the Site and to all workshops and places where Products are being manufactured, fabricated or prepared for the Work and the Contractor shall afford every facility for, and every assistance in, obtaining the right to such access.
- .2 The Owner shall be entitled, during manufacture, fabrication or preparation to inspect and test the Products to be supplied under the Contract. If Products are being manufactured, fabricated or prepared in workshops or places other than those of the Contractor, the Contractor shall obtain permission for the Owner to carry out such inspection and testing

in those workshops or places. Such inspection or testing shall not release the Contractor from any obligation under the Contract.

5.6 DATES FOR INSPECTION AND TESTING

- .1 The Contractor shall agree with the Owner on the time and place for the inspection or testing of any Products as provided in the Contract. The Owner shall give the Contractor not less than 48 hours notice of his intention to carry out the inspection or to attend the tests. If the Owner does not attend on the date agreed, the Contractor may, unless otherwise instructed by the Owner, proceed with the tests. The Contractor shall forthwith forward to the Owner certified copies of the test results.

5.7 REJECTION

- .1 If, at the time and place agreed in accordance with clause 5.6, Products are not ready for inspection or testing or if, as a result of the inspection or testing referred to in clause 5.5, the Owner determines that the Products are defective or otherwise not in accordance with the Contract, he may reject the Products and shall notify the Contractor thereof immediately. The notice shall state the Owner's objections with reasons. The Contractor shall then promptly make good the defect or ensure that rejected Products comply with the Contract. If the Owner so requests, inspection and testing of rejected Products shall be made or repeated under the same terms and conditions.

5.8 COST FOR INSPECTION AND TESTING

- .1 All costs incurred by the Owner because of rescheduling, or undue delay of inspection and testing, and for which the Contractor is responsible, shall be determined by the Owner and shall be recoverable from the Contractor by the Owner.

5.9 INDEPENDENT INSPECTION

- .1 Inspection and testing of Products to be carried out by the Owner may be delegated to an independent agency. Any such delegation shall be effected in accordance with clause 1.3 and for this purpose such independent agency shall be considered as an assistant of the Owner.

5.10 EXAMINATION OF WORK BEFORE COVERING UP

- .1 The Contractor shall afford full opportunity for the Owner to examine and measure any part of the Work which is about to be covered up or put out of view and to examine exposed or excavated surfaces before any part of the Work is placed thereon. The Contractor shall give notice to the Owner whenever any such part of the Work or exposed or excavated surface is or are ready or about to be ready for examination and the Owner shall, without unreasonable delay, unless he considers it unnecessary and advises the Contractor accordingly, attend for the purpose of examining and measuring such part of the Work or of examining such surfaces.

5.11 UNCOVERING AND MAKING OPENINGS

- .1 The Contractor shall uncover any part of the Work or make openings in or through the same as the Owner may from time to time instruct and shall reinstate and make good such part. If any such part has been covered up or put out of view after compliance with the requirement of clause 5.9 and is found to be executed in accordance with the Contract,

the Owner shall determine the amount of the Contractor's costs in respect of such uncovering, making openings in or through, reinstating and making good, which shall be added to the Contract Price. In any other case all costs shall be borne by the Contractor.

5.12 REMOVAL OF IMPROPER WORK OR PRODUCTS

- .1 The Owner shall have authority to issue instructions for:
 - .1 The removal from the Site, within such time or times as may be specified in the instruction, of any Products which, in the opinion of the Owner, are not in accordance with the Contract,
 - .2 The substitution of proper and suitable Products, and
 - .3 The removal and proper re-execution, notwithstanding any previous test thereof or progress payment therefore, of any work which is not in accordance with the Contract.
- .2 In case of default by the Contractor in carrying out instructions pursuant to clause 5.12.1 within the time specified therein or, if none, within a reasonable time, the Owner may employ other persons or contract with other firms or corporations to carry out the same, and all costs consequent thereon or incidental thereto shall be determined by the Owner and shall be recoverable from the Contractor by the Owner.

6. COMMENCEMENT, COMPLETION, CONTRACT TIME AND DELAYS

6.1 COMMENCEMENT OF WORK

- .1 The Contractor shall commence the Work as soon as is reasonably possible in accordance with the instructions contained in the Letter of Acceptance and other provisions of the Contract. Thereafter, the Contractor shall proceed with the Work without delay.

6.2 POSSESSION OF SITE AND ACCESS TO SITE

- .1 If the Contractor suffers delay or incurs costs from failure of the Owner to give possession of the Site or part thereof in accordance with the provisions of the Contract, the Owner shall determine:
 - .1 Any extension of time to which the Contractor is entitled under clause 6.4, and
 - .2 The amount of such costs, which shall be added to the Contract Price.
- .2 The Contractor shall bear all costs and charges for special or temporary rights-of-way required by him in connection with the Work. The Contractor shall also provide at his own cost any additional facilities outside the Site required by him for the purposes of the Work.

6.3 CONTRACT TIME

- .1 The Contractor shall achieve Substantial Performance of the Work as a whole within the Contract Time.

- .2 When the Contractor is required to achieve Substantial Performance of part or parts of the Work prior to achieving Substantial Performance of the Work as a whole, the Contractor shall achieve Substantial Performance of such part or parts of the Work within the time or times specified and such time or times shall be considered to be the Contract Time or Times for such part or parts.

6.4 EXTENSION OF CONTRACT TIME

- .1 In the event of:
 - .1 A change in the Work made under clause 8.1, or
 - .2 Any cause of delay referred to in the Contract, or
 - .3 Abnormally adverse weather conditions, abnormal weather being defined as temperature, precipitation, humidity or wind that is outside of plus or minus one standard deviation from the mean, for the time period in question, determined pursuant to clause 4.5, or
 - .4 Any delay, impediment or prevention by the Owner, or
 - .5 Other special circumstances which may occur, other than through a default of or breach of Contract by the Contractor or for which he is responsible, being such as to affect an activity on the critical path of the Contractor's schedule, the Owner shall determine the extension of the Contract Time for the whole or part of the Work, to which the Contractor may be entitled.

6.5 CONTRACTOR TO PROVIDE NOTIFICATION AND DETAILS

- .1 The Owner shall not be bound to make any determination pursuant to clause 6.4 unless the Contractor has:
 - .1 Within 7 days after such event has first arisen notified the Owner, and
 - .2 Within 14 days, or such other reasonable time as may be agreed by the Owner after such notification, submitted to the Owner details of any extension of time to which he may consider himself entitled in order that such submission may be investigated at the time.

6.6 INTERIM DETERMINATION OF EXTENSION OF TIME

- .1 Where an event has a continuing effect such that it is not practicable for the Contractor to submit details within the period of 14 days referred to in clause 6.5.1.2, he may claim for an extension of time provided that he has submitted to the Owner interim details at intervals of not more than 14 days and final details within 14 days of the end of the effects resulting from the event. On receipt of such interim details, the Owner may make an interim determination of extension of time and, on receipt of the final details, the Owner shall review all the circumstances and may determine an overall extension of time in regard to the event. No final review shall result in a decrease of any extension of time already determined by the Owner. The Owner may determine an extension of the Contract Time notwithstanding that the Contract Time may have passed without being extended.

6.7 RATE OF PROGRESS

- .1 If for any reason, which does not entitle the Contractor to an extension of time, the rate of progress of the Work or any part is at any time, in the opinion of the Owner, too slow to comply with the Contract Time, the Owner may notify the Contractor who shall immediately take such steps as are necessary, subject to the consent of the Owner, to expedite progress so as to comply with the Contract Time. The Contractor shall not be entitled to any additional payment for taking such steps. If any steps, taken by the Contractor in meeting his obligations under this clause, involve the Owner in additional costs, such costs shall be determined by the Owner and shall be recoverable from the Contractor by the Owner.

6.8 SUBSTANTIAL PERFORMANCE OF THE WORK

- .1 When the whole of the Work has been substantially performed and any pre-requisites to Substantial Performance of the Work prescribed by the Contract have been met, the Contractor may so submit to the Owner a Certificate of Substantial Performance, accompanied by a written undertaking to finish without delay any outstanding work during the warranty period. Such notice and undertaking shall be deemed to be a request by the Contractor for the Owner to accept or reject the Certificate of Substantial Performance.
- .2 The Owner shall, within 21 days after the date of receipt of the certificate referred to in clause 6.8.1, either issue to the Contractor, a letter, stating the date on which, in his opinion, the Work was substantially performed in accordance with the Contract, or give instructions in writing to the Contractor specifying all the work which, in the Owner's opinion, is required to be done by the Contractor before the acceptance of such certificate. The Owner shall also notify the Contractor of any defects in the Work affecting substantial performance that may appear after such instructions and before completion of the Work specified therein. The Contractor shall be entitled to receive such notification within 21 days after completion, to the satisfaction of the Owner, of the Work so specified and remedying all defects so notified. The Owner may specify the date for Total Performance of the Work in such notice.

6.9 SUBSTANTIAL PERFORMANCE OF PART OR PARTS OF WORK

- .1 In accordance with the procedure set out in clause 6.8, the Contractor may submit a Certificate of Substantial Performance to the Owner in respect of any substantial part of the Permanent Work which has been substantially completed and which has been or will be occupied or used by the Owner or an Other Contractor prior to Substantial Performance of the Work as a whole, whether or not such prior occupation or use is provided for in the Contract.

6.10 TOTAL PERFORMANCE OF THE WORK

- .1 When the whole of the Work has been totally performed and any pre-requisites to Total Performance of the Work prescribed by the Contract have been met, the Contractor may so submit written notice to the Owner. Such notice shall be deemed to be a request by the Contractor for the Owner to issue a Certificate of Total Performance of the Work.
- .2 The Owner shall, in accordance with the procedure set out in clause 6.8.2, either issue a Certificate of Total Performance of the Work or give instructions.

6.11 WARRANTY PERFORMANCE OF THE WORK

- .1 The Work of the Contract shall only be considered as completed when a Certificate of Warranty Performance of the Work has been signed by the Owner and delivered to the Contractor, stating the date on which the Contractor has completed his obligations to execute and complete the Work and remedy any defects therein to the Owner's satisfaction. The Certificate of Warranty Performance of the Work shall be given by the Owner within 28 days after the expiration of the warranty period, or, if different warranty periods are applicable to different parts of the Permanent Work, the expiration of the latest such period, or as soon thereafter as any Work instructed, pursuant to clause 7, has been completed to the satisfaction of the Owner.

6.12 ACCELERATION

- .1 If the Owner wishes to reduce the Contract Time for the Work or any part thereof, he shall issue to the Contractor a notice thereof and an instruction requiring the Contractor to submit to him within the period specified in the instruction:
 - .1 The Contractor's priced proposals for reducing the Contract Time, together with any consequential modifications to the construction schedule, or
 - .2 The Contractor's explanation why he is unable to reduce the Contract Time.
- .2 If the Owner accepts the Contractor's proposals submitted pursuant to clause 6.12.1.1, including amendments thereto agreed by both parties, the Owner shall issue instructions to the Contractor modifying the Contract accordingly. Such instructions shall include:
 - .1 The revised Contract Time or Times,
 - .2 The modifications to the construction schedule,
 - .3 The revised Contract Price, and
 - .4 Any other relevant modifications to the Contract.
- .3 The Contractor may at any time submit to the Owner proposals to reduce the Contract Time for the Work or part thereof. The Owner shall consider such proposals and if he accepts them he shall take action as in clause 6.12.2.

6.13 DAMAGES FOR DELAY

- .1 Without prejudice to any other right the Owner may have with respect to damages, if the Contractor fails to achieve Substantial Performance of the Work or, if applicable, of part of the Work, within the Contract Time or Times, the Contractor shall pay to the Owner an amount equal to the sum of:
 - .1 **One Thousand Dollars (\$1,000)** as liquidated damages and not as a penalty for each calendar day the Work is not substantially complete after the Date of Substantial Performance. The said sum being a fair estimate of the actual damages the Owner will incur if the Work is not completed by the said Substantial Performance Date.

- .2 **One Thousand Dollars (\$1,000)** as liquidated damages and not as a penalty for each calendar day the Work remains uncompleted after the date of Total Performance. The said sum being a fair estimate of the actual damages the Owner will incur if the Work is not completed by the said Total Performance Date.
 - .3 All other costs and damages incurred or sustained by the Owner as a result of the Contractor's failure to achieve Substantial Performance of the Work or part thereof within the Contract Time or Times.
- .2 The Owner may, without prejudice to any other method of recovery, deduct the amount referred to in clause 6.13.1 from any monies due or to become due to the Contractor under the Contract. The payment or deduction of such amount shall not relieve the Contractor from his obligation to complete the Work or from any other of his contractual obligations.
 - .3 For the purposes of this clause, "period of delay" means the period commencing on the date specified in the Contract for Substantial Performance of the Work or part thereof and ending on the day immediately preceding the date on which Substantial Performance of the Work or part thereof is actually achieved.

7. WARRANTY

7.1 WARRANTY PERIOD

- .1 In the Contract the term "warranty period" shall mean a period of one (1) year, or such longer period as may be provided elsewhere in the Contract, calculated from:
 - .1 The date of Substantial Performance of the Work, certified by the Owner in accordance with clause 6.8, or
 - .2 In the event of more than one certificate having been issued by the Owner under clause 6.9, the respective dates so certified, or
 - .3 In the case of outstanding work to be completed after the date or dates of Substantial Performance referred to in clauses 7.1.1.1 and 7.1.1.2, the date upon which such work is certified as complete by the Owner, and in relation to the warranty period the term "the Work" shall be construed accordingly.

7.2 COMPLETION OF OUTSTANDING WORK

- .1 The Contractor shall complete work outstanding at the date of Substantial Performance of the Work within the time specified by the Owner in the Certificate of Substantial Performance of the Work.

7.3 REMEDYING DEFECTS

- .1 The Contractor shall, during or as soon as practicable after the expiration of the warranty period, remedy any defects in the Work and execute any work of modification or reconstruction related thereto, as the Owner may, during the warranty period or within 14 days after its expiration instruct the Contractor to do.

- .2 Work referred to in clause 7.3.1 shall be executed by the Contractor at his own cost if the necessity thereof is, in the opinion of the Owner, due to:
 - .1 Defects in Products or workmanship, or defects in design for which the Contractor is responsible,
 - .2 The neglect or failure on the part of the Contractor to comply with any obligation, expressed or implied, on the Contractor's part under the Contract. If, in the opinion of the Owner, such necessity is due to any other cause, he may determine an addition to the Contract Price in accordance with clause 8.

7.4 CONTRACTOR'S FAILURE TO CARRY OUT INSTRUCTIONS

- .1 If the Contractor defaults in carrying out instructions issued pursuant to clause 7.2 or 7.3, the Owner may employ other persons or contract with other firms or corporations to carry out the same. If such work is work, which, in the opinion of the Owner, the Contractor was liable to do at his own cost, then all costs consequent thereon or incidental thereto shall be determined by the Owner and shall be recoverable from the Contractor by the Owner.

7.5 CONTRACTOR TO SEARCH

- .1 If any defect in the Work appears at any time prior to the end of the warranty period, the Owner may instruct the Contractor to search for the cause thereof. If such defect is one for which the Contractor is liable, the cost of the work carried out in searching shall be borne by the Contractor and he shall in such case remedy such defect at his own cost in accordance with the provisions of clauses 7.3 and 7.4. If such defect is one for which the Contractor is not liable under the Contract, the Owner shall determine the amount of the costs of such search incurred by the Contractor, which shall be added to the Contract Price.

8. CHANGES AND VARIATIONS

8.1 CHANGES IN THE WORK

- .1 Consistent with the Work, the Owner may make changes in the Work or any part thereof, and he shall have the right to instruct the Contractor to make such changes and the Contractor shall make such changes, which may include:
 - .1 Increasing or decreasing the quantity of any work included in the Contract,
 - .2 Omitting any work, but not if the omitted work is to be carried out by the Owner or by an Other Contractor except by reason of the Contractor's default or negligence,
 - .3 Changing the character or quality or kind of any work,
 - .4 Changing the levels, lines, position and dimensions of any part of the Work,
 - .5 Executing additional work of any kind necessary for the completion of the Work,
 - .6 Changing any specified sequence or timing of construction of any part of the Work.

- .2 No such change shall invalidate the Contract, but the effect, if any, of such changes on the Contract Price shall be valued in accordance with clause 8.3 and any extension of the Contract Time shall be determined in accordance with clause 6.4. Where an instruction to change the Work is necessitated by default or negligence of the Contractor or for which he is responsible, any cost and time attributable to such default or negligence shall be borne by the Contractor.

8.2 INSTRUCTIONS FOR CHANGES IN THE WORK

- .1 The Contractor shall not make any changes in the Work without a written instruction from the Owner.
- .2 No instruction shall be required for:
 - .1 An increase or decrease in the quantity of any work where such increase or decrease is not the result of an instruction given under this clause, but is the result of quantities exceeding or being less than those stated in the Schedule of Prices, and
 - .2 A change or adjustment in lines, levels, grades or elevations when such change or adjustment is already provided for in the Contract.

8.3 VALUATION OF CHANGES IN THE WORK

- .1 Changes referred to in clause 8.1 and any changes to the Contract Price which are required to be determined in accordance with this clause (for the purposes of this clause referred to as "changed work"), shall be valued, at the Owner's option:
 - .1 At the rates and prices set out in the Contract if, in the opinion of the Owner, these are applicable, or
 - .2 If the rates and prices set out in the Contract are not applicable to the changed work, at rates and prices deduced or extrapolated from such rates and prices, or
 - .3 By acceptance by the Owner of rates and prices submitted by the Contractor or other rates and prices as may be agreed by negotiation, or
 - .4 By acceptance by the Owner of a lump sum quotation submitted by the Contractor or other lump sum as may be agreed by negotiation, or
 - .5 As Cost Plus Work in accordance with the provisions of Section 00630 – Payment Conditions.
- .2 If there is disagreement on the value of changed work, the Owner shall fix such rates or prices as are, in his opinion, appropriate and shall notify the Contractor accordingly. Until such time as rates or prices are agreed or fixed, the Owner shall determine provisional rates or prices to enable on-account payments to be made in accordance with the payment conditions of the Contract.

8.4 IMPACT OF CHANGES IN THE WORK

- .1 If in the opinion of the Owner or the Contractor the nature or amount of any changed work relative to the nature or amount of the whole of the Work or to any part thereof, is

such that the rate or price contained in the Contract for any item of the Work is, by reason of such changed work, rendered inappropriate or inapplicable, then, after due consultation by the Owner with the Contractor, a suitable rate or price may be agreed upon between the Owner and the Contractor.

- .2 If there is disagreement on the rates or prices referred to in clause 8.4.1, the Owner shall fix such rate or price as is, in his opinion, appropriate and shall notify the Contractor. Until such time as rates or prices are agreed or fixed, the Owner shall determine provisional rates or prices to enable on-account payments to be made in accordance with the payment conditions of the Contract.

8.5 QUANTITY VARIATIONS

- .1 The quantities set out in the Schedule of Prices are approximate only and no claim shall be made by the Contractor against the Owner on account of any excess or deficiencies absolute or relative, in the same.
- .2 The price or prices provided in the Contract whether stipulated sum or unit price or both shall be accepted by the Contractor, as full compensation for everything furnished and done by the Contractor under the Contract, including all Work required but not included in the items herein mentioned, and also for all loss or damages arising out of the nature of the Work or the action of the weather, elements, or any unforeseen obstruction or difficulty encountered in the prosecution of the work, and for all risks of every description connected with the Work, and for all expenses incurred by or in the consequence of any delay or suspension or discontinuance of the work as herein specified, and for well and faithfully completing the Work as provided in the Contract.

9. CHANGES IN COST AND REGULATORY REQUIREMENTS

9.1 INCREASE OR DECREASE IN COST

- .1 Subject to clause 9.2, the Contract Price shall not be subject to any adjustment in respect of rise or fall in the cost of labour, Products or any other matters affecting the cost of execution of the Contract.

9.2 CHANGES IN REGULATORY REQUIREMENTS

- .1 If, after the latest date for submission of Bids for the Contract, there is a change to any Regulatory Requirement, or a new Regulatory Requirement is introduced, which causes additional or reduced cost to the Contractor in the execution of the Contract, such additional or reduced cost shall be determined by the Owner and shall be added to or deducted from the Contract Price.
- .2 When a Regulatory Requirement is changed or introduced during the period of time referred to in clause 9.2.1 but public notice thereof has been given by the applicable authority before the commencement of such period of time, the change or introduction shall be deemed to have occurred before the commencement of such period of time.

10. CLAIMS

10.1 NOTICE OF CLAIMS

- .1 If the Contractor intends to claim any additional payment, he shall give notice of his intention to the Owner within 7 days after the event giving rise to the claim has first arisen.
- .2 Upon the occurrence of the event referred to in clause 10.1.1, the Contractor shall take all reasonable measures required to mitigate any loss or damage, which may be incurred as a result of such event.

10.2 CONTEMPORARY RECORDS

- .1 Upon the occurrence of the event referred to in clause 10.1, the Contractor shall keep such contemporary records as may reasonably be necessary to support any claim he may subsequently wish to make, including records of time and cost relating to labour, products, construction equipment and other resources used in the work. The Contractor shall permit the Owner to inspect all records kept pursuant to this clause and shall supply him with copies thereof as and when the Owner so instructs.

10.3 SUBSTANTIATION OF CLAIMS

- .1 Within 14 days, or such other reasonable time as may be agreed by the Owner, of giving notice under clause 10.1, the Contractor shall send to the Owner an account giving detailed particulars of the amount claimed and the grounds upon which the claim is based. Where the event giving rise to the claim has a continuing effect, such account shall be considered to be an interim account and the Contractor shall, at such intervals as the Owner may reasonably require, send further interim accounts giving the accumulated amount of the claim and any further grounds upon which it is based. In cases where interim accounts are sent to the Owner, the Contractor shall send a final account within 14 days after the end of the effects resulting from the event.

10.4 PAYMENT OF CLAIMS

- .1 The Contractor shall be entitled to have included in any progress payment such amount in respect of any claims as the Owner may consider due to the Contractor. If information is insufficient to substantiate the whole of the claim, the Contractor shall be entitled to payment in respect of such part of the claim as such information may substantiate to the satisfaction of the Owner.

10.5 OBLIGATIONS TO AND CLAIMS OF THIRD PARTIES

- .1 The Contractor shall, with respect to lawful obligations of and lawful claims against the Contractor or any Subcontractor arising from the Contract:
 - .1 Discharge such obligations of and satisfy such claims against the Contractor, and
 - .2 Ensure the discharge of such obligations of and the satisfaction of such claims against Subcontractors.

- .2 The Contractor shall, when requested by the Owner, make a statutory declaration deposing to the existence and condition of any obligations and claims referred to in clause 10.5.1.
- .3 If a third party sends written notice to the Owner of an undischarged obligation or unsatisfied claim referred to in clause 10.5.1, the Owner may, 30 days after giving written notice to the Contractor, and surety where applicable:
 - .1 Pay any amount that is due and payable to the Contractor pursuant to the Contract directly to the obligees of and the claimants against the Contractor or the Subcontractor, and
 - .2 Where security for payment of claims has been provided in the form of a security deposit, the Owner may deduct such amount from the security deposit, or
 - .3 Where a security deposit has not been provided or insufficient monies are available in the security deposit, the Owner may deduct such amount, or portion thereof, from the amount payable to the Contractor under the Contract.
- .4 Clause 10.5.3 shall apply only when written notice of the obligation or claim is sent to Owner as set out in the Builders' Lien Act.

10.6 CLAIMS AGAINST OWNER ONLY

- .1 Any claims, demands or actions by the Contractor, arising out of alleged errors, omissions or misrepresentations in the Contract Documents or arising out of acts or omissions of the Owner's Representative or his assistants during the execution of the Work, shall be made only to or against the Owner. The Contractor waives any right to commence or carry on such claims, demands or actions against any person or party other than the Owner.

11. RELEASE FROM PERFORMANCE

11.1 FRUSTRATION

- .1 If any circumstance outside the control of both the Owner and the Contractor arises after the award of the Contract which renders it impossible or unlawful for either party to fulfill his contractual obligations, then the Owner or the Contractor may terminate the Contract by giving notice to the other party and, upon such notice, the Contract shall, except as to the rights of the parties under this clause and to the operation of clause 15, terminate, but without prejudice to the rights of either party in respect of any antecedent breach thereof.

11.2 REMOVAL OF CONSTRUCTION EQUIPMENT ON TERMINATION

- .1 If the Contract is terminated pursuant to clause 11.1, the Contractor shall remove from the Site all Construction Equipment.

11.3 PAYMENT IF CONTRACT TERMINATED

- .1 If the Contract is terminated pursuant to clause 11.1, the Contractor shall be paid by the Owner, insofar as such amounts or items have not already been covered by payments on

account made to the Contractor, for all Work executed prior to the date of termination at the rates and prices provided in the Contract and in addition:

- .1 The cost of Products reasonably ordered for the Work which have been delivered in acceptable condition to the Contractor or of which the Contractor is liable to accept delivery, such Products becoming the property of the Owner upon such payments being made by him,
 - .2 The amount of any expenditure reasonably incurred by the Contractor in the expectation of completing the whole of the Work insofar as such expenditure has not been covered by any other payments referred to in this clause,
 - .3 Such proportion of the cost as may be reasonable, taking into account payments made or to be made for work executed, for removal of Construction Equipment under clause 11.2 provided that against any payment due from the Owner under this clause, the Owner shall be credited with any amounts which, at the date of termination, were recoverable by the Owner from the Contractor.
- .2 Any amount payable under this clause shall be determined by the Owner.

12. SUSPENSION AND TERMINATION BY OWNER

12.1 SUSPENSION OF WORK

- .1 The Contractor shall, on the instructions of the Owner, suspend the progress of the Work or any part thereof for such time and in such manner as the Owner may consider necessary and shall, during such suspension, properly protect and secure the Work or such part thereof so far as is necessary in the opinion of the Owner. Clause 12.2 shall apply unless such suspension is:
 - .1 Otherwise provided for in the Contract, or
 - .2 Necessary by reason of some default of or breach of contract by the Contractor or for which he is responsible, or
 - .3 Necessary by reason of normal weather conditions on the Site, or
 - .4 Necessary for the proper execution of the Work or for the safety of the Work or any part thereof, except to the extent that such necessity arises from any act or default by the Owner, in which case such suspension shall be at the Contractor's expense.

12.2 OWNER'S DETERMINATION FOLLOWING SUSPENSION

- .1 Where, pursuant to clause 12.1, this clause applies the Owner shall determine:
 - .1 Any extension of time to which the Contractor is entitled under clause 6.4, and
 - .2 The amount, which shall be added to the Contract Price, in respect of the cost incurred by the Contractor by reason of such suspension.

12.3 SUSPENSION LASTING MORE THAN 91 DAYS

- .1 If the progress of the Work or any part thereof is suspended on the written instructions of the Owner and if permission to resume work is not given by the Owner within a period of 91 days after the date of suspension then, unless such suspension is the Contractor's responsibility pursuant to clauses 12.1.1.1 to 12.1.1.4, the Contractor may give notice to the Owner requesting permission, within 28 days from the receipt thereof, to proceed with the Work or that part thereof in regard to which progress is suspended. If, within such time, such permission is not granted, the Contractor may elect to treat the suspension, where it affects only part of the Work, as an omission of such part under clause 8.1 by giving a further notice to the Owner to that effect, or, where it affects the whole of the Work, treat the suspension as an event of default by the Owner and terminate the Contract in accordance with the provisions of clause 14, in which case the provisions of clauses 14.2 and 14.3 shall apply.

12.4 TERMINATION OF CONTRACT

- .1 The Owner may terminate the Contract at any time by giving a notice of termination to the Contractor. When such a notice is received by the Contractor he shall, subject to the provisions of such notice, forthwith cease all operations in performance of the Contract.
- .2 If the Owner terminates the Contract pursuant to clause 12.4.1, the Owner shall be under the same obligations to the Contractor in regard to payment as if the Contract had been terminated under the provisions of clause 14.

13. DEFAULT OF CONTRACTOR

13.1 DEFAULT

- .1 If the Contractor:
 - .1 Is deemed by law unable to pay his debts as they fall due, or becomes insolvent, or
 - .2 Enters into voluntary or involuntary bankruptcy, liquidation or dissolution (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), or
 - .3 If any act is done or event occurs with respect to the Contractor or his assets which, under any applicable law, has a similar effect to any of the foregoing, or if he
 - .4 Has contravened clause 2.1, or
 - .5 Has repudiated the Contract, then the Owner may, upon written notice, enter upon the Site and the Work and immediately terminate the Contractor's right to continue with the Work.
- .2 If the Owner determines, that, in his opinion, the Contractor without reasonable excuse:
 - .1 Has failed to commence and proceed with the Work or any part thereof in accordance the provisions of the Contract, or

- .2 Has failed to comply with a notice issued pursuant to clause 6.7 or an instruction issued pursuant to clause 6.12 within 14 days after receiving it, or
 - .3 Despite previous warning from the Owner, in writing, is otherwise persistently or flagrantly neglecting to comply with any of his obligations under the Contract, or
 - .4 Has contravened clause 2.2, or
 - .5 Has failed to attain Substantial Performance of the Work or part or parts of the Work within the Contract Time or Times pursuant to clause 6.3, then the Owner may, after giving 14 days notice to the Contractor, and unless the Contractor has within such period remedied the default, enter upon the Site and the Work and terminate the Contractor's right to continue with the Work in whole or in part.
- .3 If the Owner terminates the Contractor's right to continue with the Work, in whole or in part, pursuant to clause 13.1.1 or clause 13.1.2, such termination shall not release the Contractor from any of his obligations or liabilities under the Contract, and shall not affect the rights and authorities conferred on the Owner by the Contract, and the Owner may complete the Work or part thereof, or may contract with any Other Contractor to complete the Work or part thereof. The Owner or such Other Contractor may use for such completion so much of the Construction Equipment, Temporary Work and Products as he or they may think proper.

13.2 VALUATION AT DATE OF TERMINATION

- .1 The Owner shall, as soon as practicable after any entry and termination by the Owner pursuant to clause 13.1, determine:
 - .1 What amount (if any) had, at the time of such entry and termination, been reasonably earned by or would reasonably accrue to the Contractor in respect of work then actually done by him under the Contract, and
 - .2 The value of any unused or partially used Products, any Construction Equipment and any Temporary Work.

13.3 PAYMENT AFTER TERMINATION

- .1 If the Owner terminates the Contractor's right to continue with the Work in whole or in part under clause 13.1, he shall not be liable to pay to the Contractor any further amount in respect of the Contract until the expiration of the warranty period and thereafter until the costs of execution, completion and remedying of any defects, damages for delay in completion (if any) and all other expenses incurred by the Owner have been determined. The Contractor shall then be entitled to receive only such sum (if any) as the Owner may determine would have been payable to him upon due completion by him after deducting the said amount. If such amount exceeds the sum which would have been payable to the Contractor on due completion by him, then the Contractor shall, upon demand, pay to the Owner the amount of such excess and it shall be deemed a debt due by the Contractor to the Owner and shall be recoverable accordingly.

13.4 ASSIGNMENT OF BENEFIT OF AGREEMENT

- .1 The Contractor shall, if so instructed by the Owner within 14 days of the entry and termination referred to in clause 13.1, assign to the Owner the benefit of any agreement

for the supply of any goods or materials or services and/or for the execution of any work for the purposes of the Contract, which the Contractor may have entered into.

14. DEFAULT OF OWNER

14.1 FAILURE OF OWNER TO PAY

- .1 If the Owner fails to pay to the Contractor any amount due under the Contract within 28 days after the expiry of the time stated in the Payment Conditions within which payment is to be made, the Contractor may terminate the Contract by giving notice to the Owner. Such termination shall take effect 14 days after the giving of such notice unless payment is received within such period.

14.2 REMOVAL OF CONSTRUCTION EQUIPMENT

- .1 Upon the termination of the Contract referred to in clause 14.1, the Contractor shall remove promptly from the Site all Construction Equipment.

14.3 PAYMENT ON TERMINATION

- .1 In the event of termination pursuant to clause 14.1 the Owner shall be under the same obligations to the Contractor in regard to payment as if the Contract had been terminated under the provisions of clause 11, but, in addition to the payments specified in clause 11.3, the Owner shall pay to the Contractor the amount of any loss or damage, including reasonable profit, to the Contractor directly arising out of or in connection with or by consequence of such termination.

14.4 CONTRACTOR MAY SUSPEND WORK

- .1 As an alternative to termination under clause 14.1 but without prejudice to the Contractor's entitlement to terminate under clause 14.1, the Contractor may, after giving 14 days' prior notice to the Owner, suspend work or reduce the rate of work.
- .2 If the Contractor suspends or reduces the rate of work pursuant to clause 14.4.1 and thereby suffers delay or incurs cost the Owner shall determine:
 - .1 Any extension of time to which the Contractor is entitled under clause 6.4, and
 - .2 The amount of such costs, which shall be added to the Contract Price.

14.5 RESUMPTION OF WORK

- .1 When the Contractor suspends work or reduces the rate of work pursuant to clause 14.4.1 and the Owner subsequently pays the amount due, the Contractor's entitlement under clause 14.1 shall, if notice of termination has not been given, lapse and the Contractor shall resume normal working as soon as is reasonably possible.

15. SETTLEMENT OF DISPUTES

15.1 DISPUTES

- .1 If a dispute of any kind arises between the Owner and the Contractor in connection with, or arising out of, the Contract or the execution of the Work, whether during the execution of the Work or after its completion and whether before or after repudiation or other termination of the Contract, including any dispute as to any opinion, instruction, determination, certificate or valuation of the Owner, the matter in dispute shall be settled in accordance with the provisions of this clause 15.
- .2 Unless the Contract has already been repudiated or terminated, the Contractor shall, during the course of any dispute settlement, and without prejudice to any claim the Contractor may have:
 - .1 Proceed with the Work without delay, and
 - .2 Comply with any instructions issued by the Owner with respect thereto, unless and until such instructions are revised, as hereinafter provided, in a negotiated settlement or an arbitral or judicial award.

15.2 NOTICE OF DISPUTE

- .1 A dispute shall be deemed to arise when the Owner or the Contractor serves on the other party a written notice of dispute stating the nature of the dispute. No notice of dispute shall be served by either party unless all other applicable provisions of the Contract have been invoked.

15.3 NEGOTIATED SETTLEMENT

- .1 The Owner and the Contractor shall make bona fide efforts to settle any dispute arising between them by negotiations, in accordance with this clause 15.3, and provide timely disclosure of all relevant facts, information and documents to such negotiations.
- .2 Within 14 days after the serving of a notice of dispute by one party on the other pursuant to clause 15.2, the parties shall commence negotiations for the purposes of settling the dispute. Such settlement process may include, if both parties agree, the use of mediation.
- .3 If, after 28 days, or such longer period as the parties and the mediator, if any, may agree, after the commencement of negotiations pursuant to clause 15.3.2, the parties have not settled the dispute, it shall be referred to arbitration, unless the parties mutually agree otherwise.

15.4 MEDIATION

- .1 If, in their efforts to reach a negotiated settlement, the parties agree to use mediation pursuant to clause 15.3.2, such mediation shall be conducted by a single mediator acceptable to both parties and under terms-of-reference established by both parties and the mediator. The parties shall share equally the cost of mediation.

15.5 ARBITRATION

- .1 A reference to arbitration pursuant to clause 15.3.3 shall be effected by either party serving on the other party a notice to refer the dispute to arbitration and such dispute shall be referred to a single arbitrator agreed for that purpose or, in default of agreement within a reasonable time, appointed at the request of the Owner or the Contractor by the Alberta Arbitration and Mediation Society.

- .2 A reference to arbitration under this clause shall be a reference to which the Arbitration Act (Alberta) applies and any award pursuant thereto shall bind the parties, except as otherwise provided by the Act.

END OF SECTION

1. SUPPLEMENTARY CONDITIONS

- .1 These Supplementary Conditions provide information relative to specific items not covered in other sections.

2. ALBERTA ENVIRONMENT NAME CHANGE

- .1 Any reference to “Alberta Environment” refers to the Provincial Regulatory Agency that is responsible for the ‘Water Act’, ‘Environmental Protection and Enhancement Act’, and ‘Public Lands Act’.
- .2 The Owner has made application for the proposed work under the Alberta Environmental Protection and Enhancement Act. Do not commence work on the project until approval has been obtained by the Owner.

3. PROJECT FUNDING

- .1 The Owner has made funding applications for the project work. Do not commence work until funding approval has been obtained by the Owner.

4. WARRANTY PERIOD

- .1 The Warranty Period for all of the work is two (2) years with the exception of grass landscaped areas which will be one (1) year.

5. INCIDENTAL ITEMS

- .1 The following items are incidental to the contract and no separate payment will be made for this work:
 - .1 All submittals.
 - .2 All Road Restoration beyond the Limits of Work, which have been damaged or disturbed by the Work.
 - .3 All Site Restoration beyond the Limits of Work, which have been damaged or disturbed by the Work.
 - .4 Locating, protecting, and reconnecting where necessary all existing utilities (underground and overhead) and service connections, existing trees, fences, buildings, etc.
 - .5 Working in proximity to and crossing of utilities including Alberta One-Call notification, third party locations and hydrovacating / hand exposure as required.
 - .6 Public notification program.
 - .7 Road/lane closure and traffic control, providing access to existing residences, businesses or facilities as required or to provide nearby alternate parking.

- .8 Cleaning and delivery of salvaged material removed during construction to the Owner's Public Works yard.
- .9 Proof rolling.
- .10 Dust control.
- .11 Thrust Blocking.
- .12 Care of Water.
- .13 Removal and replacement of guardrail, fencing, signs, etc., necessary to complete the work.
- .14 Wheel cutting of asphalt.
- .15 Co-ordination of solid waste (garbage) collection with residents and the Public Works Department.

6. HOURS OF WORK AND RESTRICTED DAYS

- .1 Hours of Work must be approved by the Town of Drumheller and be in accordance with any Town Noise bylaws. No work shall be performed on Highway 838 on any long weekend unless expressly approved by the Town of Drumheller and Alberta Transportation. The Town may restrict areas of work for special events which the Town will inform the Contractor at the time of Contract Signing.

END OF SECTION

1. GENERAL

1.1 WORK OF THE PROJECT

- .1 Work of the Project, of which Work of this Contract is a part, comprises the following:
 - .1 2022 Utility Upgrades
 - .2 The Owner may subdivide, consolidate, add to, or otherwise modify the above contract packages.
 - .3 Coordinate and connect the work of this Contract to accommodate the work of Other Contractors.

1.2 WORK OF THIS CONTRACT

- .1 The main items of Work of this Contract include the following:
 - .1 Installation of 270 m of 300 mm HDPE Watermain.
 - .2 Installation of 215 m of 250 mm HDPE Watermain.
 - .2 Installation of 135 m of 150 mm HDPE Watermain.
- .2 The Site of the Work of this Contract is located in Drumheller, Alberta.

1.3 CONTRACT TIME

- .1 The Contract will commence on the date on which the Letter of Acceptance is issued.
- .2 Upon receipt of the Letter of Acceptance, promptly, and without undue delay, commence work at the Site.
- .3 Attain Substantial Performance of the Work October 15, 2022.
- .4 Attain Total Performance of the Work by November 1, 2022

1.4 USE OF THE SITE

- .1 The Site Limits are specified in the Contract Documents.
- .2 Approximate locations of existing utility lines within the Site that are known to the Owner are specified in the Contract Documents.
- .3 Site Limits to allow for construction access are specified in the Contract Documents.
- .4 Use of the areas within the Site described below are subject to the following conditions:
 - .1 Maintain public access as specified in Section 01552 – Existing and Temporary Roads.
- .5 Assume responsibility for the care and protection of the existing work.

2450-057-00

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

2450-057-00

1. GENERAL

1.1 DEFINITIONS

- .1 “Utility” means a public or private utility company, or a municipality.

1.2 CONTRACTOR’S RESPONSIBILITIES

- .1 Arrange for the provision and connection of permanent Project service lines to the Utility’s lines, regardless of whether the required work is performed by the Contractor or by the Utility.
- .2 Co-ordinate service connections work. Comply with the requirements of, and co-operate fully with, each Utility.
- .3 Cut, fit, and re-instate work of this Contract as required to accommodate the work of each Utility.
- .4 While the Utilities are relocating or reinstalling lines, schedule and co-ordinate activities to prevent any delays to the Work.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

1. GENERAL

1.1 MEASUREMENT SYSTEM

- .1 This section specifies the measurement rules that will generally be used for payment purposes unless otherwise specified in the Contract Documents. In case of conflict between the method of measurement specified in this section and the requirements specified in Section 01280 – Measurement Schedule, the latter will govern.
- .2 Work will be measured in the International System of Units (SI) in accordance with CAN/CSA–Z234.1–89 Canadian Metric Practice Guide.
- .3 When used in the Contract, the following abbreviations and symbols have the meaning assigned to them.

Abbreviation/Symbol	Meaning
µm	micrometre or micron
mm	millimetre
m	metre
mm ² or mm2	square millimetre
m ² or m2	square metre
ha	hectare
kPa	kilopascal
MPa	megapascal
m ³ or m3	cubic metre
L	litre
L.S.	lump sum
g	gram
kg	kilogram
N	newton
kN	kilonewton
t	tonne
no.	number (quantity)
min	minute (time)
h	hour
d	day
wk	week
%	percent
>	greater than
≥	greater than or equal to
<	less than
≤	less than or equal to
\$	Canadian dollars
°	degree (angle)
°C	degree Celsius
vm	vertical metre
rpm	revolutions per minute
US gpm	US gallon per minute
gal	gallon
Btu	British thermal unit
VDC	volts of direct current
VAC	volts of alternating current
Ah	amp hour

1.2 METHOD OF MEASUREMENT

- .1 Unless otherwise indicated in the Contract Documents:
 - .1 Earthwork materials will be measured net in place after compaction, with no allowance for bulking, shrinkage, compression, foundation settlement, or waste;
 - .2 Products will be measured net, with no allowance for waste;
 - .3 Dimensions used in calculating quantities will be rounded to the nearest unit of dimension as follows:

<u>Quantity</u>	<u>Dimension</u>
Volume of earth	centimetre
Volume of concrete	millimetre
Length of pipe	centimetre
Area of land	decimetre
 - .4 The survey station grid system adopted will be at 10 linear metres spacing on curves and 20 linear metres spacing on tangent sections for measuring earthwork quantities, respectively;
 - .5 Contours may be based on aerial photograph interpretation and are approximate only. Actual ground elevations and location co-ordinates will be determined in the field during the course of the Work for measurement purposes; and
 - .6 Measurement and payment will not be made for work carried out beyond measurement and payment lines and limits specified in the Contract Documents.
- .2 When boundaries between different items of Work are not specified in the Contract Documents, such boundaries will be established by the Owner.
- .3 Mass:
 - .1 Mass will be measured by weigh scale or by estimated or theoretical mass taken from reference documents, as specified.
 - .2 Mass will be measured to 3 decimal places.
- .4 Length:
 - .1 Length will be measured at the item centreline or mean chord.
 - .2 Items to be measured by linear dimension will be measured parallel to the base or foundation upon which such items are placed.
 - .3 Items to be measured by station will be measured horizontal to the base or foundation upon which such items are placed.
 - .4 Centre line for pipes, ducts, culverts, and similar items will be the line equidistant between inside faces of pipe walls.

- .5 Area:
 - .1 For rectangular and regular shaped objects, area will be measured using mean length and width or radius.
 - .2 For irregular objects, area will be measured by the sum of squares, triangles, and circles, etc., as selected by the Owner.
- .6 Volume:
 - .1 Unless otherwise indicated, volume will be measured using mean length, width, and height or thickness.
 - .2 Excavation and fill volumes will be computed using a digital terrain modelling computer software program.
- .7 Time:
 - .1 Construction Equipment to be paid for on a time basis will be measured in hours of actual working time, and necessary travelling time, when under its own power to the nearest tenth thereof.
 - .2 Hauling equipment to be paid for on a time basis will be measured in hours of actual working time to the nearest tenth thereof.
- .8 Number of items will be measured on a per item basis.
- .9 Lump Sum items will not be measured for payment.
- .10 When standard manufactured items are identified by their physical characteristics, such characteristics will be considered as nominal. Unless more stringently controlled by specified tolerances, manufacturing tolerances established by the industry involved will be accepted.

1.3 MEASUREMENT COMPUTATION

- .1 Formulae and computer programs used for measurement computation will be as specified or, when not specified, as selected by the Owner.

1.4 MEASUREMENT OF WORK

- .1 Unless otherwise specified, the Owner will measure the Work for the purpose of determining payment to the Contractor.
- .2 The Owner will request the Contractor to attend with the Owner in making measurements.
- .3 If the Contractor does not attend pursuant to Paragraph 1.4.2, measurements made or approved by the Owner will be considered to be the correct measurement for such part of the Work.
- .4 The Owner will prepare survey records and drawings for payment purposes as the Work progresses. The Owner will request the Contractor to attend, within 14 days, to examine and verify such records and drawings. If the Contractor does not attend to examine and verify such records and drawings, they will be considered to be correct.

- .5 If, after attending pursuant to Paragraph 1.4.2 or 1.4.4, the Contractor disagrees with such measurements or records or drawings, they will nevertheless be considered correct until the Contractor notifies the Owner of the aspects in which they are considered incorrect. On receipt of such notice, the Owner will review the measurements or records or drawings and either confirm or vary them.

1.5 QUANTITIES

- .1 Unless otherwise indicated, quantities specified in the Schedule of Prices for Unit Price Work are estimated quantities and will not be considered as actual quantities of Work to be performed. Subject to the Contract terms, unit prices stated in the Schedule of Prices will be applied to actual quantities of Work performed as measured in accordance with the Contract Documents.
- .2 When it is stated that the Contractor will be paid only for the quantity specified for an item of Work, such quantity will be considered as a fixed quantity and the Contractor will be paid for the quantity specified, regardless of the actual quantity performed. If a change in the Work directed by the Owner results in a change in a fixed quantity, the quantity will be adjusted in accordance with the Contract Documents and payment will be made for the adjusted quantity.

1.6 SCALES

- .1 Unless otherwise indicated, provide weigh scales, certified by Industry Canada, for measurement purposes.
- .2 Provide scales that are accurate to within 0.5% of correct mass throughout the range of use. Spring balances will not be permitted.
- .3 Prior to use and at any time requested by the Owner, provide the services of a qualified independent person, acceptable to the Owner, for the testing and servicing of weigh scales. Perform baseline tests and record results. Service and adjust weigh scales to meet requirements of Industry Canada and the Contract Documents. Submit a final report of weigh scale tests, services, and adjustments.
- .4 Scales indicating more than true mass will not be permitted to operate and material measured subsequent to the last previous correct accuracy test will be reduced by the percentage of error in excess of 0.5%.
- .5 Scales indicating less than true mass will be adjusted and no additional payment will be made for materials previously scaled and recorded.

1.7 SCHEDULE OF PRICES

- .1 The Schedule of Prices is divided into items for purposes of measurement and payment of Work. Price each item in accordance with the methods of measurement specified in the Contract.
- .2 Item names in the Schedule of Prices identify the work covered by the respective item, but do not define the size or nature of the unit.
- .3 Read item names in the Schedule of Prices as part of the item scope, measurement, and payment requirements to which they apply in the Measurement Schedule.

- .4 For each price specified in the Schedule of Prices include all costs and charges required to perform the Work including overhead charges and profit, and all costs of all related Work for which payment is not specified elsewhere.
- .5 Subject to the provisions of the Contract Documents, the total amount of the Schedule of Prices shall cover all of the Contractor's obligations under the Contract and all matters and things necessary for performance of the Work in accordance with the Contract Documents.
- .6 Payment will be made only for items specified in the Schedule of Prices. Costs and charges not directly provided for in the Schedule of Prices will be deemed to be included therein.
- .7 Work or material included in any one item will not also be measured for payment under another item. No item will be paid for more than once.
- .8 Omissions or errors in any item including quantities in the Schedule of Prices will not invalidate the Contract nor release the Contractor from any of his obligations or liabilities under the Contract.

1.8 LUMP SUM ITEMS

- .1 Breakdown of Lump Sum Items
 - .1 If requested, submit to the Owner a breakdown of each Lump Sum item included in the Schedule of Prices, within 21 days after the commencement date of the Contract.
 - .2 Provide sufficient details as required by the Owner to identify the principal components of the Work and to permit ready valuation of Work performed.
- .2 Lump Sum Items Paid in Accordance with a Schedule
 - .1 For Mobilization and Demobilization, Existing and Temporary Roads, and Care of Water, where payment of the respective Lump Sum amount will be made in accordance with a schedule as specified in Section 01280 – Measurement Schedule, the measurement of the completed Work by the Owner will include the amount of any work completed for Mobilization and Demobilization, Existing and Temporary Roads, and Care of Water.

1.9 SCHEDULE OF PRICES – DIVIDED BID ITEMS

- .1 Where Divided Bid items are included in the Schedule of Prices or the Measurement Schedule, such items shall be excluded from the provisions for variations specified in the General Conditions.
- .2 Include in the Unit Price for the first quantity of the divided item:
 - .1 Costs and profit for each unit of first quantity, and
 - .2 Contractor's fixed costs for the total quantity of the divided item specified in the Schedule of Prices plus additional quantities as specified in 1.9.4 Contractor's fixed costs shall include fixed costs for labour, Products, Construction Equipment, Temporary Work and overhead.

- .3 Include in the Unit Price for the quantity of Work over the first quantity, hereinafter called the 'second quantity', cost and profit for each unit of Work, excluding fixed costs included in 1.9.2.2.
- .4 Where the actual total quantity of the Divided Bid item is less than 120% of the estimated total quantity specified in the Schedule of Prices, the Unit Prices bid for the second quantity shall apply to all quantities in excess of the first quantity.
- .5 Where the actual total quantity of the Divided Bid item is more than 120% of the estimated total quantity of the Divided Bid Item, the Contractor's fixed costs per unit of Work shall be calculated by the Owner as follows:

Fixed costs per Unit of work = ((FQUP – SQUP) x FQ)/ TQ

Where: FQUP – First Quantity Unit Price bid
SQUP – Second Quantity Unit Price bid
FQ – First Quantity in the Schedule of Prices
TQ – Total Quantity in the Schedule of Prices

Payment for the actual quantity which exceeds 120% of the total quantity in the Schedule of Prices shall be based on the Unit Price bid for the second quantity plus the fixed costs calculated by the Owner.

- .6 The Unit Price for the second quantity of Work shall not exceed the Unit Price for the first quantity. Where a Unit Price for the second quantity of Work is greater in amount than the Unit Price for the first quantity, the Unit price and its extension will be corrected by the Owner to the Unit Price of the first quantity. Accordingly, the Bid will be evaluated and the Work will be paid for at the Unit Price of the first quantity. Contractor shall be bound to such corrected amounts.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

1. GENERAL

- .1 Requirements specified in this Section apply to the scope and measurement of work for purposes of determining payment under the Contract.

2. MEASUREMENT SCHEDULE

2.1 EXTRA WORK ALLOWANCES

.1 Unforeseen Work:

- .1 Scope: Includes unforeseen work for which payment is not included elsewhere. Unforeseen work shall be approved by Owner.
- .2 Measurement: Shall be made by the Owner after assessment of the nature of the unforeseen work. Method of measurement, extent of work and the limit of work shall be agreed to prior to commencing the unforeseen work.
- .3 Payment: Shall be made by an approved change order describing the unforeseen work and setting out the method of payment (ie. lump sum, unit price and/or force account). Payment amount shall be taken from the Extra Work Allowance provided for in the Contract.

2.2 SCHEDULE 'A' – GENERAL ITEMS

.1 General Requirements – Item 1

- .1 Scope:
 - .1 Includes the following: Division 0; Division 1; and all related work for which payment is not included elsewhere.
 - .2 Includes Mobilization and Demobilization preparatory work and operations including those necessary to the movement of material, labour and equipment to and from the project site.
 - .3 Provision of all equipment, materials and labour required for preparation, notifications, implementation, modifications, maintenance and removal of all traffic accommodation work, complete. The work includes traffic accommodation plan; necessary approvals; temporary detours; traffic control measures; protective measures; barricades; delineators; barriers; flashing lights; signage; flagmen; clean-up; and all related work for which payment is not included elsewhere.
 - .4 The item includes all other work or costs incurred prior to beginning the Work and following the completion of the Work on various items on the project site and all related work for which payment is not included elsewhere.
- .2 Measurement: General Requirements will not be measured for payment.

- .3 Payment: Payment for General Requirements will be as follows:
- .1 When 5% of the original contract amount is earned, 25% of the lump sum bid for “General Requirements” will be paid.
 - .2 When 10% of the original contract amount is earned, 50% of the lump sum bid for “General Requirements” will be paid.
 - .3 When 25% of the original contract amount is earned, 60% of the lump sum bid for “General Requirements” will be paid.
 - .4 When 50% of the original contract amount is earned, 70% of the lump sum bid for “General Requirements” will be paid.
 - .5 Upon completion of all work on the Project, 100% of the lump sum bid for “General Requirements” will be paid.

The total payments for this item shall not exceed the original amount bid for this item regardless of the fact that the Contractor may have for any reason shut down his work on the project or moved equipment away from the project and then back again.

.2 Hydro Excavation – Item 2

- .1 Scope: Provision of all equipment, material and labour required for exposing existing utilities that will be crossed by the underground utilities installation work and exposing existing utility piping for tie-ins. The work includes locates; hydro excavation; water; waste excavation; measurement and recording of the utility information; sand backfill; protection of hydro excavation; disposal of hydro excavated material; clean-up; and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be on an hourly basis, as specified in the Schedule of Prices.

Measurement will be made for the hours of hydro excavation work while onsite. No measurement will be made for travel time “to” or “from” the site. No measurement will be made for re-locating or re-exposing of hydro excavated utilities already measured for payment.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

2.3 SCHEDULE ‘B’ – 3RD STREET WEST

.1 Temporary Water Supply – Item 1

- .1 Scope: Provision of all equipment, material and labour for supply and installation of a temporary water supply to residences, institutions, and businesses affected by the project work. This includes provision of all necessary pipes, hoses, fittings, connections to hydrants, hydrant box/backflow prevention, service connections, flushing and disinfection of temporary water system, cleaning and swabbing, testing; monitoring; furnishing of all materials and labour required therefore; and all related work as defined within the specifications and as shown on the drawings for which payment is not included elsewhere.
- .2 Measurement: Will not be measured for payment.

- .3 Payment: Lump sum payment as follows:
 - .1 When 5% of Schedule B amount is earned and Temporary Water Supply is implemented, 25% of lump sum bid for Temporary Water Supply will be paid.
 - .2 When 10% of Schedule B amount is earned and Temporary Water Supply is implemented, 25% of lump sum bid for Temporary Water Supply will be paid.
 - .3 When 25% of Schedule B amount is earned and Temporary Water Supply is implemented, 10% of lump sum bid for Temporary Water Supply will be paid.
 - .4 When 50% of Schedule B amount is earned and Temporary Water Supply is implemented, 10% of lump sum bid for Temporary Water Supply will be paid.
 - .5 Upon Substantial Performance and Temporary Water Supply is implemented, the unpaid balance of the lump sum bid in the Schedule of Prices for Temporary Water Supply will be paid.

.2 Remove Existing Asphalt – Item 2

- .1 Scope: Provision of all equipment, materials, and labour required for cold milling asphalt up to 150 mm thick, complete. This work includes saw cutting; cold milling, loading, hauling, stockpiling of RAP at the designated stockpile site; street sweeping; ramping; clean-up; and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be on a per square metre basis of asphalt removed.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

.3 Trench Zone Waste Excavation – Item 3

- .1 Scope: Provision of all equipment, material and labor required for waste excavation of the pipe trench zone, complete. The work includes excavating, loading, hauling, placing, stockpiling of suitable waste excavation material at designated stockpile site and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be on a per cubic metre basis of waste excavation, determined by surveys and volume calculations by Contractor and Owner's Representative at the waste excavation disposal site.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

No separate payment will be made for unnecessary excavation or excavation work performed beyond established lines or grades unless otherwise authorized by the Owner's Representative.

No separate payment will be made for damages or for unstable soil conditions caused by surface drainage after the commencement of construction and during maintenance period.

.4 Road Structure Waste Excavation – Item 4

- .1 Scope: Provision of all equipment, material and labor required for waste excavation of the road structure, complete. The work includes excavating, loading, hauling, placing, stockpiling of suitable waste excavation material at designated stockpile site, and disposal of unsuitable waste excavation material, and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be on a per cubic metre basis of waste excavation, determined by volume calculations based on the square metre area of road structure installed to the depths specified in the schedule of prices.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

No separate payment will be made for unnecessary excavation or excavation work performed beyond established lines or grades unless otherwise authorized by the Owner's Representative.

.5 Topsoil Stripping and Placement – Item 5

- .1 Scope: Provision of all equipment, material and labour required for topsoil stripping, stockpiling and placement, complete. The work includes excavating, loading, hauling and stockpiling of existing topsoil; seeding of topsoil stockpile; weed prevention; loading, hauling and placing stockpiled topsoil, grading, screening, preparation and fertilizing, and all related work for which payment is not included elsewhere.
- .2 Measurement: Shall be on a per square metre basis, determined by surveys.
- .3 Payment: Shall be at the unit price bid therefor in the Schedule of Prices.

No separate payment will be made for unnecessary excavation or excavation work performed beyond established lines or grades unless otherwise authorized by the Owner's representative.

.6 Water Network Pipe – Item 6

- .1 Scope: Includes but is not limited to all labour, material and equipment for the supply and installation of HDPE water main pipe, complete. The work includes: excavation; waste excavation; removal, disposal and capping of the existing water main; pipe materials; fittings; couplers; adaptors; corrosion protective paste and tape system, sacrificial anodes; thrust blocks; restrainers; granular materials; swabbing and disinfection; chlorination points; flushing; utility crossings; pressure testing; backfilling; clean-up; and other related work for which payment is not included elsewhere.

- .2 Measurement: Will be on a per linear metre basis of HDPE water pipe installed at the sizes noted in the Schedule of Prices. The length Will be measured horizontally to the nearest tenth of a metre of water main pipe installed.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

.7 25 mm Water Service Replacement – Item 7

- .1 Scope: Provision of all equipment, material and labour required for the removal and replacement of a water service to property line, complete. The work includes excavation; removal and disposal of existing service; pipe materials; fittings; main stop; couplers; curb stop and stand; fittings; utility crossings; connections to mains; swabbing and disinfection; chlorination and flushing; testing; re-connection to existing services at property line; waste excavation; granular materials; backfill; clean-up; and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be made on a per unit basis for each complete water service replaced, in accordance with the sizes as specified in the schedule of prices.
- .3 Payment: Will be at the unit price in accordance with the sizes specified in the Schedule of Prices.

.8 Isolation Valves – Item 8

- .1 Scope: Provision of all equipment, material and labour required for the supply and installation of a water main isolation valve, complete. The work includes: excavation; waste excavation; fittings; couplers; isolation valve; concrete base; valve box; casing; operating rod; top box; lid; granular materials; corrosion protective paste and tape system, sacrificial anodes; swabbing; flushing; disinfection; testing; backfilling; clean-up; and other related work for which payment is not included elsewhere.
- .2 Measurement: Shall be on a per unit basis for complete isolation valve installed at the size noted in the contract documents.
- .3 Payment: Shall be at the unit price bid therefor in the Schedule of Prices.

.9 Connection to Existing Water Distribution System – Item 9

- .1 Scope: Provision of all equipment materials and labour required for the supply and installation of the connections to the existing water distribution system, complete. The work includes excavation; waste excavation; location, isolation and dewatering of existing water main; modification to existing mains; removal of existing thrust blocks, fittings and pipes; supply and installation of fittings, couplers, adaptors, mechanical restrainers, thrust blocks c/w polyethylene sheets, stainless steel nuts/bolts/washers, denso tape & paste system, anodes and granular materials; swabbing and disinfection; flushing; testing; utility crossings; backfilling; clean-up; and all related work for which payment is not included elsewhere.

- .2 Measurement: Will be on a per unit basis for each complete connection to the existing water distribution system in accordance with the size and type specified in the Schedule of Prices.
- .3 Payment: Will be at the unit price bid according to the size and type specified in the Schedule of Prices.

.10 Concrete Removal and Replacement – Item 10

- .1 Scope: Provision of all equipment, materials and labour required for the removal and replacement of concrete structures in accordance with limit lines, sections, alignments and grades; complete. The work includes saw cutting concrete and asphalt; jack hammering; excavation; loading, hauling and disposal of the concrete; tipping fees; subgrade preparation; granular materials; forming; doweling; steel reinforcement; concrete; vibrating, finishing and protection of the concrete; drop sections; backfilling; landscape restoration tie-ins; clean-up; and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be on a per linear metre basis for standard curb and gutter, and swales; and on a per square metre basis for sidewalk and driveways; as specified in the Schedule of prices.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

.11 Local Asphalt Road Structure – Item 11

- .1 Scope: Provision of all equipment, material and labour for installation of local asphalt road in accordance with limit lines, compacted depths, densities, moisture contents and grades; complete. The work includes excavation; subgrade preparation; base granular materials; proof rolling; moisture conditioning of granular surfaces; prime and/or tack coats; hot mix asphaltic concrete materials; ramping; backfilling; compaction; proof rolling; utility crossings; tipping fees; street sweeping; clean-up; and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be on a per square metre basis of asphalt road restoration, in accordance with the type and road structure specified in the Schedule of Prices.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

.12 Hydro Mulch and Dryland Seed – Item 12

- .1 Scope: Provision of all equipment, material and labour for hydro mulch of seeded areas, complete. The work includes mulch, water, tackifiers, additives, application; supply and installation of seed; initial watering of seed; maintenance of seeded area until successful grass catch is achieved; and all related work for which payment is not included elsewhere.

No separate payment will be made for repairs to topsoil due to erosion damage, and/or gullies, and/or washouts, or reapplication of hydro mulch to bare areas during the maintenance period.

- .2 Measurement: Will be on a per square metre basis of placed hydro mulch and seed within the designated limits.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

2.4 SCHEDULE 'C' – RAILWAY AVENUE WEST

.1 Temporary Water Supply – Item 1

- .1 Scope: Provision of all equipment, material and labour for supply and installation of a temporary water supply to residences, institutions, and businesses affected by the project work. This includes provision of all necessary pipes, hoses, fittings, connections to hydrants, hydrant box/backflow prevention, service connections, flushing and disinfection of temporary water system, cleaning and swabbing, testing; monitoring; furnishing of all materials and labour required therefore; and all related work as defined within the specifications and as shown on the drawings for which payment is not included elsewhere.
- .2 Measurement: Will not be measured for payment.
- .3 Payment: Lump sum payment as follows:
 - .1 When 5% of Schedule C amount is earned and Temporary Water Supply is implemented, 25% of lump sum bid for Temporary Water Supply will be paid.
 - .2 When 10% of Schedule C amount is earned and Temporary Water Supply is implemented, 25% of lump sum bid for Temporary Water Supply will be paid.
 - .3 When 25% of Schedule C amount is earned and Temporary Water Supply is implemented, 10% of lump sum bid for Temporary Water Supply will be paid.
 - .4 When 50% of Schedule C amount is earned and Temporary Water Supply is implemented, 10% of lump sum bid for Temporary Water Supply will be paid.
 - .5 Upon Substantial Performance and Temporary Water Supply is implemented, the unpaid balance of the lump sum bid in the Schedule of Prices for Temporary Water Supply will be paid.

.2 Remove Existing Asphalt – Item 2

- .1 Scope: Provision of all equipment, materials, and labour required for cold milling asphalt up to 150 mm thick, complete. This work includes saw cutting; cold milling, loading, hauling, stockpiling of RAP at the designated stockpile site; street sweeping; ramping; clean-up; and all related work for which payment is not included elsewhere.

- .2 Measurement: Will be on a per square metre basis of asphalt removed.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

.3 Trench Zone Waste Excavation – Item 3

- .1 Scope: Provision of all equipment, material and labor required for waste excavation of the pipe trench zone, complete. The work includes excavating, loading, hauling, placing, stockpiling of suitable waste excavation material at designated stockpile site and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be on a per cubic metre basis of waste excavation, determined by surveys and volume calculations by Contractor and Owner's Representative at the waste excavation disposal site.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

No separate payment will be made for unnecessary excavation or excavation work performed beyond established lines or grades unless otherwise authorized by the Owner's Representative.

No separate payment will be made for damages or for unstable soil conditions caused by surface drainage after the commencement of construction and during maintenance period.

.4 Road Structure Waste Excavation – Item 4

- .1 Scope: Provision of all equipment, material and labor required for waste excavation of the road structure, complete. The work includes excavating, loading, hauling, placing, stockpiling of suitable waste excavation material at designated stockpile site, and disposal of unsuitable waste excavation material, and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be on a per cubic metre basis of waste excavation, determined by volume calculations based on the square metre area of road structure installed to the depths specified in the schedule of prices.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

No separate payment will be made for unnecessary excavation or excavation work performed beyond established lines or grades unless otherwise authorized by the Owner's Representative.

.5 Water Network Pipe – Item 5

- .1 Scope: Includes but is not limited to all labour, material and equipment for the supply and installation of HDPE water main pipe, complete. The work includes: excavation; waste excavation; removal, disposal and capping of the existing water main; pipe materials; fittings; couplers; adaptors; corrosion protective paste and tape system, sacrificial anodes; thrust blocks; restrainers; granular materials; swabbing and disinfection; chlorination points; flushing; utility crossings; pressure

testing; backfilling; clean-up; and other related work for which payment is not included elsewhere.

- .2 Measurement: Will be on a per linear metre basis of HDPE water pipe installed at the sizes noted in the Schedule of Prices. The length Will be measured horizontally to the nearest tenth of a metre of water main pipe installed.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

.6 25 mm Water Service Replacement – Item 6

- .1 Scope: Provision of all equipment, material and labour required for the removal and replacement of a water service to property line, complete. The work includes excavation; removal and disposal of existing service; pipe materials; fittings; main stop; couplers; curb stop and stand; fittings; utility crossings; connections to mains; swabbing and disinfection; chlorination and flushing; testing; re-connection to existing services at property line; waste excavation; granular materials; backfill; clean-up; and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be made on a per unit basis for each complete water service replaced, in accordance with the sizes as specified in the schedule of prices.
- .3 Payment: Will be at the unit price in accordance with the sizes specified in the Schedule of Prices.

.7 Isolation Valves – Item 7

- .1 Scope: Provision of all equipment, material and labour required for the supply and installation of a water main isolation valve, complete. The work includes: excavation; waste excavation; fittings; couplers; isolation valve; concrete base; valve box; casing; operating rod; top box; lid; granular materials; corrosion protective paste and tape system, sacrificial anodes; swabbing; flushing; disinfection; testing; backfilling; clean-up; and other related work for which payment is not included elsewhere.
- .2 Measurement: Shall be on a per unit basis for complete isolation valve installed at the size noted in the contract documents.
- .3 Payment: Shall be at the unit price bid therefor in the Schedule of Prices.

.8 Connection to Existing Water Distribution System – Item 8

- .1 Scope: Provision of all equipment materials and labour required for the supply and installation of the connections to the existing water distribution system, complete. The work includes excavation; waste excavation; location, isolation and dewatering of existing water main; modification to existing mains; removal of existing thrust blocks, fittings and pipes; supply and installation of fittings, couplers, adaptors, mechanical restrainers, thrust blocks c/w polyethylene sheets, stainless steel nuts/bolts/washers, denso tape & paste system, anodes and granular materials; swabbing and disinfection; flushing; testing; utility crossings; backfilling; clean-up; and all related work for which payment is not included elsewhere.

- .2 Measurement: Will be on a per unit basis for each complete connection to the existing water distribution system in accordance with the size and type specified in the Schedule of Prices.
- .3 Payment: Will be at the unit price bid according to the size and type specified in the Schedule of Prices.

.9 Concrete Removal and Replacement – Item 9

- .1 Scope: Provision of all equipment, materials and labour required for the removal and replacement of concrete structures in accordance with limit lines, sections, alignments and grades; complete. The work includes saw cutting concrete and asphalt; jack hammering; excavation; loading, hauling and disposal of the concrete; tipping fees; subgrade preparation; granular materials; forming; doweling; steel reinforcement; concrete; vibrating, finishing and protection of the concrete; drop sections; backfilling; landscape restoration tie-ins; clean-up; and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be on a per linear metre basis for standard curb and gutter, and swales; and on a per square metre basis for sidewalk, concrete islands, and driveways; as specified in the Schedule of prices.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

.10 Local Asphalt Road Structure – Item 10

- .1 Scope: Provision of all equipment, material and labour for installation of local asphalt road in accordance with limit lines, compacted depths, densities, moisture contents and grades; complete. The work includes excavation; subgrade preparation; base granular materials; proof rolling; moisture conditioning of granular surfaces; prime and/or tack coats; hot mix asphaltic concrete materials; ramping; backfilling; compaction; proof rolling; utility crossings; tipping fees; street sweeping; clean-up; and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be on a per square metre basis of asphalt road restoration, in accordance with the type and road structure specified in the Schedule of Prices.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

.11 Highway Asphalt Road Structure – Item 11

- .1 Scope: Provision of all equipment, material and labour for installation of local asphalt road in accordance with limit lines, compacted depths, densities, moisture contents and grades; complete. The work includes excavation; subgrade preparation; base granular materials; proof rolling; moisture conditioning of granular surfaces; prime and/or tack coats; hot mix asphaltic concrete materials; ramping; backfilling; compaction; proof rolling; utility crossings; tipping fees; street sweeping; clean-up; and all related work for which payment is not included elsewhere.

- .2 Measurement: Will be on a per square metre basis of asphalt road restoration, in accordance with the type and road structure specified in the Schedule of Prices.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

2.4 SCHEDULE 'D' – ALLEY NORTH OF 3RD AVENUE WEST

.1 Temporary Water Supply – Item 1

- .1 Scope: Provision of all equipment, material and labour for supply and installation of a temporary water supply to residences, institutions, and businesses affected by the project work. This includes provision of all necessary pipes, hoses, fittings, connections to hydrants, hydrant box/backflow prevention, service connections, flushing and disinfection of temporary water system, cleaning and swabbing, testing; monitoring; furnishing of all materials and labour required therefore; and all related work as defined within the specifications and as shown on the drawings for which payment is not included elsewhere.
- .2 Measurement: Will not be measured for payment.
- .3 Payment: Lump sum payment as follows:
 - .1 When 5% of Schedule D amount is earned and Temporary Water Supply is implemented, 25% of lump sum bid for Temporary Water Supply will be paid.
 - .2 When 10% of Schedule D amount is earned and Temporary Water Supply is implemented, 25% of lump sum bid for Temporary Water Supply will be paid.
 - .3 When 25% of Schedule D amount is earned and Temporary Water Supply is implemented, 10% of lump sum bid for Temporary Water Supply will be paid.
 - .4 When 50% of Schedule D amount is earned and Temporary Water Supply is implemented, 10% of lump sum bid for Temporary Water Supply will be paid.
 - .5 Upon Substantial Performance and Temporary Water Supply is implemented, the unpaid balance of the lump sum bid in the Schedule of Prices for Temporary Water Supply will be paid.

.2 Remove Existing Asphalt – Item 2

- .1 Scope: Provision of all equipment, materials, and labour required for cold milling asphalt up to 150 mm thick, complete. This work includes saw cutting; cold milling, loading, hauling, stockpiling of RAP at the designated stockpile site; street sweeping; ramping; clean-up; and all related work for which payment is not included elsewhere.

- .2 Measurement: Will be on a per square metre basis of asphalt removed.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

.3 Trench Zone Waste Excavation – Item 3

- .1 Scope: Provision of all equipment, material and labor required for waste excavation of the pipe trench zone, complete. The work includes excavating, loading, hauling, placing, stockpiling of suitable waste excavation material at designated stockpile site and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be on a per cubic metre basis of waste excavation, determined by surveys and volume calculations by Contractor and Owner's Representative at the waste excavation disposal site.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

No separate payment will be made for unnecessary excavation or excavation work performed beyond established lines or grades unless otherwise authorized by the Owner's Representative.

No separate payment will be made for damages or for unstable soil conditions caused by surface drainage after the commencement of construction and during maintenance period.

.4 Road Structure Waste Excavation – Item 4

- .1 Scope: Provision of all equipment, material and labor required for waste excavation of the road structure, complete. The work includes excavating, loading, hauling, placing, stockpiling of suitable waste excavation material at designated stockpile site, and disposal of unsuitable waste excavation material, and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be on a per cubic metre basis of waste excavation, determined by volume calculations based on the square metre area of road structure installed to the depths specified in the schedule of prices.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

No separate payment will be made for unnecessary excavation or excavation work performed beyond established lines or grades unless otherwise authorized by the Owner's Representative.

.5 Topsoil Stripping and Placement – Item 5

- .1 Scope: Provision of all equipment, material and labour required for topsoil stripping, stockpiling and placement, complete. The work includes excavating, loading, hauling and stockpiling of existing topsoil; seeding of topsoil stockpile; weed prevention; loading, hauling and placing stockpiled topsoil, grading, screening, preparation and fertilizing, and all related work for which payment is not included elsewhere.

- .2 Measurement: Shall be on a per square metre basis, determined by surveys.
- .3 Payment: Shall be at the unit price bid therefor in the Schedule of Prices.

No separate payment will be made for unnecessary excavation or excavation work performed beyond established lines or grades unless otherwise authorized by the Owner's representative.

.6 Water Network Pipe – Item 6

- .1 Scope: Includes but is not limited to all labour, material and equipment for the supply and installation of HDPE water main pipe, complete. The work includes: excavation; waste excavation; removal, disposal and capping of the existing water main; pipe materials; fittings; couplers; adaptors; corrosion protective paste and tape system, sacrificial anodes; thrust blocks; restrainers; granular materials; swabbing and disinfection; chlorination points; flushing; utility crossings; pressure testing; backfilling; clean-up; and other related work for which payment is not included elsewhere.
- .2 Measurement: Will be on a per linear metre basis of HDPE water pipe installed at the sizes noted in the Schedule of Prices. The length Will be measured horizontally to the nearest tenth of a metre of water main pipe installed.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

.7 25 mm Water Service Replacement – Item 7

- .1 Scope: Provision of all equipment, material and labour required for the removal and replacement of a water service to property line, complete. The work includes excavation; removal and disposal of existing service; pipe materials; fittings; main stop; couplers; curb stop and stand; fittings; utility crossings; connections to mains; swabbing and disinfection; chlorination and flushing; testing; re-connection to existing services at property line; waste excavation; granular materials; backfill; clean-up; and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be made on a per unit basis for each complete water service replaced, in accordance with the sizes as specified in the schedule of prices.
- .3 Payment: Will be at the unit price in accordance with the sizes specified in the Schedule of Prices.

.8 Isolation Valves – Item 8

- .1 Scope: Provision of all equipment, material and labour required for the supply and installation of a water main isolation valve, complete. The work includes: excavation; waste excavation; fittings; couplers; isolation valve; concrete base; valve box; casing; operating rod; top box; lid; granular materials; corrosion protective paste and tape system, sacrificial anodes; swabbing; flushing; disinfection; testing; backfilling; clean-up; and other related work for which payment is not included elsewhere.

- .2 Measurement: Shall be on a per unit basis for complete isolation valve installed at the size noted in the contract documents.
- .3 Payment: Shall be at the unit price bid therefor in the Schedule of Prices.

.9 Connection to Existing Water Distribution System – Item 9

- .1 Scope: Provision of all equipment materials and labour required for the supply and installation of the connections to the existing water distribution system, complete. The work includes excavation; waste excavation; location, isolation and dewatering of existing water main; modification to existing mains; removal of existing thrust blocks, fittings and pipes; supply and installation of fittings, couplers, adaptors, mechanical restrainers, thrust blocks c/w polyethylene sheets, stainless steel nuts/bolts/washers, denso tape & paste system, anodes and granular materials; swabbing and disinfection; flushing; testing; utility crossings; backfilling; clean-up; and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be on a per unit basis for each complete connection to the existing water distribution system in accordance with the size and type specified in the Schedule of Prices.
- .3 Payment: Will be at the unit price bid according to the size and type specified in the Schedule of Prices.

.10 Concrete Removal and Replacement – Item 10

- .1 Scope: Provision of all equipment, materials and labour required for the removal and replacement of concrete structures in accordance with limit lines, sections, alignments and grades; complete. The work includes saw cutting concrete and asphalt; jack hammering; excavation; loading, hauling and disposal of the concrete; tipping fees; subgrade preparation; granular materials; forming; doweling; steel reinforcement; concrete; vibrating, finishing and protection of the concrete; drop sections; backfilling; landscape restoration tie-ins; clean-up; and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be on a per linear metre basis for standard curb and gutter, and swales; and on a per square metre basis for sidewalk, concrete islands, and driveways; as specified in the Schedule of prices.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

.11 Lane Asphalt Structure – Item 11

- .1 Scope: Provision of all equipment, material and labour for installation of local asphalt road in accordance with limit lines, compacted depths, densities, moisture contents and grades; complete. The work includes excavation; subgrade preparation; base granular materials; proof rolling; moisture conditioning of granular surfaces; prime and/or tack coats; hot mix asphaltic concrete materials; ramping; backfilling; compaction; proof rolling; utility crossings; tipping fees; street sweeping; clean-up; and all related work for which payment is not included elsewhere.

- .2 Measurement: Will be on a per square metre basis of asphalt road restoration, in accordance with the type and road structure specified in the Schedule of Prices.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

.12 Highway Asphalt Road Structure – Item 12

- .1 Scope: Provision of all equipment, material and labour for installation of local asphalt road in accordance with limit lines, compacted depths, densities, moisture contents and grades; complete. The work includes excavation; subgrade preparation; base granular materials; proof rolling; moisture conditioning of granular surfaces; prime and/or tack coats; hot mix asphaltic concrete materials; ramping; backfilling; compaction; proof rolling; utility crossings; tipping fees; street sweeping; clean-up; and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be on a per square metre basis of asphalt road restoration, in accordance with the type and road structure specified in the Schedule of Prices.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

.13 Hydro Mulch and Dryland Seed – Item 13

- .1 Scope: Provision of all equipment, material and labour for hydro mulch of seeded areas, complete. The work includes mulch, water, tackifiers, additives, application; supply and installation of seed; initial watering of seed; maintenance of seeded area until successful grass catch is achieved; and all related work for which payment is not included elsewhere.

No separate payment will be made for repairs to topsoil due to erosion damage, and/or gullies, and/or washouts, or reapplication of hydro mulch to bare areas during the maintenance period.
- .2 Measurement: Will be on a per square metre basis of placed hydro mulch and seed within the designated limits.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

.14 Remove and Reinstall Chain Link Fence – Item 14

- .1 Scope: Provision of all equipment, materials and labour required to salvage and reinstall various remove and reinstall chain link fence, complete. The work includes; salvage; loading; hauling; unloading; re-installation including fasteners and hardware; clean-up; and all related work for which payment is not included elsewhere.
- .2 Measurement: Will be on a per linear metre basis of chain link fence salvaged and replaced.
- .3 Payment: Will be at the unit price bid therefor in the Schedule of Prices.

END OF SECTION

1. GENERAL

1.1 CO-ORDINATION

- .1 Co-ordinate all construction activities to provide efficient and orderly construction of each and every part of the Work.
- .2 Where construction of one part of the Work is dependent on construction of other parts, schedule and co-ordinate construction activities in the sequence needed to obtain the best results.
- .3 Where availability of space is limited, co-ordinate construction of different parts of the Work to provide maximum accessibility for maintenance, service, and repair.
- .4 Make adequate provisions to accommodate Work scheduled for later construction by Other Contractors or by the Owner's own forces.

1.2 COMMUNICATION EQUIPMENT

- .1 Provide suitable computer equipment and software at the Contractor's office specified in this section for exchange of electronic data by e-mail of the following types of documents:
 - .1 Letters and Memos Microsoft® Word
 - .2 Document Readers Adobe Acrobat® Reader
 - .3 Schedules Microsoft® Project
 - .4 Drawings AutoCAD®
 - .5 Communication Microsoft® Outlook

1.3 COMMUNICATION METHODS

- .1 Communications will be sufficiently given by any one of the following methods:
 - .1 Delivered personally to the Contractor, the Contractor's representative, or left at the Contractor's address as specified in this section.
 - .2 Mailed at any post office to the Contractor's address as specified in this section.
 - .3 Couriered to the Contractor's address as specified in this section.
 - .4 Transmitted by facsimile to the Contractor's facsimile number as specified in this section.
 - .5 Transmitted by Internet to the Contractor's e-mail address as specified in this section.

1.4 CONTRACT ADMINISTRATION

- .1 Co-ordinate scheduling and timing of administrative procedures with other construction activities to avoid delays and provide orderly progress of the Work. Administrative procedures include the following:

- .1 Preparation and monitoring of schedules.
- .2 Co-ordination of construction and removal of temporary facilities.
- .3 Co-ordination, review, and processing of submittals.
- .4 Participation in project meetings.
- .5 Following Contract acceptance procedures.
- .6 Preparation of change order proposals.

1.5 CONTRACTOR'S ADDRESS FOR CORRESPONDENCE

- .1 Submit the name, address, telephone number, facsimile number, and e-mail address to be used for correspondence with the Contractor within 10 days of the date of commencement of the Contract. Update whenever information changes during the Contract.

1.6 OWNER'S ADDRESS FOR CORRESPONDENCE

- .1 The Owner will provide to the Contractor the name, address, telephone number, facsimile number, and e-mail address to be used for correspondence with the Owner within 10 days of the date of commencement of the Contract. This information will be updated as required during the Contract.

1.7 CONTRACTOR'S REPRESENTATIVES AND SITE MANAGEMENT

- .1 Submit an organization chart showing the names, positions, telephone numbers, and responsibilities and levels of authority for the Contractor's representatives and site management organization, within 10 days of the date of commencement of the Contract, and update whenever information changes during the Contract.

1.8 OWNER'S REPRESENTATIVES AND ASSISTANTS

- .1 The Owner will provide to the Contractor an organization chart showing the names, positions, telephone numbers, and responsibilities and levels of authority for the Owner's Representative and assistants, within 10 days of the date of commencement of the Contract, and will update whenever information changes during the Contract.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

1. GENERAL

1.1 ADMINISTRATIVE RESPONSIBILITIES

- .1 The Owner will be responsible for administrative requirements for the following Contract meetings:
 - .1 Pre–construction
 - .2 Construction Progress
 - .3 Environment
- .2 The Contractor shall be responsible for administrative requirements for the following Contract meetings:
 - .1 Workplace Orientation
 - .2 Safety
- .3 The Owner or the Contractor may request additional meetings related to installation of equipment, commissioning progress, warranty, dispute resolution, environmental issues. Unless otherwise specifically requested by the Contractor, the Owner will be responsible for administrative duties related to these meetings. The agenda for these meetings may be combined with that of the construction progress meetings.

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 The administrative requirements for Contract meetings include the following:
 - .1 Scheduling and administering the Contract meetings throughout the progress of the Work.
 - .2 Preparing the agenda for the meetings.
 - .3 Distributing to the relevant attendees written notice of each meeting and the proposed agenda at least 3 days in advance of the meeting date.
 - .4 Presiding at the meetings.
 - .5 Recording the minutes including attendance, significant proceedings and decisions, and action required by the parties.
 - .6 Reproducing and distributing copies of the minutes within 7 days after each meeting to the meeting participants and affected parties not in attendance.
- .2 Representatives of the Contractor, Subcontractors, and Suppliers shall attend meetings as necessary and be authorized to act on behalf of the party each represents.

1.3 PRE–CONSTRUCTION MEETING

- .1 Frequency: Within 15 days after award of the Contract and prior to commencement of activities at the Site.

- .2 Purpose: To review personnel assignments, responsibilities, schedules, submissions, and administrative and procedural requirements.
- .3 Attendees:
 - .1 Contractor's representatives: senior management, site superintendent, major Subcontractors, and others as necessary.
 - .2 Owner's representatives: as determined by the Owner.
- .4 Agenda may include the following:
 - .1 Appointment of representatives of participants in the Work.
 - .2 Schedule of the Work and progress scheduling.
 - .3 Schedule of submittals.
 - .4 Requirements for temporary facilities, site signage, offices, storage sheds, utilities, and fences.
 - .5 Schedule of equipment delivery.
 - .6 Site safety and security.
 - .7 Contemplated changes, change orders, approvals required, costing and mark-up percentages permitted, time extensions, overtime, and administrative requirements.
 - .8 Products and materials provided by the Owner.
 - .9 Record documents.
 - .10 Maintenance manuals.
 - .11 Takeover procedures, acceptance, and warranties.
 - .12 Monthly progress claims, administrative procedures, and holdbacks.
 - .13 Inspection and testing.
 - .14 Insurance and transcripts of policies.
 - .15 Environmental management principles.
 - .16 Mobilization to the Site.

1.4 CONSTRUCTION PROGRESS MEETINGS

- .1 Frequency: Weekly during the course of the Work.
- .2 Purpose: To monitor construction progress, to identify problems and actions required for their solution, and to expedite the Work.

- .3 Attendees:
 - .1 Contractor's representatives: site superintendent and, when so requested by the Owner, Subcontractors, Suppliers, and other parties involved in the Work.
 - .2 Owner's representatives: as determined by the Owner.
- .4 Agenda may include the following:
 - .1 Review and approval of minutes of the previous meeting.
 - .2 Review of the Work progress since the previous meeting.
 - .3 Field observations, problems, and conflicts.
 - .4 Problems that impede the construction schedule.
 - .5 Off-site fabrication delivery schedules.
 - .6 Corrective measures and procedures to regain the Contract schedule.
 - .7 Revisions to the construction schedule.
 - .8 Progress and schedule for the succeeding work period.
 - .9 Submittal schedules.
 - .10 Adherence to quality standards.
 - .11 Contemplated changes effect on the construction schedule and Contract Time.
 - .12 Contentious items of the Work.
 - .13 Contract closeout issues.
 - .14 Safety and security issues.
 - .15 Environmental issues.
 - .16 Other business.

1.5 WORKPLACE ORIENTATION MEETINGS

- .1 Frequency: As required for all new workers prior to commencement of Work on the Site.
- .2 Purpose: To familiarize new workers with site conditions, rules, regulations, safety, and security requirements.
- .3 Attendees: All new Contractor and Owner personnel scheduled to work on the Site.
- .4 Agenda may include the following:
 - .1 Project description including areas of work and other concurrent construction contracts.

- .2 Hazardous areas including open excavations, construction equipment traffic, blasting, and chemical or explosive storage, etc.
- .3 Safety equipment to be worn by workers, including areas with special requirements.
- .4 Traffic routes on the Site.
- .5 Evacuation procedures.
- .6 First aid procedures.
- .7 Excavation or work permit procedures.
- .8 WHMIS (Workplace Hazardous Materials Information System) requirements for handling and storage of chemicals.
- .9 Fire safety rules and regulations.
- .10 Rules and regulations regarding wildlife, environmental concerns, drugs, alcohol, etc.

1.6 SAFETY MEETINGS

- .1 Frequency: Weekly during the course of the Work for each area of work.
- .2 Purpose: To review safety concerns and implement preventive safety measures.
- .3 Attendees: Contractor's and Owner's personnel for each area of work.
- .4 Agenda may include the following:
 - .1 Review and discussion of safety concerns, accidents, and "near misses."
 - .2 Remedial or preventive actions to be taken.

1.7 ENVIRONMENTAL MEETINGS

- .1 Frequency: During the course of Work, schedule environment meetings weekly or as required by the Owner to deal with issues that may arise. Dependent on the issues, the Owner may combine the agenda for environmental meetings with that of the construction progress meetings.
- .2 Purpose: To review environment issues and implement mitigative measures.
- .3 Attendees:
 - .1 Contractor's representatives: Contractor's site superintendent and when so requested by Owner, subcontractors, suppliers and other parties involved in the Work. Contractor's representatives shall be qualified and authorized to act on behalf of the party each represents.
 - .2 Owner's representatives: as determined by Owner.

- .4 Agenda to include the following:
 - .1 Review and discussion of environment concerns, accidents and “near misses”.
 - .2 Identify environmental emergency notification procedures.
 - .3 Identify remedial or preventative action to be taken.
- .5 All employees must attend environmental orientation.

2. **PRODUCTS** – **NOT USED**

3. **EXECUTION** – **NOT USED**

END OF SECTION

1. GENERAL

1.1 DEFINITIONS

- .1 “Administrative Submittals” means data presented for review to ensure administrative requirements of the Contract are met.
- .2 “Shop Drawings” means technical data specifically prepared for work of this Contract including drawings, diagrams, schedules, templates, patterns, and similar information not in standard printed form.
- .3 “Product Data” means standard printed information describing materials, products, equipment, and systems not specifically prepared for work of this Contract. Product Data consisting of manufacturers’ standard schematic drawings, catalogue sheets, diagrams, schedules, performance charts, illustrations, and descriptive data will be accepted in lieu of Shop Drawings provided that:
 - .1 Information not applicable to the work of this Contract is deleted; and
 - .2 Standard information is supplemented with information specifically applicable to the Work of this Contract.
- .4 “Samples” means cuts or containers of materials or partial sections of manufactured or fabricated components that are physically identical to products proposed for use.
- .5 “Field Samples” means volumes of materials as specified, which are physically representative of the materials proposed for use.

1.2 SCHEDULE OF SUBMITTALS

- .1 Submittals required for the Contract are specified in each section of the Contract Documents.
- .2 Submittals required by this section are appended to this section.

1.3 SUBMITTAL PREPARATION

- .1 Determine and verify:
 - .1 Field measurements.
 - .2 Field construction criteria.
 - .3 Catalogue numbers and similar data.
 - .4 Compliance with the Contract Documents.
- .2 Co-ordinate each submittal with requirements of the Work and the Contract Documents.
- .3 Notify the Owner, in writing, on the submittal and at the time of submission, of any deviations from the requirements of the Contract Documents.

1.4 SUBMITTAL REQUIREMENTS

- .1 Make submittals within the times required by the Contract Documents and sufficiently in advance of the date that reviewed submittals will be required, and in such sequence as to cause no delay in the Work.
- .2 Make submittals in the form specified or in a form considered as an industry standard.
- .3 Provide a transmittal letter with each submittal containing:
 - .1 Date.
 - .2 Project Name.
 - .3 Contract Name.
 - .4 Tender Number.
 - .5 Contractor's name and address.
 - .6 Number of each Shop Drawing, Product Data, and Sample submitted.
 - .7 Other pertinent data.
- .4 Include in the submittals:
 - .1 Date and revision dates.
 - .2 Project Name.
 - .3 Contract Name.
 - .4 Tender Number.
 - .5 Name of:
 - .1 Contractor.
 - .2 Subcontractor.
 - .3 Supplier.
 - .4 Manufacturer.
 - .5 Name of detailer when details are not prepared by the Contractor, Subcontractor, or Supplier.
 - .6 The Contractor's stamp, signed, certifying its review of the submittal, verification of field measurements, and compliance with the Contract Documents, or that deviations, if incorporated, will be compatible with other elements of the Work.

1.5 REVIEW OF SUBMITTALS

- .1 The Owner will review each submittal within 10 working days of receipt of the submittal unless specified otherwise in the Contract Documents.

- .2 Make corrections or changes to reviewed submittals and resubmit as specified for the initial submission.
- .3 Until a reviewed submittal is received, do not proceed with the Work related to the submittal.
- .4 The Owner's review of any submittal does not relieve the Contractor from responsibility for errors and omissions, nor deviations from the requirements of the Contract Documents.

1.6 CASH FLOW FORECAST

- .1 Submit to Owner for review, 15 days before submission of first application for payment, a forecast of approximate progress payments for the duration of the Contract.
- .2 Submit revised cash flow forecasts of progress payments as the Work progresses and as requested by Owner.

1.7 LIST OF SUPPLIERS

- .1 Submit a list of suppliers to Owner for review 15 days prior to commencement of activities at the Site.
- .2 Submit revised list of suppliers as the work progresses and as requested by the Owner.

1.8 CONSTRUCTION NOTIFICATIONS - PUBLIC

- .1 Seven days prior to construction, notify all affected businesses, institutions, facilities and residents informing them in writing of the nature of the work to be performed, how long the inconvenience will last, who to contact in the event of damages to the home, business or property, and what to do for access and alternative parking arrangements. The Contractor shall submit the proposed notification to the Owner's Representative for review before issuance.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

1. GENERAL

- .1 Submit for review, shop drawings, product data and samples called for by the Contract Documents and for such other items as the Owner's Representative may reasonably request.
- .2 Until submittal is reviewed, do not proceed with work involving the relevant product.

2. SHOP DRAWINGS

- .1 Shop drawings means technical data specially prepared for work of this Contract; including drawings, diagrams, performance curves, data sheets, schedules, templates, patterns, reports, calculations, instructions, measurements and similar information not in standard printed form.
- .2 Present shop drawings in a clear and thorough manner to appropriately illustrate the work.
- .3 Identify field dimensions on drawings.
- .4 Identify shop drawings by appropriate references to sheet, detail, schedule or room numbers.
- .5 Maximum drawing size: 860 × 1120 mm.
- .6 Leave a clear space of 100 mm × 75 mm on each sheet of shop drawings for placement of Engineer's review stamp.
- .7 Submit PDFs for each required shop drawing.

3. PRODUCT DATA

- .1 Product data means standard printed information describing materials, products, equipment and systems; not specially prepared for work of this Contract, other than the designation of selections.
- .2 Clearly mark product data to identify products.
- .3 Manufacturer's standard schematic drawings, catalogue sheets, diagrams, schedules, performance charts, illustrations and descriptive data will be accepted in lieu of shop drawings provided that:
 - .1 Information not applicable to work of this Contract is deleted, and
 - .2 Standard information is supplemented with information specifically applicable to the work of this Contract.
- .4 Submit clear reproducible information in PDF format.

4. SAMPLES

- .1 Samples means cuts or containers of materials or partial sections of manufactured or fabricated components which are physically identical to products proposed for use and which establish minimum standards by which the work will be judged.
- .2 Label samples as to origin and intended use in the Work.

5. SUBMITTAL PREPARATION

- .1 Review, date and sign, shop drawings, product data and samples, prior to submission.
- .2 Determine and verify:
 - .1 Field measurements.
 - .2 Field construction criteria.
 - .3 Catalogue numbers and similar data.
 - .4 Conformance with Contract Documents.
- .3 Coordinate each submittal with requirements of work and Contract documents. Individual drawings will not be reviewed until all related shop drawing and product data are available.
- .4 Notify Owner's Representative, in writing, on the submittal and at the time of submission, of deviations from requirements of Contract Documents.

6. SUBMISSION REQUIREMENTS

- .1 Make submittals sufficiently in advance of date that reviewed submittals will be required and in such sequence as to cause no delay in the Work.
- .2 Accompany submittals with transmittal letter, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Number of each shop drawing, product data and sample submitted.
 - .5 Other pertinent data.
- .3 Submittals shall include:
 - .1 Date and revision dates.
 - .2 Project title and number.

- .3 Name of:
 - .1 Contractor.
 - .2 Subcontractor.
 - .3 Supplier.
 - .4 Manufacturer.
 - .5 Name of detailer when details not prepared by Contractor, sub-contractor, or supplier.
- .4 Contractor's stamp, initialed or signed, certifying review of submittal, verification of field measurements, and compliance with Contract Documents.
- .4 Make corrections or changes to rejected submittals and resubmit, as specified for initial submission.

7. RESPONSIBILITY FOR ERRORS, OMISSIONS AND DEVIATIONS

- .1 Owner's Representative's review of submittals does not relieve Contractor from responsibility for errors and omissions, nor deviations from requirements of the Contract Documents.

8. REPRODUCTION OF SUBMITTALS

- .1 After final review, Owner's Representative will reproduce at his expense, the number of copies he requires, and return reviewed reproducible documents. Contractor shall reproduce at his expense the number of copies required for performance of the Work.

END OF SECTION

1. GENERAL

1.1 ENVIRONMENTAL LEGISLATION

- .1 Adhere to the latest editions of all applicable federal, provincial and municipal legislation, regulations and Codes of Practice concerning environmental protection and conduct activities in accordance with such legislation, codes and regulations. This includes but not necessarily limited to, the provincial Environmental Protection and Enhancement Act and Water Act; and the federal Fisheries Act and Navigable Waters Protection Act.
- .2 In the event of conflicting statements between the various Acts, Authorizations, Permits, and Codes of Practice, the more stringent requirement shall apply.
- .3 The Owner will obtain the environmental approvals, permits, licences, and authorizations required for the Project.
- .4 Comply with the conditions of all environmental approvals, permits, licences and authorizations issued for the Contract. Obtain any further environmental approvals, permits, licences and authorizations for temporary work as may be required for the Contract.
- .5 Provide the Owner with written confirmation of Contractor's full compliance with all approvals, permits, licences and authorizations before the Final Mobilization / Demobilization payment is released.
- .6 Keep on Site copies of approvals, permits, licences and authorizations. Make these documents readily available to authorized persons at the Site. Keep documents on Site until the date of Warranty Performance of the Work or at such earlier dates accepted by the Owner.

1.2 ENVIRONMENTAL CONSTRUCTION OPERATIONS (ECO) PLAN

- .1 Prepare, submit and implement an Environmental Construction Operations (ECO) Plan for each phase of the Contract in accordance with the Alberta Transportation's manual entitled "Environmental Construction Operations (ECO) Plan Framework," (most current edition). Completed ECO Plans consist of written procedures and drawings that address the environmental protection issues relevant to the site specific activity being performed and shall detail temporary environmental control measures that the Contractor undertakes to comply with all applicable approvals, permits, licenses and authorizations during the course of construction and during "winter shut down," and other similar "shut downs."
- .2 Prepare the ECO Plan specific to the Work and the Site. Ensure effective implementation of the ECO Plan by assigning responsibility for the implementation, and maintenance of the work prescribed by the ECO Plan, including temporary erosion control measures, to one individual, herein called the work zone representative. The work zone representative shall be identified at the pre-construction meeting.
- .3 The ECO Plan shall not cover any permanent or long term environmental or erosion control devices or work specified in the Contract.
- .4 Submit the ECO Plan to the Owner at least 14 calendar days prior to the pre-construction meeting. The Owner will review the ECO Plan and communicate any concerns to the Contractor at least seven calendar days prior to the pre-construction meeting. Address any

issues or concerns regarding the proposed ECO Plan to the satisfaction of the Owner prior to the commencement of the Work.

- .5 Finalized ECO Plans shall be agreed to by all parties and shall be signed by the Contractor's 'Principal-In-Charge' and the Contractor's work zone representative before the commencement of Work. If the Contractor's work zone representative changes; provide a letter of acknowledgement to the Owner indicating that the new work zone representative has reviewed the ECO Plan and will comply with its requirements.
- .6 The finalization of the ECO Plan to the mutual satisfaction of the Owner and the Contractor does not constitute an approval or assurance from the Owner to Provincial or Federal Regulatory Agencies that the "temporary environmental control measures" detailed in the ECO Plan are sufficient to ensure compliance with all applicable permits legislation, regulations or conditions of approval. The Contractor is ultimately responsible to ensure all measures, used on the Work, are sufficient to ensure compliance with all applicable authorities. This may mean increasing the number of installations, providing alternate devices or modifying procedures.
- .7 If at any time during the performance of the Work of the contract, it is determined that the devices or procedures detailed in the ECO Plan (any specific measures, locations or quantities proposed) are inappropriate or insufficient, the Owner will notify the Contractor in writing and the ECO Plan shall be modified accordingly, and resubmitted in a timely manner for Owner's approval..
- .8 The Owner may suspend work in cases where in the Owner's opinion the Contractor fails to comply with procedures stated in the ECO Plan. If the Contractor fails to adhere to finalized ECO Plans, or fails to address the concerns the Owner has given the Contractor (in writing) within seven days of notification, the Owner may make other arrangements to have the work done, and deduct the cost thereof from any money owing to the Contractor.
- .9 The cost of preparing the ECO Plan and the performance of all Work necessary to ensure compliance with the ECO Plan and applicable legislation, regulations or conditions of approval will be incidental to the Work and will not be paid for separately.

1.3 ENVIRONMENTAL RESOURCE PROTECTION

- .1 Ground Water Resources:
 - .1 Do not change ground water levels in wells located on adjacent lands.
 - .2 Do not change ground water quality in adjacent landowner wells.
- .2 Wildlife Management:
 - .1 Do not allow pets on the Site.
 - .2 Do not allow firearms, hunting, or shooting on the Site.
 - .3 Prevent livestock from entering the Site by installing new fences as specified in the Contract Documents; and temporary fences as necessary.
 - .4 Do not harass wildlife.

- .3 Vegetation and Weed Control:
 - .1 Remove or control existing and new adverse vegetation that affects adjacent landowners and their croplands, lawn or landscaping, construction operations, or the function of the Permanent Work.
 - .2 Do not import any materials to the Site that are contaminated with weed seeds. Clean dirty construction and reclamation equipment prior to mobilization, to prevent importing weed seeds.
 - .3 Notify the Owner prior to commencing adverse vegetation control measures.
 - .4 Be responsible for damage to crops, lawns or other vegetation, both on and off the Site, resulting from the Contractor's use of herbicides, or other adverse vegetation control measures.
 - .5 Maintain records of the types and amounts of herbicides purchased, delivered, stored, mixed, and used, and the means of disposal of all excess. Maintain the records current and accurate, and make them available for review by the Owner.
 - .6 Monitor the site for early detection of weed growth during the growing season.
 - .7 Control weeds once by mechanical equipment before they go to seed, but not before August 1, and at no extra cost to the Owner.
- .4 Historical and Archaeological Resources:
 - .1 Protect known heritage resources specified in the Contract Documents with the specified fencing and marking devices.
 - .2 Protect new heritage resources found during the Contract work. Flag an area of 15 m beyond the edge, and surrounding, a new found heritage resource, and report the finding immediately to the Owner.
 - .3 Additional works required to protect new found heritage resources will be authorized by Change Order and valued in accordance with Section 00725 – General Conditions, Article 8.3 – Valuation of Changes in the Work.
- .5 Socio-Economic Considerations:
 - .1 Prevent the discharge of atmospheric contaminants from construction operations in accordance with Regulatory Requirements.
 - .2 Do not operate equipment, including Construction Equipment that shows excessive emissions of exhaust gases, or fluid leaks, until corrective repairs or adjustments are made.
 - .3 Control dust on the Site, and prevent dust from the Site from damaging crops, orchards, cultivated fields, and dwellings, or causing a nuisance to persons. Be responsible for damages from dust caused by construction operations.
 - .4 Direct all stationary floodlights to shine downward at an angle less than horizontal. Provide shielding for all floodlights and do not direct at residences.

1.4 GENERAL ENVIRONMENTAL PROTECTION REQUIREMENTS

- .1 Reporting:
 - .1 Spills or releases of hazardous materials and any other substances that cause or could cause impairment of, or damage to the environment or human health or safety shall be immediately reported to the Owner as well as applicable Regulatory Agencies; and remediation measures undertaken as required and legislated.
- .2 Silt Fence Management:
 - .1 Be responsible for and maintain silt fences until date of Warranty Performance of the Work.
 - .2 Inspect silt fencing at intervals appropriate to weather events. Based on inspections maintain silt fencing in functional condition, remove silt accumulations and dispose on site at locations acceptable to the Owner.
 - .3 Unless otherwise specified in the Contract Documents, or otherwise requested by the Owner, remove temporary silt fencing within 30 days after date of Warranty Performance of the Work.
- .3 Waste Management:
 - .1 Remove construction waste, including demolition waste, from the Site unless otherwise specified. Dispose of such waste at the waste disposal facility identified in the Environmental Management Plan.
 - .2 Do not burn, bury or otherwise discharge construction or demolition waste on the Site unless specified otherwise.
 - .3 When practical, minimize the amount of waste generated from construction operations and demolitions by salvaging materials for recycling. Salvage and segregate metal, plastic, paper, cardboard, and glass and transfer them to the nearest appropriate collection facility.
- .4 Hazardous Materials:
 - .1 Transport hazardous materials to and from the Site in accordance with Regulatory Requirements.
 - .2 Use and store hazardous materials in accordance with Regulatory Requirements.
 - .3 Take all reasonable measures to contain spills, remove spilled materials, and cleanup as required in accordance with the applicable legislation and regulations, at the contractor's expense.
- .5 Handling of Construction Equipment Fuels and Lubricants:
 - .1 Employ persons qualified to handle construction equipment fuels and lubricants.
 - .2 Carry the following protection materials in all fuel and service vehicles:
 - .1 10 kg of suitable sorbant material.

- .2 30 m² of 6 mil polyethylene.
- .3 A shovel.
- .4 An empty fuel barrel with the lid removed.

- .3 Maintain a setback distance of 100 m between stored Construction Equipment fuels and lubricants and rivers, streams, and other surface bodies of water.
- .4 Prevent handling and fuelling operations from contaminating the ground, surface water, and ground water. Use containment berms and an impermeable base course or other system during fueling operations, in order to contain possible spilled fuel.
- .5 Clearly mark and barricade fuel storage areas and non-portable transfer lines. Use markers that are visible under all weather conditions.
- .6 Store waste Construction Equipment lubricants in a tank or closed container, and dispose of off-site in accordance with the Regulatory Requirements.

2. PRODUCTS - NOT USED

3. EXECUTION - NOT USED

END OF SECTION

1. GENERAL

1.1 REGULATORY RESPONSIBILITY

- .1 Conform to Regulatory Requirements and pay all fees and give all notices required by them.
- .2 Obtain approvals necessary for the Work and the Contract from the regulatory agencies having jurisdiction, except those approvals obtained by the Owner as identified in this section.
- .3 The Owner will obtain the approvals necessary for the Project that involve agreement between the Owner and the regulatory agency having jurisdiction.

1.2 VARIATIONS BETWEEN THE CONTRACT DOCUMENTS AND THE REGULATORY REQUIREMENTS

- .1 If the Contract Documents are at variance with Regulatory Requirements, notify the Owner in writing, requesting direction, immediately after such variance becomes known.
- .2 The Owner may make Changes in the Work due to Regulatory Requirements, and such changes will be authorized by Change Order and valued in accordance with Section 00725 – General Conditions, Article 8.3 – Valuation of Changes in the Work.
- .3 If the Contractor fails to notify the Owner in writing and obtain the Owner’s direction related to variations in Regulatory Requirements and performs work knowing it to be contrary to Regulatory Requirements, the Contractor accepts responsibility for correcting violations thereof, and bears the costs, expenses, and damages attributable to the Contractor’s failure to comply with the provisions of such Regulatory Requirements.

1.3 CONTRACT DOCUMENTS

- .1 Contractor shall not be responsible for verifying that Contract Documents comply with regulatory requirements. If Contract Documents are at variance therewith, or changes which require modification to Contract Documents are made to regulatory requirements, by authorities having jurisdiction, subsequent to date of tender closing, Contractor shall notify Owner’s Representative in writing, requesting direction, immediately such variance or change becomes known to him. Owner’s Representative may make changes required to Contract Documents and any resulting change in Contract Price or Contract Time will be made in accordance with the General Conditions of Contract.
- .2 If Contractor fails to notify Owner’s Representative in writing and obtain Owner’s Representative’s direction as required in paragraph 1.3.1 and performs work knowing it to be contrary to regulatory requirements, Contractor shall be responsible for and shall correct violations thereof and shall bear costs, expenses and damages attributable to his failure to comply with provisions of such regulatory requirements.

1.4 ALBERTA BUILDING CODE

- .1 Conform to and perform work in accordance with the Alberta Building Code, except as otherwise indicated in Contract Documents.

1.5 ALBERTA ENVIRONMENT

- .1 The Owners have made application for the proposed work under the Alberta Environmental Protection Act. Do not commence work on the project until approval has been obtained by the Owner.

1.6 PERMITS

- .1 Development Permit: Owner will apply for, obtain, and pay for development permit if required.
- .2 Building Permit:
 - .1 Apply for, obtain and pay for building permit and other permits required for the Work and its various parts.
 - .2 Display the building permit and such other permits in a conspicuous location at the Place of the Work.
- .3 Occupancy Permits:
 - .1 Where required by authority having jurisdiction, apply for, obtain, and pay for occupancy permits, including partial occupancy permits.
 - .2 Where Contract Document deficiencies are required to be corrected in order to obtain occupancy permits, including partial occupancy permits, Owner's Representative will issue appropriate instructions to correct the Work.
 - .3 Turn occupancy permits over to Owner's Representative.

1.7 LINEAR LAND RECLAMATION

- .1 Adhere to all requirements as stipulated by Alberta Environment and Parks relative to linear land reclamation of pipeline right of ways.

2. PRODUCTS - NOT USED

3. EXECUTION - NOT USED

END OF SECTION

1. GENERAL

1.1 WORK SITE SAFETY – THIS CONTRACTOR IS “PRIME CONTRACTOR”

- .1 For the purposes of the *Occupational Health and Safety Act* (Alberta), and for the duration of the Work of this Contract:
 - .1 Be the “prime contractor” for the “work site”; and
 - .2 Do everything that is reasonably practicable to establish and maintain a system or process that complies with the Act and its regulations, and as required to provide for the health and safety of all persons at the “work site.”
- .2 Direct all Subcontractors, Sub-subcontractors, Other Contractors, employers, workers, and any other persons at the “work site” on safety related matters, to the extent required to fulfil “prime contractor” responsibilities pursuant to the Act, regardless of:
 - .1 Whether or not any contractual relationship exists between the Contractor and any of these entities; and
 - .2 Whether or not such entities have been specifically identified in this Contract.

1.2 CERTIFICATE OF RECOGNITION (COR)

- .1 Maintain a valid COR for the duration of the Work of this Contract.

1.3 SAFETY REQUIREMENTS

- .1 Establish and maintain a system or process to provide for the safety for all persons at the Site during the Contract Time, including:
 - .1 The development and implementation of satisfactory safety plans for all aspects of work and the co-ordination of all plans;
 - .2 The establishment of a safety committee; and
 - .3 Conducting safety meetings and workplace orientation meetings.
- .2 Communicate and co-operate on safety matters with the Owner and Occupational Health and Safety.
- .3 Comply with federal, provincial, and municipal legislation, including the Workplace Hazardous Materials Information System.
- .4 Rectify unsafe conditions, and be responsible for all related costs and delays.
- .5 Advise the Owner as soon as possible of all accidents.
- .6 Investigate any accident that causes injury, and complete accident forms and prepare accident reports.
- .7 Provide and maintain a first aid room and equipment as required by the Occupational Health and Safety Regulations.

- .8 Maintain first aid supplies, space, and trained personnel on Site as required by the Occupational Health and Safety Regulations.
- .9 Have at least one qualified first aider on Site for each work shift.

1.4 SUBMITTALS

- .1 Provide the following submittals.
- .2 The Certificate of Recognition (COR) prior to commencing Work at the Site.
- .3 The name of the person responsible for supervision of the Contractor's safety plan at the Site prior to commencing Work at the Site.
- .4 The names of workers qualified as first aiders prior to commencing Work at the Site including monthly updates.
- .5 At the end of each month, a list of accidents including lost time injuries incurred for the month, and a cumulative summary of all accidents and total lost time including a comparison with the total work time since the start of the Contract.
- .6 Completed accident forms and reports as soon as possible.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

1. GENERAL

1.1 QUALITY CONTROL

- .1 Establish and maintain an effective quality control system including quality control procedures and testing to ensure compliance with the requirements of the Contract Documents.
- .2 Conduct tests incorporated in the quality control system and as required in the Specifications.
- .3 Engage qualified personnel, professional engineers, and independent CSA certified materials engineering and testing companies to carry out designs and to perform tests when required by the Specifications.

1.2 QUALITY ASSURANCE

- .1 The Owner will perform quality assurance testing and inspection as the Owner deems appropriate.
- .2 Co-operate with the Owner and provide assistance required by the Owner for testing, inspection, and sampling; provide access including off-Site locations; and provide equipment and labour to obtain samples.
- .3 If the quality assurance testing identifies quality deficiencies, the extent of removal and replacement of potentially deficient materials will be at the discretion of the Owner and will include, at least, all related materials placed after the Owner's previous quality assurance testing indicated acceptable quality.
- .4 If the quality assurance testing identifies ongoing quality deficiencies, submit to the Owner in writing, proposed revisions to the quality control procedures and testing that will prevent quality deficiencies. Continue the work only when the proposed quality control revisions have been reviewed with no exceptions taken by the Owner and implemented by the Contractor.

1.3 TESTING BY CONTRACTOR

- .1 Contractor shall furnish to Owner's Representative, upon request, test results from testing performed by Contractor.

1.4 TESTING BY OWNER

- .1 Owner reserves the right to employ services of independent testing agencies to establish if work complies with Contract Documents. Owner will appoint and pay for services of such testing agency.
- .2 Where tests or inspections, by Owner appointed testing agency, indicate work is not in accordance with the Contract Documents, additional tests or inspections, as Owner may require, to verify acceptability of corrected work, shall be paid for by Contractor.

1.5 REFERENCE STANDARDS

- .1 Within the text of these specifications, reference may be made to the following standards:
 - .1 ANSI - American National Standards Institute
 - .2 ASTM - American Society for Testing and Materials
 - .3 CGSB - Canadian General Standards Board
 - .4 CSA - Canadian Standards Association
 - .5 CAN 2 - National Standard of Canada (published by CGSB)
 - .6 FM - Factory Mutual Engineering Corporation
 - .7 ULC - Underwriters Laboratories of Canada
 - .8 CAN 3 - National Standard of Canada (published by CSA)
- .2 The testing of materials may be requested by the Owner, to prove conformance with Standards, and shall be paid for by the Contractor.
- .3 The referenced standard and any amendments in force on the day of receipt of tenders shall be applicable to the work during the duration of the Contract.

2. PRODUCTS - NOT USED

3. EXECUTION - NOT USED

END OF SECTION

1. GENERAL

1.1 EXISTING UTILITIES

.1 Contractor's General Responsibilities:

- .1 The approximate existence of service lines known to the Owner are indicated in the Contract Documents. Confirm the number, type, location and elevation of all existing service lines. Contact the appropriate Utility to locate all lines, conduits, and other such structures. Notify the Owner if any service lines have been omitted from or are incorrectly specified in the Contract Documents.
- .2 Identify, stake, and flag all existing service line locations and elevations. Maintain staking and flagging.
- .3 Notify the appropriate Utility prior to carrying out operations in the vicinity of the service lines. Comply with the requirements of and co-operate fully with, each Utility for the location and protection of the service lines during the Work.
- .4 Be responsible to the Utility for any claims resulting from damage to the service lines as a result of the Contractor's construction operations.
- .5 Promptly notify the Utility and the Owner in the event of any damage or interruption to any services caused by the Contractor's construction operations. Co-operate with the Utility in the restoration of service as promptly as possible and bear all costs arising from the damage or interruption.
- .6 Excavation adjacent to power poles may require the poles to be supported. Contact the Owner of the power poles to determine if pole supporting is required for the construction methodology employed. Support power poles as necessary to complete the work.
- .7 At no time interfere with the operations of existing utilities.
- .8 Notify the utility owner at least 48 hours in advance of any interruption required for purposes of the work of an affected utility.
- .9 Co-ordinate the timing of the connections with the affected Owner of the specific utilities as required for the construction works.
- .10 Do not operate any existing water main valves and hydrants.
- .11 Only the utility owner's personnel shall operate the utility.
- .12 Advise the proper authorities and Fire Departments of hydrants which will be out of commission, so that alternate fire protection can be provided for.
- .13 Install a non-shrink grout plug at each end of any abandoned pipe that is not removed during construction.
- .14 Meet Occupational Health and Safety (OH&S) regulations and requirements for all work associated with asbestos cement water materials.

- .2 Utility Crossings:
 - .1 The shallow Utility Owner(s) shall complete all relocation, modification, and repair work as highlighted in the drawings. The costs of shallow utility relocations, modifications, and repairs undertaken by the shallow Utility Owner(s) and shown on the drawings shall be borne by the Owner. All other shallow utility relocations, modifications, and repairs shall be borne by the Contractor.
 - .2 Co-ordinate all relocation, modification and repair work with the construction schedule and assist the utility Owner where needed. No separate payment will be made for this work.
- .3 Hydro Excavation:
 - .1 Hydro excavation shall be used to locate and expose existing utilities to be crossed by the underground utility works.
 - .2 The hydro excavation work includes locates; hydro excavation; measuring and recording of the hydro excavation information; securing and protecting the locate holes; and sand backfill.
 - .3 No separate payment will be made for relocating of existing utilities that were previously hydro excavated and measured for payment.
 - .4 No separate payment will be made for hydro excavating of shallow utilities related to roadwork unless approved by the Owner's Representative.
 - .5 Provide monthly written statements to the Owner's Representative for the hydro excavation hours for review and approval. Keep a running total of approved hydro excavation hours to date and shall provide that information to the Owner's Representative upon request.

1.2 TEMPORARY UTILITIES

- .1 Provide the specified temporary utilities and as otherwise required in order to execute the Work expeditiously. Remove the temporary utilities from the Site upon completion of the Work unless specified otherwise.
- .2 Co-ordinate and pay for all required temporary utility work.
- .3 Temporary Power and Light:
 - .1 Provide power for the Owner's Site office.
 - .2 Arrange for connection with the appropriate Utility. Pay all costs for installation, maintenance, power consumption, and removal.
 - .3 Provide and maintain sufficient temporary power for all construction equipment required to carry out the Work.
 - .4 Provide and maintain adequate lighting to safely perform the Work. Provide white light for night construction. Avoid light pollution off the Site.

- .5 Where failure of the normal lighting system would endanger workers, provide an emergency lighting system capable of producing sufficient dependable illumination to enable the workers to:
 - .1 Leave the worksite;
 - .2 Initiate emergency shut-down procedures; or
 - .3 Restore normal lighting.
- .4 Temporary Heating and Ventilation:
 - .1 Provide temporary heating for the Owner's Site office including maintenance and fuel consumption during the period of construction up to the date of Substantial Performance. Design the heating system for a temperature differential of 60°C and to be capable of maintaining a minimum temperature of 16°C.
 - .2 Provide temporary heating for construction as specified in the Contract Documents.
- .5 Temporary Water Supply:
 - .1 Provide a continuous supply of potable water for the Owner's Site office.
 - .2 Provide a continuous supply of potable water to affected residence, institutions and businesses as required in order to execute the work expeditiously. Remove the temporary utilities from the site upon completion of the work unless specified otherwise.
 - .3 Pay all costs of providing the temporary works and the potable water used for construction purposes.
 - .4 Provide and maintain appropriate temporary fire protection equipment during the performance of the work as required.
- .6 Temporary Sanitation Facilities:
 - .1 Provide and maintain temporary sanitary facilities on site for work as required by legislation.
 - .2 Provide sanitation facilities for the Owner's Site office.
 - .3 Arrange and pay all costs for installation, maintenance, and removal.
 - .4 Re-establish sanitary services to affected residences, institutions and businesses as required to execute the work as quickly as possible.
- .7 Temporary Natural Gas or Propane Supply:
 - .1 Provide a continuous supply of natural gas or propane for the Owner's Site office.
 - .2 Arrange for connection with the appropriate Utility and pay all costs for installation, maintenance, and removal.
 - .3 Pay for utility charges.

1.3 CROSSING AGREEMENTS

- .1 Owner has made application for all required utility crossing agreements. Do not commence work on the utility crossings portion of the project until the Owner has obtained the agreements.
- .2 Meet the requirements of the applicable crossing agreements when undertaking all utility crossing work.
- .3 A copy of the crossing agreement will be provided to the Contractor once issued.
- .4 The Owner's representative and the Owner offer no interpretation of the crossing agreements. It is the responsibility of the Contractor to determine how to utilize the information provided to determine how the proposed work will be installed; and to provide all necessary equipment and labour for such installation. Any unforeseen delays or costs as a result of the crossings are the responsibility of the Contractor.
- .5 The following is a list of the crossing agreements that are expected:
 - .1 TELUS Communications
 - .2 Bell West Communications
 - .3 Shaw Communications
 - .4 Alpha Gas
 - .5 ATCO Electric
 - .6 Big Country Gas Co-Op

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

1. GENERAL

1.1 REFERENCES

- .1 Provide traffic accommodation in accordance with the latest edition and revisions of the Alberta Transportation – “Traffic Accommodation in Work Zones”, unless otherwise specified.
- .2 All traffic accommodation signage shall be in accordance with the latest edition of the “Manual of Uniform Traffic Control Devices for Canada” by the Traffic Association of Canada (TAC).

1.2 EXISTING ROADS

- .1 Protect the integrity of existing road structures including using suitably sized equipment and implementing construction procedures that will minimize damage to the structures.
- .2 Determine the condition and availability of public roads, clearances, restrictions, bridge load limits, bond requirements, conditions of use, and other limitations that may affect ingress to and egress from the site.
- .3 Complete a detailed video survey of all roadways and private property that may be used or impacted by the construction activities, prior to commencing any construction activities. The video survey will establish the condition of those areas prior to construction and will be the basis for any restoration work that may arise. Provide a copy of the video survey to the Owner’s Representative within 7 days of commencement of work.
- .4 Clean existing roads impacted by the construction activities, as directed by the Owner’s Representative and at no cost to the Owner.
- .5 Motor scrapers, rock trucks or tracked equipment are not permitted to travel on highways, bridges, irrigation works, paved roadways and lanes.
- .6 Do not block or impede access roads or driveways to local landowner residences located adjacent to the work sites.

1.3 TEMPORARY ACCESS ROADS, HAUL ROADS AND DETOURS

- .1 Design and construct all temporary roads, crossings across existing irrigation works, temporary bridges, and drainage structures required for construction operations.
- .2 Provide detours required for the execution of the Work.
- .3 Confine construction traffic to the limits of temporary roads and avoid disturbances to adjacent lands.
- .4 Contain hauled material in vehicles, and keep routes clear of mud, fallen rock, and debris resulting from construction operations.
- .5 Control dust, remove snow, and maintain road surfaces daily or at frequent intervals depending upon weather or traffic and as required by the Owner.
- .6 Reclaim all haul roads when they are no longer required. Scarify, grade to original contours, cultivate, replace topsoil, and seed to grass.

1.4 TRAFFIC ACCOMMODATION STRATEGY

- .1 Comply with all requirements of the road authority having jurisdiction over public roads used by the Contractor in the execution of the Work.
- .2 Determine the condition and availability of public highways and roads, clearances, restrictions, bridge load limits, bond requirements, and other limitations that may affect ingress to and egress from the Site.
- .3 Comply with applicable load regulations during hauling of materials and equipment over public highways, roads, or bridges. Minimize interference with local traffic.
- .4 Keep public highways and roads impacted by the Work open to traffic and passable at all times.
- .5 Retain qualified personnel or organizations specializing in such work to develop a Traffic Accommodation Strategy in accordance with Alberta Transportation - "Traffic Accommodation in Work Zones" documents and the requirements of other road authorities having jurisdiction.
- .6 The Traffic Accommodation Strategy work includes all equipment, material and labour required for the preparation, notification, implementation, modification, maintenance and removal component works necessary to complete the contract work.
- .7 The major components of the Traffic Accommodation works includes the following:
 - .1 Preparation:
 - .1 Utilize any traffic accommodation plans provided in the contract drawings as a basis to develop a plan for their work schedule. Assume ownership of any information from the provided traffic accommodation plan that is used to develop the traffic accommodation plan work.
 - .2 Prepare and provide the Owner's Representative a copy of their proposed traffic accommodation plan for review and comment a minimum of 14 days prior to implementation. Accommodating review comments is considered incidental.
 - .3 Undertake a detailed video survey of all highway, bridges, irrigation works, roadways, and lanes to be used or impacted by the Traffic Accommodation Strategy work. The video survey will establish the condition of those areas as the basis for any restoration work that may arise. Provide a copy of the video survey to the Owner's Representative within 7 days of commencement of traffic accommodation works.
 - .2 Notifications:
 - .1 At least 14 days prior to implementation of the traffic accommodation plan, provide written notification to the proper authorities including emergency services of proposed traffic accommodation works, detours, road closures and alternate traffic routes.
 - .2 Seven days prior to implementation of the traffic accommodation plan, distribute written construction notifications to all affected residences, businesses, institutions and facilities informing them the nature of the

work to be performed, how long the inconvenience will last, who to contact to register any complaint/claim. Submit the proposed notification to Owner's Representative for review and comment prior to distribution to the public.

.3 Implementation:

- .1 Supply and install all detours, construction signage, traffic control and information signage required by their traffic accommodation plan and that is necessary to protect the work site and the safety of the workers and the public. The signage may include arrow boards, traffic signalization, barricades, delineators, glow posts, flashers, flashing lights, flagmen and associated items.
- .2 Supply and install all protective measures required by their traffic accommodation plan necessary to protect the work site and the safety of the workers and the public. The protective measures may include barricades, protective barriers, fences, delineators, glow posts, flashers, flashing lights, flagmen and associated items.
- .3 Provide qualified flagmen to control traffic at all locations where the Contractor's operations interfere with public highways, roads, and detours.
- .4 The Owner will not provide any signage, protective measures or such items.
- .5 Provide and maintain a barrier between his work site and the public, where possible.
- .6 Safeguard all on-site equipment and materials.

.4 Modification:

- .1 Supplement, modify and/or improve the traffic accommodation works on an ongoing basis to meet any vehicle and/or pedestrian traffic issues that may arise. This may include the addition or deletion of signage, protective measures and associated works. All modifications must be documented, submitted and reviewed by the Owner's Representative prior to implementation.

.5 Maintenance:

- .1 When working onsite, check and maintain all traffic accommodation signage and protective measures work at least three times daily or as required. All maintenance items shall be remedied immediately upon notification.
- .2 When not working onsite, check and maintain all traffic accommodation signage and protective measures work at least twice daily or as required. All maintenance items shall be remedied immediately upon notification.
- .3 Check, maintain and repair all traffic accommodation signage and protective measures for the duration of the work to ensure a safe protected route for both pedestrian and vehicular traffic at all times.

.4 Promptly provide dust control and repair any damage to public highways, roads, and bridges resulting from traffic accommodation works in order to maintain public safety, access and use.

.6 Removal:

.1 At the completion of the contract work, remove all traffic accommodation signage and protective measures. All covered/salvaged permanent signage removed during construction shall be uncovered/re-installed.

.2 Upon achieving substantial performance of the Contract work, the Contractor, Owner's Representative and Owner shall review all traffic accommodation works and detour routes to determine if any corrective works are required. Any corrective work will be included in the project deficiency list. All corrective work is considered incidental.

2. **PRODUCTS** – **NOT USED**

3. **EXECUTION** – **NOT USED**

END OF SECTION

1. GENERAL

1.1 REFERENCES

- .1 Reference are made to standards as listed in the Specifications.
 - .1 Conform to these standards, in whole or in part, as required in the Specifications.
 - .2 Conform to the latest date of issue of the standards in effect on the date of the submission of bids, except where another date or issue is specified.

1.2 SUBMITTALS

- .1 When requested by the Owner, a complete description of the procedures for installing the product.
- .2 When requested by the Owner, appropriate design calculations for the products to be installed.

1.3 DELIVERY, STORAGE, AND HANDLING

- .1 Inspect each shipment of products and timely replace any missing or damaged items.
- .2 Handle and store products in a manner to prevent damage, alteration, deterioration, and soiling, and in accordance with the manufacturer's written instructions when applicable.
- .3 Store packaged or bundled products in original and undamaged condition with the manufacturer's seal and label intact. Do not remove products from packaging or bundling until required in the Work.
- .4 Store products subject to damage from weather in weatherproof enclosures.

2. PRODUCTS

2.1 PRODUCT QUALITY

- .1 Provide products that conform to the Contract Documents, are new, not damaged or defective, and of the best quality (compatible with the Specifications) for the purpose intended. If requested by the Owner, furnish evidence as to the type, source, and quality of products provided.
- .2 Defective products, whenever identified prior to the completion of the Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility from the Contractor, but provides a precaution against oversight or error.
- .3 Unless otherwise indicated in the Contract Documents, maintain uniformity of manufacture for any particular or like items.
- .4 Do not place permanent labels, trademarks, or nameplates on products in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

2.2 PRODUCT AVAILABILITY

- .1 Immediately upon signing Contract, review Product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of Products are foreseeable, notify the Owner's Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In the event of failure to notify the Owner's Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Owner's Representative reserves the right to substitute more readily available Products of similar character, at no increase in Contract Price.

3. EXECUTION

3.1 PRODUCT CONTROL

- .1 Maintain an inventory of all products delivered to the Site and placed in temporary storage.
- .2 Record the use of products during the course of construction.
- .3 When requested by the Owner, provide inventory records for verification of quantities.

3.2 TRANSPORTATION, STORAGE, HANDLING AND PROTECTION

- .1 Pay costs of transportation of products required in the performance of Work.
- .2 Handle and store products in a manner to prevent damage, alteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .3 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and label intact. Do not remove from packaging of bundling until required in the Work.
- .4 Store products subject to damage from weather in weatherproof enclosures.
- .5 Store cementitious products clear of earth or concrete floors, and away from structures or undrained depressions.
- .6 Store and handle miscellaneous steel products and reinforcing steel by methods such that materials are not contaminated by mud, soil, dust or other debris.
- .7 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .8 Stockpile sand, gravel or processed granular materials on a well drained prepared pad with low exposure to dust accumulation.
- .9 Store sheet materials and lumber in flat, solid supports and keep clear of ground. Slope to shed moisture.
- .10 Remove and replace damaged products at own expense and to the satisfaction of the Owner.

3.3 INSTALLATION STANDARDS

- .1 Unless otherwise specified in the Contract Documents, install products in accordance with the manufacturer's instructions. Do not rely on labels or enclosures provided with the products. Obtain written instructions directly from the manufacturers.
- .2 Notify the Owner, in writing, of conflicts between the Contract Documents and the manufacturer's instruction, so that the Owner may establish a course of action.

3.4 REMEDIAL WORK

- .1 Repair or replace the parts or portions of the Work identified by the Owner as defective or unacceptable.
- .2 Retain specialists familiar with the products affected to perform remedial work in a manner that neither damages nor endangers any portion of the Work.

END OF SECTION

1. GENERAL

1.1 DEFINITIONS

- .1 “Proprietary Specification” means a specification that lists one or more proprietary names of products or manufacturers and may also include descriptive language, references to standards, or lists performance requirements, or any combination thereof.
- .2 “Non–proprietary Specification” means a specification that uses descriptive language, references to standards, or lists performance requirements, or any combination thereof, but does **not** include proprietary names of products or manufacturers.
- .3 “Substitute Product” means a product not specified by proprietary name that may be acceptable in place of a product which is specified by proprietary name.
- .4 “Substitute Manufacturer” means a manufacturer not specified by proprietary name that may be acceptable in place of manufacturer which is specified by proprietary name.
- .5 “Substitution” means a Substitute Product or Substitute Manufacturer.

1.2 PRODUCT OPTIONS

- .1 For products specified by Non–proprietary Specification:
 - .1 Select any product by any manufacturer that meets the requirements of the Contract Documents.
- .2 For products specified by Proprietary Specification:
 - .1 Select any product or manufacturer named; or
 - .2 Select a substitute product or manufacturer in accordance with Article 1.3.
- .3 For products specified by Proprietary Specification and accompanied by words indicating that substitutions will not be accepted:
 - .1 Select any product or manufacturer named; Substitutions will not be permitted.

1.3 SUBSTITUTIONS

- .1 Where Substitute Products are permitted; unnamed products will be authorized by the Owner, subject to the following:
 - .1 Substitute Products shall be the same types as, be capable of performing the same functions as, and meet or exceed the standards of quality and performance of the named product(s). Substitute Products shall not require revisions to the Contract Documents nor to work of Other Contractors.
- .2 Do not order or install Substitutions without the Owner’s authorization.
- .3 If, in the Owner’s opinion, a Substitution does not meet the requirements of the Contract Documents, provide a product that, in the Owner’s opinion, does meet the requirements of the Contract Documents.

1.4 CHANGES TO AUTHORIZED PRODUCTS AND MANUFACTURERS

- .1 Do not change products or manufacturers, authorized by the Owner for use in performance of the Work, without the Owner’s written authorization.
- .2 Submit requests to change authorized products and manufacturers to the Owner in writing, including the product data indicated in Article 1.5.

1.5 PRODUCT DATA

- .1 When requested by the Owner, submit complete data substantiating compliance of a product with the requirements of the Contract Documents. Include the following:
 - .1 Product identification, including the manufacturer’s name and address.
 - .2 Manufacturer’s literature providing product description, applicable reference standards, and performance and test data.
 - .3 Samples, as applicable.
 - .4 Name and address of projects where the product has been used and the date of each installation.
 - .5 For Substitutions and requests for changes to authorized products, include, in addition to the above, the following:
 - .1 Itemized comparison of the substitution with the named product(s). List significant variations.
 - .2 Availability of maintenance services and sources of replacement products and parts.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

1. GENERAL

1.1 SURVEY REFERENCE POINTS

- .1 Primary horizontal and vertical survey reference points have been established by the Owner as specified in the Contract Documents. The Owner is responsible for the accuracy of the primary survey reference points.
- .2 Locate, confirm, and protect primary reference points prior to starting Work on the Site. Preserve permanent reference points during construction.
- .3 Make no changes to or relocations of the primary survey reference points without prior written authorization of the Owner.
- .4 Report to the Owner when a reference point is lost or damaged, or requires relocation because of the Work.
- .5 Replace damaged reference points in accordance with the original survey control.

1.2 CONTRACTOR SURVEY WORK

- .1 Employ qualified construction surveyors to perform survey work.
- .2 Record survey data in accordance with standard survey methods in a form acceptable to the Owner.
- .3 Establish secondary survey reference points required for laying out and staking the Work and for checking tolerances. Be solely responsible for the accuracy of the secondary survey reference points and the layout, staking, and checking of the Work.
- .4 Establish lines, grades, and elevations, and locate and lay out the Work.
- .5 Provide final grade staking of each line, grade or elevation required for the Owner's checking of the work and for measurement for payment purposes, as defined in Section 01280 – Measurement Schedule, for checking by the Owner. Maintain final grade stakes in place until the Owner has authorized their removal.
- .6 Provide such assistance as may be required by the Owner for carrying out surveys in Article 1.4.
- .7 Establish and maintain survey reference points in all work areas, including elevations and locations relative to established stationing and offset systems or otherwise required by the Owner. Provide reference points within 50 m horizontal distance and 2 m vertical distance of all locations where testing, observations of conditions, or other similar activities are undertaken by the Owner, such that the Owner can establish the location and elevations at those locations.

1.3 GLOBAL POSITIONING SYSTEMS (GPS)

- .1 If GPS controlled excavation and trimming equipment is utilized in conjunction with GPS final grade checking, the Owner may waive the requirement for final grade stakes if the accuracy and consistency of the final grade check can be demonstrated.

- .2 If the final grade stake requirement is waived, provide a surface grade sheet in electronic and hard copy of the electronic survey data in a format acceptable to the Owner.
- .3 The surface grade sheet to include the following minimum information:
 - .1 Station.
 - .2 Offset left or right of the centerline.
 - .3 Design elevation at the grade line break point.
 - .4 Actual elevation at the grade line break point.
 - .5 Deviation of the actual elevation from the design elevation.
 - .6 Indication if deviation is within specified tolerances.

1.4 OWNER'S SURVEY REQUIREMENTS

- .1 The Owner may carry out surveys, as the Owner deems necessary, to check the accuracy of the Contractor's layout and stakes.
- .2 The Owner will carry out surveys for the purpose of measuring the Work for payment.

1.5 SUBMITTALS

- .1 Provide the following submittals.
- .2 The name and address of the Contractor's surveyor to the Owner prior to commencing the Work at the Site.
- .3 When requested, submit a copy of reduced notes for surveys or portions of surveys to the Owner.
- .4 A certificate signed by the Contractor's surveyor confirming that the lines, grades, elevations, and dimensions of the completed Work are in conformance or not in conformance with the Contract Documents. Provide details of all non-conformances.
- .5 Electronic survey data files in a format acceptable to the Owner.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

1. GENERAL

- .1 Perform final cleaning operations prior to the request for inspection for Total Performance.
- .2 Remove surplus products, tools, construction machinery, and equipment not required for the performance of the remaining Work prior to the request for inspection for Substantial Performance.
- .3 Remove waste products and debris resulting from the Work of the Contractor, and leave the Work clean and suitable for use by the Owner.
- .4 Repair, patch, and touch-up marred surfaces to match adjacent finishes.
- .5 Leave all surfaces in a neat, levelled condition.
- .6 Excavate and dispose of contaminated soils from equipment service and maintenance areas.
- .7 Excavate and dispose of excess soils including impervious, random, granular, and riprap materials.
- .8 Clean up and dispose of all foreign matter including wire, posts, logs, branches, roots, rocks, and construction debris.
- .9 Remove all temporary work.
- .10 Clean and sweep all new and existing roadways affected by contract work.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

1. GENERAL

1.1 SUMMARY OF PROCESS

- .1 A Contract acceptance process will be used to facilitate the Owner's acceptance of the Work. The process can be summarized as follows:
 - .1 Substantial Performance of the Work:
 - .1 Fulfilment of prerequisites to Substantial Performance.
 - .2 Inspection for Substantial Performance.
 - .3 Issuance of a Certificate of Substantial Performance.
 - .2 Total Performance of the Work:
 - .1 Fulfilment of prerequisites to Total Performance.
 - .2 Inspection for Total Performance.
 - .3 Issuance of a Certificate of Total Performance.
 - .3 Warranty Performance of the Work:
 - .1 Fulfilment of prerequisites to Warranty Performance.
 - .2 Inspection for Warranty Performance.
 - .3 Issuance of Certificate of Warranty Performance.

1.2 SUBSTANTIAL PERFORMANCE OF PART OF THE PERMANENT WORK

- .1 When utilization of part of the Permanent Work is required and Substantial Performance of part of the Permanent Work is a condition of such utilization, the applicable requirements specified in this section will apply to the part of the Permanent Work to be utilized.

1.3 PREREQUISITES TO SUBSTANTIAL PERFORMANCE

- .1 Prior to requesting the Owner's inspection for Substantial Performance carry out the following:
 - .1 Perform Initial Commissioning.
 - .2 Obtain and submit evidence of compliance with Regulatory Requirements.
 - .3 Remove from the Site temporary facilities along with construction tools, equipment, mock-ups, and similar items not required for the performance of the remaining work.
 - .4 Correct all Contract Deficiencies that may affect operation of the canal and structures.
 - .5 Complete the Work and have it ready for the purpose intended except for the parts of the Permanent Work specified in Articles 1.3.2 and 1.6.

- .6 Review the Contract Documents and inspect the Work to confirm that prerequisites to Substantial Performance have been fulfilled and that the Work is ready for inspection for Substantial Performance.
- .7 Submit product warranties and extended warranties when specified in the Contract Documents.
- .8 Make final change-over of locks and transmit keys to the Owner.
- .9 Complete installation of architectural finish items, including all mechanical and electrical covers and trims.
- .2 Complete all work items such that the capital improvements can be used for the purpose intended. Work that does not have to be completed to obtain Substantial Performance follows:
 - .1 Drill seeding and hydroseeding.
 - .2 Final cleanup.
 - .3 Record drawings.

1.4 INSPECTION FOR SUBSTANTIAL PERFORMANCE

- .1 Submit a written request to the Owner for inspection for Substantial Performance, certifying that prerequisites have been fulfilled and specifying known exceptions in the form of a list of items to be completed, corrected, or submitted.
- .2 The Owner will, within a reasonable time after receipt of the Contractor's request:
 - .1 Proceed with the inspection; or
 - .2 Advise the Contractor that prerequisites are not adequately fulfilled.
- .3 Results of the Owner's inspection for Substantial Performance will form the Substantial Performance Contract Deficiency List (SPC Deficiency List).

1.5 SUBSTANTIAL PERFORMANCE OF THE WORK

- .1 Following inspection, the Owner will:
 - .1 Accept the Certificate of Substantial Performance of the Work stating the effective date of Substantial Performance, with a copy of the SPC Deficiency List attached; or
 - .2 Reject the Certificate of Substantial Performance and advise the Contractor that prerequisites to Substantial Performance are not fulfilled and repeat the inspection for Substantial Performance as necessary.
- .2 Upon acceptance of a Certificate of Substantial Performance of the Work, the Owner will assume responsibility for care, custody, and control of the Work, including responsibility for the following:
 - .1 Facility operation, including all systems and equipment.

- .2 Maintenance.
- .3 Security.
- .4 Property insurance.
- .5 Utility costs.

1.6 PREREQUISITES TO TOTAL PERFORMANCE

- .1 Prior to requesting the Owner's inspection for Total Performance, carry out the following:
 - .1 Perform the entire Work, including the correction of all Contract Deficiencies, including items listed in Article 1.3.2 and except those items arising from the warranty provisions of the Contract Documents.
 - .2 Review the Contract Documents and inspect the Work to confirm that prerequisites to Total Performance have been met and that the Work is ready for inspection for Total Performance.

1.7 INSPECTION FOR TOTAL PERFORMANCE

- .1 Submit a written request to the Owner for inspection for Total Performance, including a copy of the Owner's most recent SPC Deficiency List, and certify that each Contract Deficiency has been corrected or otherwise resolved in a manner agreed to between the Owner and the Contractor. List known exceptions, if any, in the request.
- .2 The Owner will, within a reasonable time after receipt of the Contractor's request:
 - .1 Proceed with the inspection; or
 - .2 Advise the Contractor that prerequisites are not adequately fulfilled.

1.8 TOTAL PERFORMANCE OF THE WORK

- .1 Following the inspection, the Owner will:
 - .1 Accept the Certificate of Total Performance of the Work, stating the effective date of Total Performance; or
 - .2 Reject the Certificate of Total Performance and advise the Contractor of Contract Deficiencies that must be corrected prior to issuance of a Certificate of Total Performance of the Work.

1.9 PREREQUISITES TO WARRANTY PERFORMANCE

- .1 The prerequisites to Warranty Performance are:
 - .1 Total Performance of the Work;
 - .2 Expiry of the warranty period; and
 - .3 Correction of items arising from the warranty period required by the Contract Documents.

1.10 INSPECTION FOR WARRANTY PERFORMANCE

- .1 Thirty to sixty days prior to the end of the warranty period, the Contractor shall apply to the Owner for acceptance of the Warranty Performance of the Work.
- .2 Just prior to the end of the warranty period, the Owner will conduct an inspection for Warranty Performance.

1.11 WARRANTY PERFORMANCE OF THE WORK

- .1 Following the inspection, the Owner will:
 - .1 Issue a Certificate of Warranty Performance of the Work; or
 - .2 Advise the Contractor of items that must be corrected prior to issuance of the Certificate of Warranty Performance of the Work.

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

1. GENERAL

1.1 DESIGNATION OF CONTRACT RECORD DOCUMENTS

- .1 At the commencement of the Work, the Owner will provide the following documents to be designated and retained as Contract Record Documents:
 - .1 One copy of the Specifications.
 - .2 Two complete sets of the Drawings.
 - .3 One set of all addenda issued.
- .2 Maintain one record copy of the following:
 - .1 Change Orders and other modifications to the Contract.
 - .2 Reviewed Shop Drawings, Product Data, and Samples.
 - .3 Field-test records.
 - .4 Inspection certificates.
 - .5 Manufacturers' certificates.
 - .6 Final survey data.
 - .7 Environmental Construction Operations Plan

1.2 MAINTENANCE OF CONTRACT RECORD DOCUMENTS

- .1 Store Contract Record Documents in the Contractor's Site office apart from documents used for construction. Provide files, racks, and secure storage.
- .2 Label each document "CONTRACT RECORD" in large, neatly printed letters.
- .3 Maintain Contract Record Documents in a clean, dry, and legible condition. Do not use these documents for construction purposes.
- .4 Keep Contract Record Documents available for inspection by the Owner. Revise the content of the documents as required prior to final submittal.
- .5 Maintain Contract Record Documents as work progresses. Record information for each area of work within 14 days after completion.

1.3 RECORDING INFORMATION ON CONTRACT RECORD DOCUMENTS

- .1 Record information on the Contract Record Documents provided by the Owner.
- .2 Use coloured erasable pencils to record information.
- .3 Use a different colour to record information pertaining to each major system.

- .4 Record changes and variations from the Drawings concurrently with construction progress. Do not cover any work until the required information is recorded.
- .5 Legibly mark Contract Record Drawings to record actual construction, including the following:
 - .1 Measured dimensions, depths, elevations, and horizontal co-ordinates of foundation excavations and fill surfaces, including the interfaces of fill zones.
 - .2 Measured dimensions, elevations, and horizontal co-ordinates of structure components and foundations.
 - .3 Measured depths, elevations, and horizontal co-ordinates of underground utilities and appurtenances. Reference locations to permanent surface improvements.
 - .4 Measured depths, elevations, and horizontal co-ordinates of internal utilities and appurtenances covered in construction. Reference to visible and accessible features of construction.
 - .5 Measured depths, elevations, and horizontal co-ordinates of instrumentation installed in foundations and structures.
 - .6 Field changes of dimensions and details.
 - .7 Changes to equipment layout and services.
 - .8 Details not on the original Drawings.
 - .9 References to related Shop Drawings and modifications.
- .6 Legibly mark the Specifications to record actual construction including the following:
 - .1 Manufacturer trade name and catalogue number of each product actually installed, particularly optional and substitute items.
 - .2 Changes made by addenda and Change Orders.
- .7 Maintain other documents including manufacturer's certifications, inspection certifications, field test records required by individual Specification sections.

1.4 SUBMITTALS

- .1 Provide the following submittals.
- .2 Prepare Contract Record Drawings at least monthly throughout the course of the Work as the information becomes available or the information is received. The Owner's representative will check the Contract Record Drawings and confirm the accuracy of the information by field notes, surveys, photographs, or other field observation methods and return the Contract Record Drawings to the Contractor after review for ongoing revisions.
- .3 Completed Contract Record Documents before or with the request for inspection for Total Performance. The owner reserves the right to withhold monies until record documents are provided.

2450-057-00

2. PRODUCTS – NOT USED

3. EXECUTION – NOT USED

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location, use and placement of “Site Clearing and Grubbing” specified herein.

1.2 PROTECTION

- .1 Protect trees, shrubs and other vegetation to remain in place, against unnecessary cutting, breaking and any other damage.
- .2 Protect from damage fences, roadways and other existing site improvements that are to remain.
- .3 Protect bench marks and reference points from damage.

2. PRODUCTS

- .1 Not applicable.

3. EXECUTION

3.1 INSPECTION

- .1 Inspect site and verify with the Owner’s Representative clearing and grubbing limits and items designated to remain.

3.2 GENERAL

- .1 Confirm clearing and grubbing procedures with Owner’s Representative.
- .2 Locate and protect underground and service utilities.
- .3 Notify utility agencies before starting site clearing and grubbing.
- .4 Remove all concrete, logs, trees, brush, stumps, roots and all objectionable material above the ground or on the ground surface.
- .5 Remove all stumps, roots and other deleterious materials to 0.3 m below the ground surface.
- .6 Remove visible rock fragments and boulders greater than 300mm in greatest dimension, but less than 0.25 m³.
- .7 Temporarily stockpile material within the site until conditions are suitable for disposal.

3.3 DISPOSAL

- .1 Dispose of cleared and grubbed material by hauling to disposal off-site, or on-site to a designated waste area as indicated in the Contract Documents.
- .2 If burning of combustible materials on site is permitted, obtain permits and authorization in accordance with the Regulatory Requirements prior to burning.
- .3 Provide continuous supervision during burning operation and conduct burning operations in such a manner to protect surrounding vegetation and property from damage.
- .4 When burning is not permitted by Regulatory Requirements, excavate, load, transport and dispose of all materials to a designated waste area, or off-site to the nearest waste disposal site as designated in the Contract Documents, or to the nearest qualified sanitary landfill site.
- .5 Bury burned debris and non-combustible material in designated waste areas with a minimum cover of 1 m of waste fill. Finish to a neat, leveled appearance, conforming to surrounding landscape.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for the location, use and placement of “Demolition, Removal and Salvage” requirements specified herein.

1.2 DEFINITIONS

- .1 For the purpose of construction in this Contract, the following definitions apply:
 - .1 “Salvageable” is defined as all materials having salvage value.
 - .2 “Non-salvageable” is defined as all material having no salvage value.

2. PRODUCTS

- .1 Not Applicable.

3. EXECUTION

3.1 INSPECTION

- .1 Inspect site and verify with the Owner’s Representative items to be demolished, removed, and salvaged.

3.2 SALVAGEABLE MATERIALS

- .1 All materials having a salvage value will be excavated and removed in such a manner that no damage will be done to the material. Salvaged material will be removed, cleaned and stored at a location within the work area. At the completion of the project all salvage items will be transferred to the Owner’s facility for storage. There will be no separate payment for salvaging or transferring to storage of these items.

3.3 DEMOLITION AND NON-SALVAGEABLE MATERIALS

- .1 Unless indicated otherwise, demolition and non-salvageable materials will be excavated, transported and disposed of at a licensed landfill. Burying of demolition and non-salvageable materials will not be allowed under any circumstances.
- .2 Asbestos cement pipe and materials are to be handled, removed and disposed of according to OH&S regulations and guidelines and the “*Alberta Asbestos Abatement Manual*”, latest edition by Alberta Employment and Immigration.
- .3 The Contractor will bear the cost of all disposal fees.

3.4 REMOVAL OF CONCRETE MATERIALS

- .1 Saw cut the concrete as required for all concrete removal work and as indicated by the Owner's Representative. All cutting to be approved by Owner's Representative prior to cutting.
- .2 Re-cut concrete edges that are damaged or chipped due to the work, at no expense to the Owner.
- .3 Jack hammer, excavate, load, haul and dispose of the waste concrete materials at the Drumheller Waste Management Association, unless otherwise authorized by the Owner's Representative.
- .4 No separate payment will be made for saw cutting concrete, unless otherwise noted.

3.5 REMOVAL OF ASPHALT MATERIALS

- .1 Saw cut or wheel cut the asphalt as required for all asphalt removal work and as indicated by the Owner's Representative. All cutting to be approved by Owner's Representative prior to cutting.
- .2 Re-cut asphalt edges that are damaged or rounded due to the work, at no expense to the Owner.
- .3 Asphalt removals other than by cold milled method will be excavated, loaded, hauled and disposed of at Drumheller Waste Management Association, unless otherwise authorized by the Owner's Representative.
- .4 No separate payment will be made for saw cutting or wheel cutting asphalt, unless otherwise noted.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for the location, use and placement of “Cold Milling Asphalt Pavement” requirements specified herein.

1.2 DEFINITIONS

- .1 “Reclaimed asphalt pavement (RAP)” is defined as all material produced as a result of cold milling.
- .2 “Entire roadway width” will be that portion of the roadway facility associated with the movement of traffic.

2. PRODUCTS

2.1 GENERAL - EQUIPMENT

- .1 The cold milling equipment to be a cold planning machine specifically designed for automatically controlled profiling.
- .2 The automatic controls to provide for accurately establishing profile grades at each edge of the machine by referencing from the existing pavement or an independent grade reference, where required, or be capable of automatically maintaining a designated cross slope from a single reference.
- .3 The cutting head capable at full drum width milling of a 75 mm thickness of asphaltic concrete in a single pass.
- .4 The cold milling machine to be self-propelled and to have sufficient power, traction and stability to maintain an accurate depth of cut.
- .5 The cold milling machine will be equipped with means to effectively control dust generated by the cutting operation.
- .6 Provide hauling equipment to receive milled material directly from the milling machine.
- .7 Equipment for removing any loose material during the sweeping operation will have the capability to pick the material up off the milled and/or adjacent roadway and be able to unload onto the hauling equipment.

2.2 GRADATION OF RAP

- .1 Reclaimed asphalt pavement will meet the following gradation requirements:

Sieve Size (µm)	% Passing By Weight
125 000	100
80 000	99 – 100
40 000	95 – 100

3. EXECUTION

3.1 GENERAL - CONSTRUCTION

- .1 Cold milling asphalt pavement will be performed in a manner which prevents the tearing and breaking of underlying and adjacent pavement and the contamination of the RAP with granular, subgrade or deleterious materials.
- .2 All RAP will be loaded directly into trucks from the milling machine and transported to the designated stockpile or disposal site.
- .3 In the event of rain or other inclement weather, suspend cold milling operations. Make the necessary allowances for drainage of water that may pond in areas where the milled sections have not been paved.
- .4 Dust produced from asphalt milling operations will be controlled to a level acceptable to the Owner's Representative.
- .5 Pulverizing the existing asphalt will not be permitted.

3.2 ASPHALT REMOVAL

- .1 All asphaltic concrete materials that cannot be cold milled due to physical or geometrical constraints will be removed and disposed of at a licensed landfill and bear all disposal costs unless otherwise approved by the Owner's Representative.
- .2 No separate payment will be made for asphalt removal and disposal in areas paid for as cold milling, unless otherwise noted.

3.3 ASPHALT MILLING FOR OVERLAY AND FOR MAINTAINING TRAFFIC

- .1 The pavement surface will be removed by milling to the specified depth, width, grade, and cross section shown on the plans or as directed by the Owner's Representative.
- .2 The Contractor will be responsible to determine the number of passes required to achieve the specified width, grading, depth and drainage.
- .3 The texture of the milled surface produced by the planing operation will be uniform, discontinuous longitudinal striations or other patterns, which will, in the opinion of the Owner's Representative, provide a satisfactory riding surface and skid resistance.

- .4 The milled surface deviation will not exceed 16 mm in 10 m for a final wearing surface, or 21 mm in 10 m in preparation for overlay.
- .5 Expose frames of all manholes, water valves, survey monuments, power and telephone poles and water valves to the required depth of milling.
- .6 Mill the entire roadway width to a uniform termination point in any given working day. At the point of daily termination of milling operations, avoid abrupt changes in the roadway surface profile. The longitudinal transition will be a maximum of 25 mm vertically per metre.
- .7 In the event the entire roadway of pavement along a section has not been milled by the end of the working period, resulting in a vertical longitudinal face, the maximum deviation between the two surfaces will not exceed 40 mm.
- .8 Vertical cuts along a gutter line will be allowed at the end of the working period. Provide adequate signage and warning devices when depth of milling cut is 75 mm or greater, or that may be hazardous to traffic.
- .9 Asphaltic concrete that is not removed by the milling equipment because of physical or geometrical constraints will be removed by other methods as approved by the Owner's Representative.
- .10 Minimize tearing and breaking out of the underlying and adjacent material.
- .11 Sweep the milled roadway surface clean immediately after the removal of the milled material, and in no case will the sweeping operation be more than 100 metres behind the milling operation.
- .12 Any distress of the newly milled surface resulting from the milling which may constitute a driving hazard, will be promptly repaired to the satisfaction of the Owner's Representative.
- .13 Install temporary asphalt ramps to allow access to existing driveways, lanes, wheel chair ramps and adjacent roadways with grade deviations greater than 40 mm. Temporary RAP ramps may be used as approved by the Owner's Representative.
- .14 Install temporary lane pavement markings if the milled surface does not receive an asphalt overlay within 24 hours of milling work.

3.4 STOCKPILING

- .1 RAP will be neatly stockpiled at the designated RAP stockpile at the Drumheller & District Regional Landfill.
- .2 At the completion of the project the Owner will assume ownership of all remaining RAP material.

- .3 The stockpile location will be located to assure positive surface drainage away from the RAP stockpile.
- .4 The stockpile location will be stripped of all clay loam, organic material and other soils as directed by the Owner's Representative.
- .5 No equipment will be permitted to operate on the RAP stockpile.
- .6 RAP materials will not be compacted after placement into the stockpile. The contractor will be responsible to maintain an efficient stockpile.
- .7 The RAP materials may be stockpiled to a maximum permissible height of 3.0 metres and will be stockpiled in as small an area as possible.
- .8 The minimum free fall distance of the RAP materials is 2.0 m.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this section in conjunction with other sections for the location, use and placement for “Care of Water” specified herein.

1.2 SITE CONDITIONS

- .1 Be aware that the project area is located where rapid temperature, and weather changes occur in all four seasons. Prepare the site for sudden rainfalls and quick snow melts due to Chinook winds.

2. PRODUCTS

2.1 EQUIPMENT AND MATERIALS

- .1 Provide all pumps, hoses and related equipment and power sources required for “Care of Water”.
- .2 Maintain pumps in good operating condition at all times. Have at least one standby pump for each category of pump required for care of water onsite at all times.
- .3 Install a replacement pump or pumps of equal capacity before removing a pump or pumps for maintenance.

3. EXECUTION

3.1 GENERAL

- .1 Design, construct and maintain Temporary Works, construct and maintain related Permanent Works, as required for care of water, including all necessary cofferdams, channels, flumes, drains, sandpoints, wells and sumps and other temporary diversion and protective works and furnish all materials required therefore. Furnish, install, maintain and operate all necessary pumping and other equipment, for dewatering the various parts of the work and for maintaining the foundation and other parts of the work free of water, ice and snow from whatever source.
- .2 Maintain all sumps, trenches and discharge lines to ensure proper containment and free flow of water to and from the pumps and other diversion and protective works at all times.
- .3 Obtain permits, in addition to those obtained by the Owner.
- .4 Ensure that “Care of Water” procedures do not interfere with the excavated work areas, operation of road surface drainage courses, natural watercourses, utilities or the flow of traffic.

- .5 Repair damage to any part of the work caused by water or failure of protective works at no extra cost to the Owner.
- .6 Be responsible for additional excavation and subsequent backfill made necessary by water, snow, or ice.
- .7 Ensure procedures for "Care of Water" do not cause pollution in the area. Locate and control discharges of water to avoid causing damage to property, pollution of watercourses, nuisances on roads, or injury to the public or wildlife.
- .8 Remove or level all cofferdams, drainage ditches or other Temporary Works after having served their purpose so as not to interfere in any way with adjacent facilities or with adjacent landowners.
- .9 Make provisions for handling residual water, storm runoff and snowmelt that may enter the work area or excavations from time to time.
- .10 Make arrangements with the Owner, landowners and agencies, which may be affected by disposal of water, snow and ice. Written permission is required before any water may be disposed of through sewer of a municipality.
- .11 Remove and dispose of all water, snow and ice from the work areas in a manner not detrimental to public or private property, or any portion of the work completed or under construction.
- .12 Excavations are to be kept free of water while work is in progress.
- .13 Avoid excavation below groundwater table if quick condition or heave is likely to occur. Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- .14 Protect open excavations against flooding and damage due to surface runoff.
- .15 Provide the Owner's Representative written details of the proposed dewatering and/or heave prevention measures and methods such as dikes, well points, and sheet pile cut-offs.

3.2 CONSTRUCTION ACCESS CROSSING

- .1 Provide construction access crossings, as required.
- .2 Design crossings to accommodate the drainage of runoff water.
- .3 Design crossings for the maximum load of the construction equipment to be used.
- .4 Do not use existing on-site public and private bridges and culvert crossings for construction equipment without prior written approval.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location, use and placement of “Stripping” specified herein.

1.2 DEFINITIONS

- .1 For the purpose of construction in this Contract, the following definitions apply:
- .1 “Topsoil” is defined as the uppermost part of the soil, ordinarily moved in tillage, or its equivalent in uncultivated soils, normally ranging in depth from 50 mm to 450 mm, capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
 - .2 “Subsoil” is defined as material that lies immediately beneath the Topsoil and extending to root depth. Subsoil may be up to 1.5 m in depth.
 - .3 “Overburden” is defined as soil material that lies between the Subsoil and the material that is designated to be utilized for construction.
 - .4 “Stripping” is defined as the excavation of Topsoil, Subsoil, and Overburden, including materials in frozen condition.

2. PRODUCTS

- .1 Not applicable.

3. EXECUTION

3.1 PROTECTION OF EXISTING FACILITIES

- .1 Locate utility lines, fencing, survey reference points, instrumentation, culverts, and all other existing facilities before commencement of Work. Protect these items from damage.

3.2 EXCAVATION

- .1 Do not strip any area without prior approval of the Owner.
- .2 Stay on designated haul roads and do not disturb grassed or natural areas not part of the Work. Do not drive on undisturbed areas except for the performance of stripping operation.
- .3 In stripping areas, strip topsoil to top of subsoil levels, then strip the subsoil to top of overburden levels, then strip the overburden. Avoid mixing Topsoil, Subsoil and Overburden.
- .4 Strip and stockpile materials separately to prevent contamination.

- .5 Strip and stockpile materials from temporary construction access roads, borrow areas and waste fill areas required for performance of the Work.
- .6 Conduct the stripping operation far enough in advance of excavation to ensure that undesirable material does not become mixed with the Topsoil.
- .7 Suspend stripping operations during rain or wet ground conditions.
- .8 Suspend stripping operations during high winds greater than 80 km/hr, which may result in contamination or loss of Topsoil.
- .9 Provide proper drainage of surface water from stripped area to prevent ponding and infiltration in areas where fill is to be placed.
- .10 Use equipment with precise depth control such as a grader when stripping shallow depth topsoil.
- .11 If the stripping area soils are frozen, rip the area to a depth of 300 mm and stockpile separately.
- .12 Excavate all initial frozen material. Subsequent frost removal will not be paid.

3.3 STOCKPILES

- .1 Unless otherwise designated in the Contract Documents, stockpile stripped material adjacent to borrow areas, waste areas or along the road right of way. Choose stockpile locations such that they will not interfere with construction.
- .2 Stockpile topsoil separately from other materials.
- .3 Maintain a minimum separation of 1 m between stockpiles.
- .4 Stockpile frozen stripped material separately from other materials.
- .5 Adopt measures to prevent drifting of topsoil.
- .6 Keep drainage courses clear of stockpiled material.
- .7 Stockpile material at slopes lower than 2H:1V.

3.4 DISPOSAL OF STRIPPING MATERIAL

- .1 The Contractor will assume ownership of the different waste stripping materials, not incorporated in the work. The Contractor is encouraged to recycle the waste material where practical. Dispose of non-recycled topsoil material at a licensed landfill, unless otherwise approved by Owner's Representative.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location, use and placement of “Topsoil Placement” specified herein.

1.2 SOURCE TOPSOIL

- .1 Use native topsoil materials from designated topsoil stockpiles provided it meets specified requirements.
- .2 If native topsoil is inadequate in quantity, quality or both, use imported topsoil meeting specified requirements for balance of topsoil required.

2. PRODUCTS

2.1 TOPSOIL MATERIALS

- .1 Topsoil materials to be a mixture of mineral particulates, microorganisms and organic matter which provides suitable medium for supporting intended plant growth.
 - .1 Soil texture to be based on the *Canadian System of Soil Classification*, to consist of 20% to 70% sand and contain 2% to 10% organic matter by weight.
 - .2 Topsoil PH value to be between 6.5 to 8.0.
 - .3 Topsoil to contain no toxic elements or growth inhibiting materials.
 - .4 Topsoil to be free from debris and stones over 50 mm diameter.
 - .5 Topsoil consistency to be friable when moist.
- .2 Major soil nutrients required for topsoil fertility to be present in following ratios:
 - .1 Nitrogen (N): 20 to 40 microgram of available N per gram of topsoil.
 - .2 Phosphorus (P): 10 to 20 micrograms of phosphate per gram of topsoil.
 - .3 Potassium (K): 80 to 120 micrograms of potash per gram of topsoil.
 - .4 Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
 - .5 Coarse vegetative material: 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.

3. EXECUTION

3.1 DESIGNATED TOPSOIL MATERIALS

- .1 Control and eliminate perennial grass and noxious weeds including their root systems until stockpile topsoil is required for landscape use. Stockpile topsoil will be reasonably free of all weed growth before placement on site.
- .2 Perform weed control, when necessary, in accordance with relevant government chemical pesticide application legislation. Obtain Owner's approval for all pesticide applications.
- .3 Submit detailed pesticide applicator's log for verification after each application of approved pesticide.
- .4 Disc topsoil material and remove all rocks to the extent that the rock content is comparable to adjacent undisturbed areas. Remove all debris, sod lumps and stones over 50 mm diameter. Dispose of waste materials at a licensed landfill.

3.2 PREPARATION OF SUBGRADE

- .1 Remove debris, roots, branches, foreign material, undesirable plants, visible stones in excess of 50 mm diameter, contaminated soil and other deleterious materials. Dispose of waste materials at a licensed landfill.
- .2 Grade areas to be reclaimed to finish subgrade. Eliminate uneven areas and low spots and ensure proper drainage.
- .3 Scarify all areas designated for topsoil placement to a depth of 150 mm, except in areas where considered impractical by the Owner's Representative. Scarify entire subgrade area once in the longitudinal direction and once in the perpendicular direction. Disc area when large clay lumps are prevalent.
- .4 Compact finished subgrade to 95% Standard Proctor Density.

3.3 TOPSOIL PLACEMENT

- .1 Place and spread subsoil and topsoil materials in uniform layers not exceeding 150 mm, in dry weather on dry unfrozen subgrade.
- .2 Manually spread and rake topsoil around structures, trees, fences or other obstructions.
- .3 Spread topsoil evenly and obtain proper depth after settlement.

3.4 FINISH GRADING

- .1 Remove all stones in excess of 50 mm diameter, soil lumps, roots, grass, weeds, construction materials, debris and foreign non-organic materials that may surface after preparation. Dispose of waste materials at a licensed landfill.
- .2 Thoroughly cultivate topsoil to minimum depth of 100 mm by rototilling or hand methods where compaction has occurred and to break all soil lumps.
- .3 Float until surface is smooth. Cut smooth falls to catch basin rims, finish flush.
- .4 Fine grade to eliminate rough or low areas and to ensure positive drainage on slopes and away from buildings, sidewalks and other structures. Maintain levels, profiles and contours of subgrade.
- .5 Leave surface smooth, uniform and sufficiently firm to prevent settlement or sinkage pockets when watered. Finished surface to be even and free from irregular surface changes.
- .6 Rake, chain drag and lightly roll topsoil areas, remove all ridges and fill all depressions. On larger areas, use hydraulic power box rake or similar mechanical equipment to: remove soil lumps, rocks and debris; fill and level low areas; and correct other grading deficiencies in preparation of seed or sod bed.
- .7 When topsoil will abut existing turf, cut turf to form a straight joint with the new seeded or sodded areas.
- .8 Where topsoil will be receiving sod, leave final grade 15 mm below finish grade of adjacent pavement, edging, curbs and crown of adjacent turf area.
- .9 Do not cover catch basins, manholes, valve covers, irrigation boxes or any other surface accesses.
- .10 Use water trucks and sprinklers to control all airborne dust caused by topsoil placement and grading operations when necessary.
- .11 Immediately clean up any soil or debris spilled onto roadway, walks and mulched areas.

3.5 TOLERANCES

- .1 The finished topsoil surface to be even, uniformly shaped and compacted to within ± 15 mm of design grade, but not uniformly high or low, while maintaining surface drainage.

END OF SECTION

2450-057-00

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for requirements for “Earthwork and Granular Material Testing” specified herein.
- .2 Read this Section in conjunction with requirements for testing specified in General Conditions Section 00725.

1.2 TESTING

- .1 Contractor is responsible for performance testing in performance of the Work.
- .2 The Owner’s Representative will perform quality assurance testing and related functions.
- .3 The Owner’s Representative will perform quality assurance testing according to the testing standards listed in the Contract Documents as selected by the Owner.
- .4 Provide samples requested by Owner’s Representative for testing.
- .5 Co-operate with the Owner’s Representative in site sampling for testing.

2. PRODUCTS

- .1 Not applicable.

3. EXECUTION

3.1 FILL MATERIAL TESTING

- .1 Fill materials may be tested, before and after placement, for conformance with specified requirements and to confirm suitability for intended uses.
- .2 Acceptance of fill material will be made only after the material has been dumped, spread and compacted in place. Owner may reject fill material in the borrow areas, in the stockpiles, in the transporting vehicle or in place. Cooperate with the Owner to ensure only acceptable fill material will be placed in the Work.
- .3 If requested by the Owner’s Representative, provide 1 m³ of each type of imported granular fill material for testing purposes.

3.2 COMPACTION AND MOISTURE CONTENT TESTING

- .1 Compaction and moisture content testing will be performed during fill material placement operations to ensure that specified requirements are met.
- .2 The frequency of compaction and moisture content testing will be determined by the Owner.

3.3 GRAVEL TESTING

- .1 The Owner's Representative may carry out testing of the gravel material while it is being processed.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this section in conjunction with other sections for location, use and placement of “Excavation” specified herein.

1.2 DEFINITIONS

- .1 “Common Excavation” is defined as all excavation, hauling, placement and compaction of materials within the project work area excluding materials classified under topsoil stripping, rock excavation, borrow excavation or other specified excavation operations as shown in the Contract Documents or as designated by the Owner’s Representative.
- .2 “Borrow Excavation” is defined as all imported excavation from borrow areas excluding materials classified under topsoil stripping, excavation of frozen material or other specified excavation operations as shown in the Contract Documents or as designated by the Owner’s Representative.
- .3 “Waste Excavation” is defined as all excavation, hauling, and placement of materials, within the project work area and at designated waste areas, that are not suitable for use or are surplus to requirements for the completion of the project work excluding materials classified under topsoil stripping, rock excavation or other specified excavation operations as shown in the Contract Documents or as designated by the Owner’s Representative.

2. PRODUCTS

- .1 Not applicable.

3. EXECUTION

3.1 PREPARATION

- .1 Notify Owner’s Representative at least 2 days prior to beginning excavating operations.
- .2 Prior to commencing excavation:
 - .1 Contact all appropriate utility companies and establish exact location and current status of all utilities, voltage of underground and overhead power lines and pressure of natural gas lines.
 - .2 Notify Owner if any utility lines have been omitted from or incorrectly indicated in the Contract Documents.

3.2 PROTECTION OF EXISTING FACILITIES

- .1 Locate utility lines, fencing, survey reference points, instrumentation, culverts, and all other existing facilities before commencement of Work. Protect these items from damage.

3.3 UNAUTHORIZED EXCAVATION

- .1 Unauthorized excavation is any excavation beyond lines, elevations and dimensions indicated in the Contract Documents without specific authorization by the Owner.
- .2 Fill unauthorized excavation to lines, elevations and dimensions indicated, as directed by the Owner's Representative.
- .3 Unauthorized excavation and remedial work will be at Contractor's expense.

3.4 EXCAVATION LINES

- .1 Excavate to the lines, grades and elevations indicated in the Contract Documents or as determined by the Owner's Representative
- .2 The Owner's Representative will determine if unsuitable bearing materials are encountered at indicated foundation elevations. Carry excavation deeper to remove unsuitable bearing materials and replace excavated material with suitable materials.
- .3 The Owner's Representative will determine if bearing conditions are fulfilled at elevations above those indicated in the Contract Documents. Adjust excavation elevations to accommodate raised foundation level.

3.5 SHORING AND BRACING

- .1 If required to provide safe working conditions and to prevent cave-ins and loose soil from falling into excavations, protect excavations by temporary shoring, bracing, or other suitable methods.
- .2 Where the excavation is made to accommodate structures, remove sufficient material to allow for the proper placing and bracing of forms.
- .3 No extra payment will be made for supplying, placing, maintaining and removing sheeting, bracing, shoring, or other means of temporary support.

3.6 EXCAVATION

- .1 Strip Topsoil in accordance with Section 02200 and stockpile in the designated areas.
- .2 Remove and dispose of all water, snow and surface ice prior to excavation.
- .3 Schedule and coordinate the work such that excavations are trimmed to grade prior to becoming frozen.

- .4 Excavate to the required lines, grades and elevations.
- .5 Immediately notify the Owner's Representative of unsuitable organic soils or other unsuitable or unstable materials encountered during excavation and remove unsuitable materials to the depth and extent directed.
- .6 Prevent loss of soil and sloughing of slopes if springs or seepage are encountered within excavation.
- .7 Remove boulders, loose bedrock, soil blocks and other fragments that may slide or roll into excavated areas, which, in the opinion of the Owner's Representative or the Contractor, are unsafe or appear to endanger persons, work or property. The fact that such removal may enlarge an excavation beyond the required excavation lines will not relieve the Contractor from the necessity of doing such scaling and removal.

3.7 BORROW EXCAVATION

- .1 Use all suitable materials removed by Common Excavation in embankments before taking material from borrow areas.
- .2 Obtain additional suitable embankment material from designated borrow areas.
 - .1 Owner's Representative to designate location and extent of borrow areas, and allowable depth of excavation.
 - .2 Shape edges of borrow areas on slopes of 4H:1V or flatter or as directed by the Owner's Representative and provide drainage.
- .3 Trim and leave borrow pits in a condition to permit accurate measurement of material removed.

3.8 DISPOSAL OF EXCAVATED MATERIAL

- .1 General
 - .1 Obtain prior approval by Owner for stockpile areas. Strip topsoil from stockpile areas except do not strip topsoil stockpile areas.
 - .2 If stockpiling is required, stockpile materials meeting the classifications of different zones in separate stockpiles.
 - .3 Prepare stockpile sites and construct stockpiles taking every precaution necessary to prevent segregation of particle sizes and contamination with other materials.
 - .4 Finish the surfaces in stockpiles to safe, stable lines and slopes 3H:1V or flatter or as directed by the Owner's Representative and leave the surfaces in a neat and workmanlike manner.
 - .5 Maintain stockpiles in a condition acceptable to Owner.

- .6 Do not block drainage courses with stockpiled material.
- .7 Space all stockpiles at least three metres from adjacent material stockpiles with a different classification.
- .8 Remove all stockpiled materials from stockpiles and incorporate into the Work of the Contract.
- .2 Suitable Materials
 - .1 Load, haul and place, suitable materials from common and borrow excavations where placement of compacted and tamped fills are designated.
- .3 Unsuitable Materials
 - .1 Load, haul and place unsuitable waste excavation materials in designated waste fills and waste sites.
 - .2 Load, haul and place unsuitable materials from borrow excavations in borrow areas, after the removal of all suitable materials.
- .4 Excavated Material Disposal Sites
 - .1 The Contractor will assume ownership of the different excavated materials, not incorporated into the work. The Contractor is encouraged to recycle this waste material where practical. The Contractor will dispose of non-recycled waste material at a licensed landfill.

3.9 TOLERANCE

- .1 Excavate all surfaces to within +20 mm and -20 mm of the lines, grades and elevations shown in the Contract Documents.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location, use and placement of “Compacted Earth Fill” specified herein.

1.2 TYPES OF FILL

- .1 Compacted Fill.
- .2 Tamped Fill.
- .3 Waste Fill.

1.3 DEFINITIONS

- .1 “Suitable Material” is defined as material obtained from common or borrow excavations, free of organic or frozen materials, that is suitable for compacted embankment construction.
- .2 “Unsuitable Material” is defined as organic or frozen material from common or borrow excavations, that is not suitable for compacted embankment construction.
- .3 “Compacted Fill” or “Tamped Fill” is defined as suitable material obtained from common or borrow excavations, free of organic, wet or frozen materials, and placed on site, road or embankment construction.
- .4 “Waste Fill” is defined as organic or frozen material from common or borrow excavation that is not suitable for site, road, embankment, liner or structural construction.

2. PRODUCTS

2.1 FILL MATERIALS

- .1 Compacted and tamped fill material is fine grained materials having a minimum of 50% passing the 0.08 mm sieve size and classified as a low to medium plastic clay based on the unified classification system.
- .2 Remove tree roots, sod or other organic materials.
- .3 Do not use frozen material in the fill.
- .4 Remove cobbles and rock fragments having maximum dimensions greater than 75 mm

3. EXECUTION

3.1 GENERAL

- .1 Do not proceed with fill placement until the Owner representative has inspected and approved foundation areas designated for fill placement.
- .2 Scarify the foundation to obtain a suitable bond with the earthfill immediately prior to placing the first layer of earthfill.
- .3 Construct earthfills to the lines, grades and elevations shown in the Contract Documents.
- .4 Suspend all earthwork operations at any time when satisfactory work cannot be conducted on account of rain, floods, cold weather or other unsatisfactory conditions.

3.2 DENSITY CONTROL

- .1 Compacted Fill material to be compacted to a dry density equal to or greater than 98% of the maximum dry density obtained in the Standard Proctor Compaction Test performed in accordance with ASTM D698.
- .2 Tamped Fill material to be compacted to a minimum 98% of the maximum dry density obtained in the Standard Proctor Compaction Test performed in accordance with ASTM D698.
- .3 Waste Fill material to be compacted to 85% of Standard Proctor Maximum Dry Density Test performed in accordance with ASTM D698.

3.3 MOISTURE CONTROL

- .1 Maintain moisture content for Compacted Fill materials within -1% to +2% of optimum moisture content as determined by ASTM D698 test procedures.
- .2 Maintain moisture content for Tamped Fill materials within -1% to +2% of optimum moisture content as determined by ASTM D698 test procedures.
- .3 When the moisture content in the fill material is lower than that specified for placement, add water and mix with the material to achieve uniform moisture content in the material to conform to the requirements.
- .4 When the moisture content in the fill material is higher than that specified for placement, dry the material by scarifying, disking, mixing and harrowing to achieve uniform moisture content in the material to conform to the requirements.
- .5 Moisture content control on waste fill will not be required.

- .6 Do not apply water to fill material in a manner that causes segregation or the finer materials to be washed out.
- .7 Water added to fill material for moisture control purposes will be free of deleterious materials.

3.4 PLACEMENT AND COMPACTION

- .1 Drain and clean all earth foundations of loose, thawed, frozen, soft, or other deleterious material including ice, snow and organic materials and topsoil.
- .2 Work the surface to obtain a suitable bond with the earth fill immediately prior to placing the first layer. Scarify the top 300 mm of the surface and compact to 98% of the maximum dry density obtained in the Standard Proctor Compaction Test performed in accordance with ASTM D698.
- .3 When the surface of the prepared foundations or the compacted fill material is too dry or too smooth to bond properly with the layer of fill material to be placed thereon, moisten the surface and work with a disc, scarifier, or other equipment, to provide a satisfactory bonding surface before the succeeding layer of fill material is placed.
- .4 When the surface of the prepared foundations or the compacted fill material is too wet for proper compaction, remove it and allow it to dry, or work it with a harrow, disc or other equipment to reduce the moisture content to the required amount; then compact the fill material before the succeeding layer of fill material is placed thereon.
- .5 Maintain slopes at less than 1V:1H for earth foundations on which fill is to be placed.
- .6 Place compacted fill material in continuous horizontal layers not exceeding 150 mm in thickness when compacted. Spread, blend, disc, blade, smooth and compact each lift to provide a homogeneous fill without stratification. Commence placement of fill at the lowest elevation of foundation. Use proper type of compaction equipment for each compacted fill material type.
- .7 Place waste fill materials in continuous horizontal lifts not exceeding 300 mm in thickness such that there will be no voids or bridging of material. Spread and compact each lift by complete coverage of tracked equipment. Blade the compacted waste fill embankment to a smooth, uniform, free-draining shape.
- .8 Join new fill to existing slopes by terracing or excavating into slopes to remove all dried and loose material.
- .9 Schedule fill placement operations such that the foundation areas or previously compacted earthfill does not freeze and that compacted earthfill is not placed on frozen subgrade. Remove and replace any such frozen layers of compacted earthfill at no cost to the Owner.
- .10 Scarify each lift of fill to a minimum depth of 70 mm following compaction, using a disc or other Owner approved equipment to ensure complete bond between that lift and the overlying lift.

- .11 Reroute construction traffic or increase fill thickness over soft foundations in areas where fill surface starts rutting. If rutting has occurred, scarify, regrade and moisture condition the fill surface prior to placement of overlying fill.
- .12 Re-compact or remove any portion of the fill, which has suffered a reduction in density due to frost, rain or any other reason before placing succeeding layers. Protect compacted fill material and foundations prepared for the fill from freezing.
- .13 Remove any non-conforming materials, which accumulate on the surface of any layer, or prepared foundation before any material is placed for the succeeding layer.
- .14 Maintain adequate grading during construction to protect the work from surface drainage damage.

3.5 COMPACTION EQUIPMENT

- .1 Supply necessary compaction equipment capable of meeting the specified compaction requirements.
- .2 Hauling equipment is not acceptable for compaction.
- .3 The Owner's Representative reserves the right to order the discontinuation of any compaction equipment that does not produce the specified compaction requirements or causes excessive breakage around structures or is not capable of compacting the fill material to the required density in a reasonable time.

3.6 TOLERANCE

- .1 Make changes in grade natural. Blend slopes into level areas.
- .2 Compact all surfaces to within -50 mm and +50 mm from the lines, grades and elevations shown in the Contract Documents.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this section in conjunction with other Sections for the location, use and placement of “Erosion and Sediment Control” requirements specified herein.

1.2 REFERENCES

- .1 Prepare an Erosion and Sediment Control Plan in accordance with the latest edition of Alberta Transportation’s “Design Guidelines for Erosion and Sediment Control for Highways”. The plan is required to be prepared by certified CPESC personnel.
- .2 Undertake Erosion and Sediment Control installation in accordance with the latest edition of Alberta Transportation’s “Field Guide for Erosion and Sediment Control for Highways” City of Calgary Water Services “Guidelines for Erosion & Sediment Control” 2011.

1.3 SUBMITTALS

- .1 Submit the Erosion and Sediment Control Plan to the Owner’s Representative for review and comment at least five (5) working days prior to commencing construction activities.
- .2 Submit all proposed erosion and sediment control products to the Owner’s Representative for review and comment at least two weeks prior to commencing construction activities.

2. PRODUCTS

2.1 SILT FENCE

- .1 Properties:
- .2 Approved products:
 - Brock White – AGES 600G or approved equal.

3. EXECUTION

3.1 GENERAL – EROSION AND SEDIMENT CONTROLS

- .1 Prepare an Erosion and Sediment Control Plan including drawings and documentation, for the project site construction activities. The plan will detail the measures and materials to be employed to prevent damage to the existing infrastructure and the environment by controlling erosion and sedimentation caused by water entering the site; water onsite; water exiting the site; and wind.

- .2 Provide all equipment, materials and labour for the supply, installation and maintenance of erosion and sediment control measures. The measures may include but are not limited to: silt fencing; storm inlet sediment barriers; synthetic permeable (ditch) barriers; sediment traps; seeding; surface roughening and texturing; and other best management practices for sediment and erosion control.
- .3 Modify the erosion and sediment control measures as required by changes in the construction activities and the weather conditions.
- .4 Install erosion and sediment control products as per manufacturers' recommendations, unless otherwise stated in the Contract Documents.
- .5 Undertake a site inspection and complete a sedimentation report after any significant rainfall event, and at least every seven calendar days.
- .6 Roughen the prepared topsoil slope surfaces by slope texturing employing the surface tracking method prior to seeding and hydro mulching.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location, use, and placement of “Granular Materials” specified herein.
- .2 This Section is intended to be used as a reference Section; it is not a "section of work". All materials specified in Part 2, Products, may not necessarily be required.

2. PRODUCTS

2.1 MATERIAL QUALITY

- .1 Use only clean, sound, hard, durable particles, free from silt, clay, soft shale, flaky particles, topsoil, organic matter and other detrimental material.
- .2 Ensure granular materials are not gap graded and have a smooth gradation curve with no excess or deficiency of any particular grain size within the required range.
- .3 Where blending is required, thoroughly mix the granular materials in such a manner that a homogeneous material of the specified gradation is achieved prior to placing of the material into the work or stockpiles.
- .4 “Gravel” in general means a mixture of natural gravel, crushed gravel or crushed stone, and natural or crushed sand, meeting the gradation limits specified below for each type.
- .5 “Crushed Gravel” means angular shaped particles of crushed gravel or stone, washed, meeting the gradation limits specified. Ensure minimum of 50% by weight, of material retained on 5 mm sieve has at least one face resulting from fracture.

2.2 STANDARD GRANULAR ROAD MATERIALS

Fill Type	Sieve Size (mm)	% Passing By Weight
Granular Sub-base (<i>75 mm Minus</i>)	80	100
	40	60 – 90
	20	40 – 70
	10	25 – 60
	5	15 – 45
	2.5	10 – 35
	0.630	5 – 23
	0.160	3 – 2
	0.080	2 – 10
Granular Base (<i>Road Crush</i>)	25	100
	20	95 – 100

Fill Type	Sieve Size (mm)	% Passing By Weight
	10	55 – 80
	5	35 – 65
	2.5	28 – 52
	0.630	13 – 25
	0.315	9 – 26
	0.160	6 – 18
	0.080	4 – 10

2.3 PIPE GRANULAR BEDDING MATERIALS

Fill Type	Sieve Size (mm)	% Passing By Weight
Bedding Materials for: PVC SDR 35, PVC SDR 28, PVC Profile and Concrete Sanitary and Storm Sewer Pipe; Water Distribution Mains and Service Pipes		
(bedding materials classes conform to the embankment materials specified in ASTM D2321)		
Class IA	Manufactured Aggregate:	-
	open graded, clean	
For pipes 375 mm and smaller and all sizes of PVC Profile Pipe	20	100%
	4.75	<10%
	2.5	<5%
	0.075	<5%
Class IB	Manufactured, Processed Aggregate:	
	dense graded, clean	
For pipes 375 mm and smaller and all sizes of PVC Profile Pipe	20	100%
	4.75	10-50%
	2.5	<5%
	0.075	<5%
Class II	Coarse Grained Soils:	-
	From clean or borderline clean to with fines	
For pipes 375 mm and smaller and all sizes of PVC Profile Pipe	20	100%
	4.75	Varies
	0.075	0-12%

2.4 ASPHALT AGGREGATE

- .1 For asphalt aggregates refer to Section 02744.

3. EXECUTION

3.1 GENERAL

- .1 Drain, clean and maintain foundation and subgrades free from debris, snow, ice, water, topsoil or any loose objectionable material. Do not proceed with granular material placement, until the Owner's Representative has inspected and approved the foundations and subgrade areas.
- .2 Place granular materials to the lines, grades and elevations specified in the Contract Documents.
- .3 Suspend all granular material placement at any time when satisfactory work cannot be conducted due to rain, floods, snow or other unsatisfactory conditions.
- .4 Select temporary stockpile sites that minimize potential for contamination with underlying soils.
- .5 Stockpile material in a manner that minimizes segregation.
- .6 Replace stockpiled material that becomes contaminated, damaged, or lost at no cost to the Owner.
- .7 Refer to other Sections for location, use, and placement of Granular Materials specified herein.

3.2 PLACEMENT

- .1 Granular Bedding or Granular Backfill Materials:
 - .1 Place granular material in layers not exceeding 150 mm in thickness when compacted, to the lines, grades and elevations shown in the Contract Documents. Compact to a minimum density of 98% Standard Proctor Density. Compact each layer before placing the succeeding layer. Ensure the granular material are installed within + 3% of optimum moisture content, unless indicated elsewhere in the Contract Documents.
 - .2 If any granular bedding material is too dry to allow adequate compaction, apply water into the material until uniform distribution of moisture is obtained. Control water application accurately in amounts so that free water will not appear on surface during or subsequent to rolling or tamping.
 - .3 If the material is too wet, dry and spread material in thin lifts on subgrade and permit to dry until the moisture content is reduced to the specified moisture content.

- .4 Provide tamping with hand operated mechanical tampers such as vibratory plate tampers, jumping jacks or walk-along double drum rollers. Do not use large compaction equipment in tamped backfill zones.

3.3 TOLERANCES

- .1 Granular Bedding or Granular Backfill Materials
 - .1 Place granular materials within -20 mm and +20 mm of design grades, but not uniformly high or low.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location and requirement of “Subgrade Preparation” specified herein.

2. DEFINITIONS

- .1 “Scarification” is defined as loosing or breaking up of surface of soils with a disk, cultivator, shanks, or ripper teeth to a depth of 150 mm unless specified otherwise in the Contract Documents.

3. PRODUCTS

- .1 Not Applicable.

4. EXECUTION

4.1 SUBGRADE PREPARATION

- .1 Subgrade preparation includes the following work:
 - .1 Excavate the upper 300 mm of subgrade earth materials allowing for the lower 300 mm to 600 mm zone of subgrade earth material to be shaped, scarified, conditioned and compacted. The lower zone subgrade earth materials to be compacted to a minimum of 98% Standard Proctor Maximum Dry Density and moisture conditioned to within -1% to +2% of optimum moisture content.
 - .2 Place, scarify, moisture condition, shape and compact the upper 300 mm of subgrade earth materials to 98% Standard Proctor Density, moisture conditioned to within -1% to +2% of optimum moisture content and to design subgrade elevation.
- .2 When the moisture content in the subgrade material is lower than that specified, add water and mixed with the material to achieve uniform moisture content in the material to conform to the requirements.
- .3 When the moisture content in the subgrade material is higher than that specified, dry the material by scarifying, disking, mixing and harrowing to achieve uniform moisture content in the material that conforms to the requirements.

- .4 Remove and dispose of unsuitable materials as authorized by the Owner's Representative. Replace with an approved suitable material and compact as specified herein.
- .5 Maintain the subgrade to the specified section, grades and condition required for filter fabric and/or granular material placement. Provide interim drainage to prevent damage to the work and unstable conditions due to high moisture contents. No separate payment will be made for these items.
- .6 The subgrade will pass density and proof rolling requirements prior to the placement of filter fabric and/or granular materials.

4.2 TOLERANCES

- .1 Shape and compact subgrade to the required cross-section and grade to within -10 mm and +10 mm of design elevations but not uniformly high or low, and maintain surface drainage as required to protect the work.

END OF SECTION

Property	Value	Unit	ASTM Test Method
Grab Strength	900	N	D-4632
Elongation	50	%	D-4632
Puncture Strength	2220	N	D-4833
CBR Puncture	500	N	D-6241
Mullen Burst	2618	kPa	D-3786
Trapezoidal Tear	360	N	D-4533
Ultraviolet Degradation	70	%	D-4355
Apparent Opening Size (AOS)	0.180	mm	D-4751
Permittivity	1.2	Sec ⁻¹	D-4491
Water Flow Rate	3866	l/min/m ²	D-4491

Approved Products: Armtec 250 - non-woven geotextile
or approved equal

- .3 Geo-grid to be biaxial type. The geo-grid is to be in accordance with the following standards (latest revision) ASTM D6637-01, ASTM D 5818-06, and GRI-GG2-05.

Specifications for Biaxial Geogrid		
Properties	Test Method	Geogrid Requirement (Min Average Roll Values)
Resistance to Long Term Degradation (%)	–	100
Resistance to Installation Damage (SC% / CP%)	ASTM D5818-06 and ASTM D6637-01	95 / 90
Ultimate Tensile Strength (kN/m)	ASTM D 6637-01	19
Tensile Strength at 2% Strain (kN/m)	ASTM D 6637-01	6
Tensile Strength at 5% Strain (kN/m)	ASTM D 6637-01	11
Junction Efficiency (%)	GRI-GG2-05	93
Aperture Size (mm)	–	25 x 33

Approved Products: Tensar BX1200 – bi-axial geogrid
or approved equal

2.2 SHOP FABRICATION

- .1 Provide shop-made sewn seams as required to produce the minimum roll widths and lengths specified. Provide seams that meet or exceed the strength properties of the geotextile. Use sewing thread that has equal or better resistance against chemical and biological degradation as the geotextile.

3. EXECUTION

3.1 PREPARATION

- .1 Excavate and prepare the subgrade to the lines, grades, and elevations specified in the Contract Documents. Remove rock fragments or other objects having sharp projections.

- .2 Remove snow, ice, loose or other deleterious materials from the subgrade.
- .3 Do not place geotextile until the prepared subgrade surfaces have been inspected by the Owner's Representative. Rectify any defects identified by the Owner's Representative.

3.2 INSTALLATION

- .1 Install geotextile products at the locations specified in the Contract Documents and in accordance with the manufacturer recommendations.
- .2 Minimum allowable overlap of the geotextile will be 0.5 metres. Overlap sections must be anchored sufficiently to prevent overlap separation by weather or placement of granular material.
- .3 Temporarily anchor the geotextile with sand bags or weights placed at the outer edges, along seams, and at other intermediate points as required to prevent displacement. Geotextile that extends up the sides of roadwork or excavations will be held in place with nails at 3 metre intervals, or as required.
- .4 Extend the geotextile to the outer edges to the specified lines, and trim any excess geotextile.
- .5 Protect the geotextile from damage. Repair or replace geotextile damaged during installation or construction of subsequent Work.
- .6 Do not allow any equipment to operate directly on the geotextile or the overlying material.
- .7 Cover the geotextile within 1 day of installation with the specified fill material.
- .8 During placement of the specified material, limit the height from which the fill material is placed to 0.3 m or lower, as required to avoid damaging or displacing the geotextile. Install the geotextile with sufficient slack to prevent tearing during placement of the fill material.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location, use, and placement of “Sub-Base Granular Materials” specified herein.

2. PRODUCTS

2.1 GRANULAR SUB-BASE MATERIAL

- .1 Granular sub-base material will consist of sound, hard, durable, well graded pit-run or crushed gravel or sand as specified.
- .2 Granular sub-base material will not contain clay, loam, roots, plants or other deleterious materials. The materials are to be well graded from coarse to fine within the gradation limits specified, and will not be subject to extreme variation between the lower and upper limits of the gradation envelope specified.

2.2 GRADATION

- .1 Gradation to be within the following limits when tested to ASTM C117, and giving a smooth curve without sharp breaks when plotted on a semi-log grading chart.
- .2 Sub-Base Granular Material

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
25 mm	100%
20 mm	97 - 100%
10 mm	35 - 77%
5 mm	15 - 55%
1.25 mm	0 - 30%
0.08 mm	0 - 12%

The percent fractures by weight (2 faces) will be 50% or greater.

3. EXECUTION

3.1 PLACEMENT OF SUB-BASE MATERIALS

- .1 Process, handle and transport aggregates to avoid segregation, contamination and degradation.
- .2 Place sub-base granular material on a prepared subgrade and/or geotextile fabric. Do not place granular materials on snow, ice or frozen surfaces.

- .3 Place the sub-base material in uniform layers not exceeding 150 mm compacted depth. Shape each layer to a smooth contour and compact to specified density before placing the next layer. Remove and replace areas that become segregated during spreading at the Contractor's expense. Compact the final lift of the sub-base material to proper grade and cross-section.
- .4 Maintain the sub-base material to the specified section, grade and condition required for the placement of other materials or as required by the Owner's Representative. Provide interim drainage to prevent damage to the work and unstable conditions due to high moisture contents.
- .5 Do not place the base material until the sub-base material has been inspected, surveyed, proof-rolled, tested and approved by the Owner's Representative.

3.2 COMPACTION OF SUB-BASE MATERIALS

- .1 Granular sub-base materials to be compacted by rolling with a pneumatic tired roller, vibratory smooth drum roller or other approved equipment.
- .2 During compaction, add water by an applicator in such quantities that the moisture content will be maintained at the optimum level as determined by Standard Proctor test. If the moisture content exceeds the optimum moisture content, aerate the material by mechanical means or cease work temporarily until the material has dried sufficiently to reach the optimum moisture content.
- .3 Compact sub-base material to 98% of Standard Proctor Density and within -1% and +2% of optimum moisture content.

3.3 TOLERANCES

- .1 The final surface to be even, uniformly shaped and compacted within a tolerance of +10 mm and -10 mm of established grade but not uniformly low or high, while maintaining surface drainage.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location, use, and placement of “Base Granular Materials” specified herein.

2. PRODUCTS

2.1 GRANULAR BASE MATERIAL

- .1 Granular base material will consist of sound, hard, durable, well graded crushed gravel, sand, and fine soil particles as specified.
- .2 Granular base material will not contain clay, loam, roots, plants or other deleterious materials. The materials to be well graded from coarse to fine within the gradation limits specified, and will not be subject to extreme variation between the lower and upper limits of the gradation envelope specified.

2.2 GRADATION

- .1 Gradation to be within the following limits when tested to ASTM C117, and giving a smooth curve without sharp breaks when plotted on a semi-log grading chart.
- .2 Base Granular Material

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
25 mm	100%
20 mm	97 - 100%
10 mm	35 - 77%
5 mm	15 - 55%
1.25 mm	0 - 30%
0.08 mm	0 - 12%

The percent fractures by weight (2 faces) will be 50% or greater.

3. EXECUTION

3.1 PLACEMENT OF BASE MATERIAL

- .1 Process, handle and transport aggregates to avoid segregation, contamination and degradation.
- .2 Do not place granular materials on snow, ice or frozen surfaces. Place base granular material on prepared subgrade, geotextile fabric, and/or sub-base granular materials.

- .3 Do not place the base material until the subgrade or sub-base materials have been inspected, surveyed, proof rolled, tested and approved by the Owner's Representative.
- .4 Place the base material uniformly on the approved sub-base material to compacted depths specified. Do not place the base materials in layers exceeding 150 mm compacted depth. Shape each layer to a smooth contour and compact to the specified density before placing the next layer. Areas that become segregated during spreading will be removed and replaced at the Contractor's expense. Compact the final layer of the base material to proper grade and cross-section.
- .5 Maintain the base material to the specified section, grade and condition required for the placement of other materials or as required by the Owner's Representative. Provide interim drainage to prevent damages to the work or the causing of unstable conditions due to high moisture contents.

3.2 **COMPACTION OF BASE MATERIAL**

- .1 Granular base materials to be compacted by rolling with a pneumatic tired roller, vibratory smooth drum roller or other approved equipment.
- .2 During compaction, add water by an applicator in such quantities that the moisture content will be maintained at the optimum level as determined by Standard Proctor test. If the moisture content exceeds the optimum moisture content, aerate the material by mechanical means or cease work temporarily until the material has dried sufficiently to reach the optimum moisture content.
- .3 Compact base materials to 98% of Standard Proctor Density within -1% and +2% of optimum moisture content.

3.3 **TOLERANCES**

- .1 The final surface to be even and uniformly shaped and compacted within a tolerance of +10 mm to -10 mm of established grade but not uniformly low or high, while maintaining surface drainage.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location, use and placement of “Proof Rolling” specified herein.
- .2 This Section is intended to be used as a reference section. Provide proof rolling equipment and perform the Proof Rolling as required. Proof Rolling work is considered incidental to the Contract.

2. PRODUCTS

2.1 PROOF ROLLING EQUIPMENT

- .1 Perform proof rolling using a loaded test vehicle of 8,200 kg axle load or a roller of 45,400 kg gross mass with four pneumatic tires each carrying 11,350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 915 mm maximum.
- .2 Owner’s Representative may authorize use of other acceptable proof rolling equipment.

3. EXECUTION

3.1 GENERAL

- .1 Proof roll at level in grade indicated. If alternative proof rolling equipment is authorized, Owner’s Representative will determine level of proof rolling.
- .2 Where proof rolling reveals areas of defective subgrade, Owner’s Representative will determine limits of unsuitable subgrade excavation and specify replacement material.

3.2 SUBGRADE PROOF ROLLING

- .1 Perform subgrade proof rolling on a daily basis prior to the placement of geotextile fabric, sub-base granular material, and base granular material immediately after the subgrade material has been shaped, graded and compacted to the specified density and moisture content. The loaded vehicle to be driven slowly (walking pace) in a systematic pattern so that each successive pass is next to or partially overlaps the previous pass. While the test is being performed, the Owner’s Representative will observe the surface for deflections, cracking or rutting.
- .2 Once the subgrade proof roll is complete and deficient areas have been sub cut and repaired, the Contractor is now responsible for the condition of the road. Any further road failures in the future due to weather or any other conditions will be the responsibility of the Contractor to repair at his cost.

3.3 SUB-BASE PROOF ROLLING

Perform sub-base proof rolling on a daily basis prior to the placement of base granular material and immediately after the sub-base granular material has been placed, shaped, graded and compacted to the specified density and moisture content. The loaded vehicle to be driven slowly (walking pace) in a systematic pattern so that each successive pass is next to or partially overlaps the previous pass. While the test is being performed, the Owner's Representative will observe the surface for deflections, cracking or rutting.

3.4 BASE PROOF ROLLING

- .1 Perform base proof rolling immediately prior to the placement of asphalt and after the base material has been placed, shaped, graded and compacted to the specified density and moisture content. The loaded vehicle to be driven slowly (walking pace) in a systematic pattern so that each successive pass is next to or partially overlaps the previous pass. While the test is being performed, the Owner's Representative will observe the surface for deflections, cracking or rutting.

3.5 TOLERANCES

- .1 Where an area of subgrade material deflects, then rebounds more than 10 mm, the area will be deemed as failing the proof roll test. The failed areas identified by the Owner's Representative will be repaired to a passing condition and re-tested by proof roll method again at no cost to the Owner.
- .2 Where an area of sub-base granular material deflects, then rebounds more than 10 mm, the area will be deemed as failing the proof roll test. The failed areas identified by the Owner's Representative will be repaired to a passing condition and re-tested by proof roll method again at no cost to the Owner.
- .3 Where an area of base granular material deflects, then rebounds more than 5 mm, the area will be deemed as failing the proof roll test. The failed areas identified by the Owner's Representative will be repaired to a passing condition and re-tested by proof roll method again at no cost to the Owner.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location, use and placement of “Trench Excavating and Backfilling” specified herein.
- .2 This Section is intended to be used as a reference section for excavating, backfilling of trenching required for installation of underground services which may include pipes, fittings, valves, manholes, vaults, catch basins, ducts, duct banks, conduits, cable, wire, etc.

2. PRODUCTS

2.1 FILL MATERIALS

.1 General

- .1 Do not use frozen fill materials.
- .2 Remove cobble, stones and rock fragments have maximum dimension greater than 75 mm from fill material or other object other objects which could be detrimental to the pipe or the embedment materials.

.2 Native Backfill Material

- .1 Native backfill containing no debris; tree roots, sod or other organic materials.

.3 Granular Materials

- .1 Refer to Section 02265.

.4 Non-shrink Backfill

Non-shrink Backfill is a very weak mixture of Portland Cement or Lime/Fly Ash, concrete aggregates and water that resists settlement when placed in a utility trenches and is capable of being readily excavated.

- .1 Compressive Strength – 0.2 to 0.5 Mpa with a maximum 56 day strength of 0.5 Mpa.
- .2 Aggregate consisting of washed sand conforming to the requirement of C.S.A. Standard CAN#-A23.1-M77. Aggregate gradation to be within the following limits:

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
10 mm	100%
5 mm	95 - 100%
2.5 mm	80 - 100%
1.25 mm	50 - 100%
0.630 mm	25 - 65%
0.315 mm	10 - 35%

0.160 mm	2 - 15%
0.080 mm	0 - 10%

- .3 Minimum slump - 75 mm. Maximum slump - 125mm.
- .4 Calcium chloride admixture may be used. Air entrainment admixture may be used to improve workability.
- .5 Cold Weather Requirements: Non shrink backfill delivered in cold weather will conform to the requirement specified in Section 18 of C.S.A Standard CAN3-A23.1-M77.

2.2 RIGID FROST SHIELD

- .1 Rigid frost shield material to be extruded polystyrene insulation 50 mm thick with a minimum resistance to heat transfer of 1.76 RSI (R-value of 10) as determined by ASTM C518 and a minimum comprehensive strength of 275 kPa (40 psi) as determined by ASTM D1621.
- .2 Approved products:
 - Dow STYROFOAM HIGHLOAD 40
 - Owens Corning Foamular 400
 - or approved equal

2.3 GRANULAR FROST INSULATION

- .1 Processed lightweight aggregates (LWA) used as granular frost insulation material in pipe bedding and insulating cover due to high thermal insulation value and low thermal conductivity compared to natural soils.
- .2 Approved products:
 - Granulite
 - Aggre-lite by Atrium Lightweight Materials Inc.
 - Liteweight 730
 - or approved equal

2.4 CELLULAR CONCRETE INSULATION

- .1 Insulating material will be precast cellular concrete blocks with wet density equal to 475 kg/m³.
- .2 Approved products:
 - Cematrix CMI-475
 - Or approved equal

3. EXECUTION

3.1 EXCAVATION

- .1 Excavate trenches to the lines, grades and elevations shown on the Contract Documents. For pipe trenches, comply with Pipe Trench Width Schedule.
- .2 Where a trench box and/or cage will be employed for a trench excavation refer to Uni-Bell's latest edition of "Handbook of PVC Pipe – Design and Construction" for the trench design and method of installation.
- .3 Where shoring will be employed for trenching and/or protection of utilities and structures the Contractor must engage the services of qualified professional engineer who is registered or licensed in province Alberta to design and inspect shoring and anchoring required for work.
- .4 Grade and shape pipe trench to give uniform and even bearing for each length of pipe. Dig bell holes at each joint as required.

3.2 MOISTURE CONTENT CONTROL OF BACKFILL MATERIAL

- .1 Uniform moisture content of each layer of fill to be within the Optimum Moisture Content limits specified in Backfilling Schedule, as determined by ASTM D698 test procedures.
- .2 When the moisture content in the fill material is lower than that specified for placement, add water and mix with the material to achieve uniform moisture content in the material to conform to the requirements.
- .3 When the moisture content in the fill material is higher than that specified for placement, dry the material by scarifying, disking, mixing and harrowing to achieve uniform moisture content in the material that conforms to the requirements.

3.3 PLACEMENT AND COMPACTION OF BACKFILL MATERIAL

- .1 Backfill trenches using fill materials as specified in Backfilling Schedule.
- .2 Place fill materials in layers not exceeding loose thickness specified in Backfilling Schedule.
- .3 Uniformly compact each layer of fill to minimum percentages of Standard Proctor Density specified in Backfilling Schedule, as determined by ASTM D698 test procedures.
- .4 Uniform moisture content of each layer of fill to be within the Optimum Moisture Content limits specified in Backfilling Schedule.
- .5 Where a trench box and/or cage is employed, ensure that the pipe installation and pipe zone compaction requirements are met. Refer to Uni-Bell's, latest edition of "Handbook of PVC Pipe - Design and Construction" for trench box/ cage design and methods of installation. The installed pipe and its embedment will not be disturbed when using movable trench boxes and/or cages. Movable supports will not be used below the top of

the pipe zone unless an approved method is used to maintain the integrity of the embedment material. Before moving supports, place and compact embedment to sufficient depths to ensure protection of the pipe. As supports are moved, finish placing and compaction of embedment material.

- .6 Where shoring is employed, the shoring professional will provide the Contractor instructions how the backfill schedule requirements will be achieved. Provide instructions to the Owner's Representative for review and comment at least 7 days prior to commencing backfilling
- .7 When compacting in the pipe zone, care should be taken to avoid contact between the pipe and the compaction equipment (mechanical tampers, tamping bars, etc.).
- .8 Compaction in the haunch area is to be obtained by use of mechanical tampers and tamping bars. Care should be taken to ensure that the pipe does not "float" due to the compacting methods.
- .9 When compacting initial backfill, mechanical tampers are to be used adjacent to the pipe. Mechanical tampers shall not be used directly above the pipe until a minimum of 300 mm of backfill material is in place above the pipe.
- .10 When compacting backfill in the intermediate zone, roller compacting equipment is not to be used until a minimum of 500 mm of backfill material has been placed above the top of pipe.
- .11 The use of hydro-hammer in the pipe zone is not be permitted.
- .12 When compacting backfill above the pipe zone, hydro-hammer is not to be used until a minimum of 1,000 mm of backfill material has been placed above the top of pipe.

3.4 UTILITY CROSSINGS

- .1 Install crossings to the lines, grades and elevations shown on the Contract Documents.
- .2 Comply with requirements of crossing agreement, permit or other crossing requirements issued by utility company.

3.5 PIPE TRENCH WIDTH

- .1 Except as otherwise specified, minimum and maximum trench widths, up to a point 300 mm above top of pipe, will be as specified in Pipe Trench Width Schedule.
- .2 Maximum trench widths indicated in Pipe Trench Width Schedule exclude an allowance for shoring.
- .3 Trench width at any point will not be less than trench width at any depth below such point.

2450-057-00

3.6 PIPE TRENCH WIDTH SCHEDULE

Pipe Size (Outside Diameter)	Minimum Trench Width	Maximum Trench Width
850 mm diameter or less	300 mm greater than external pipe diameter	600 mm greater than external pipe diameter or 750 mm total trench width, whichever is greater
Greater than 850 mm diameter	300 mm greater than external pipe diameter	600 mm greater than external pipe diameter

3.7 BACKFILLING SCHEDULE

Location	Fill Material	Max. Lift Thickness	Minimum Compaction	Moisture Content Variance from Optimum
Pipe Embedment – Bedding¹				
Type 1	Class I Material	150 mm	98%	±3%
Type 2	Class I or II Material	150 mm	98%	±3%
Pipe Embedment – Haunching¹				
Type 1	Class I Granular Material	150 mm	98%	±3%
Type 2	Class I or II Material	150 mm	98%	±3%
Pipe Embedment – Initial Backfill				
Type 1	Class I Granular Material	150 mm	98%	±3%
Type 2	Class I or II Material	150 mm	98%	±3%
Final Backfill – Intermediate Zone				
Type 1, 2, 3	Suitable Native Material ²	300 mm	98%	+2%

2450-057-00

Location	Fill Material	Max. Lift Thickness	Minimum Compaction	Moisture Content Variance from Optimum
Final Backfill – Final Zone to 1.0m below subgrade Type 1, 2, 3	Suitable Native Material ²	300 mm	98%	+2%

NOTES:

1. Use minus 20 mm size material for pipes 375 mm and smaller for improved support underneath the haunches of the pipe.
2. If suitable native material is not available base gravel or pit run may be used if trench width permits at the discretion of the Owner's Representative.
3. Type 4 installation will be limited to appropriately designed concrete pipe.

END OF SECTION

1. GENERAL

1.1 SCOPE

This section specifies the requirements for the supply and installation of pipe utilizing pipe bursting.

1.2 RELATED SECTIONS

- | | | |
|----|-----------------------------------|----------------|
| .1 | Trench Excavating and Backfilling | Section 02319. |
| .2 | HDPE Pipe and Fittings | Section 02513. |
| .3 | Couplings | Section 02516. |
| .4 | Water Service Connections | Section 02518. |
| .5 | Hydrostatic Pressure Testing | Section 02520. |

1.3 PIPE BURSTING METHOD

- .1 Design
- .1 Submit methodology specific to each water main section, design and construction details for the proposed pipe bursting operation.
- .2 Pulling force on pipe not to exceed manufacturer's recommendations. Contractor to log pulling force data and submit to Owner.
- .2 General Description
- .1 A tool whose outside diameter is greater than the maximum inside diameter of the existing water main is drawn through the existing water main, breaking it into small fragments and driving the broken pieces into the surrounding soil.
- .2 The tool makes a void along the path formerly occupied by the existing water main and simultaneously pulls the new pipe into place.
- .3 Pipe bursting head to be minimum 25 percent larger than new pipe outer diameter.
- .4 The tool shall be of dimensions such that the design maximum diameter of the space created shall not exceed the maximum outside diameter of the new pipe by more than 15%.
- .5 The installation procedure shall make the invert of the new pipe lower than the original invert by half the difference between the inside diameters of the old pipe and the replacement pipe.

.3 Warranty

- .1 The Contractor shall warrant to the Owner that the equipment used on this Contract, where covered by patents or license agreements, is furnished in accordance with such agreements and that the prices included herein cover all applicable royalties and fees in accordance with such license agreements.
- .2 The Contractor shall defend, indemnify and hold harmless the Owner from and against any and all costs, loss, damage or expense arising out of or in any way connected with any claim of infringement of patent, trademark, or violation of license agreement.

1.4 WORK CONTENT

- .1 Includes all Contractor engineering services, plant, labour, material, and services for the following:
 - .1 Preparation of the water mains for accepting the bursting tool and new pipe. This includes CCTV inspection, flushing and cleaning water main lines.
 - .2 Installation of a new water main by the pipe bursting process.
 - .3 Isolation of water main during replacement and maintaining servicing to users by an approved method.
 - .4 CCTV inspection of the replaced water main.

1.5 SUBMITTALS

- .1 The Contractor is required to submit the following within 10 working days of award of contract:
 1. Detailed specifications of proposed pipe bursting methods.
 2. Complete methodology specific to each water main section requiring replacement.
 3. Complete details about component materials, their properties and installation procedures.
 4. Schedule of work.
 5. Drawings and description of excavation locations.
 6. Access shaft or pit excavation shoring design stamped by a professional engineer registered in Alberta.
 7. Method of dealing with existing pipe sections which may be partially/fully encased in concrete bedding.

8. Manufacturer's test data and certification that pipe materials meet requirements of this section.
 9. The proposed method of maintaining services or providing alternate facilities, for review by the Owner.
 10. Confirmation that the Contractor, or sub-Contractor if applicable, is legally licensed to practice the method to be used in this Contract for the installation or rehabilitation of the water main line.
- .2 The Contractor shall not change any material, thickness, design values or procedural matters stated or approved in the submittals without the Engineer's prior knowledge and approval.

2. PRODUCTS

2.1 HIGH DENSITY POLYETHYLENE PIPE (HDPE)

- .1 The pipe shall be made from polyethylene resin compound which conforms to ASTM D1248 and qualified as Type III, Class C, Category 5, Grade P34 material and with ASTM D3350 as a 345434C cell class material. This material shall be listed with the Plastic Pipe Institute (PPI) as a PE 3408 material.
- .2 A Certificate of Compliance with the specifications shall be furnished by the pipe supplier.
- .3 The pipe specified on the drawings is required for the water system hydraulics. If the Contractor proposes alternative pipe materials or pipe diameters (I.D. or O.D.), then the Contractor must submit details to the Engineer for approval.
- .4 The pipe shall be free from visual defects such as foreign inclusions, concentrated ridges, pitting, discoloration, varying wall thickness and other deformities.

2.2 CLAMPS

- .1 Where excavations for the insertion of the replacement pipe are made between two junctions, the ends of the new pipe will be cut smooth and square to the axis so that both junctions meet and touch uniformly and continuously with the existing pipe.
- .2 All coupling systems must be submitted to the Engineer for approval.

2.3 OTHER PIPE MATERIALS

1. Where the Contractor proposes to use other pipe materials in a pipe bursting application, the Contractor shall submit details for approval.

3. EXECUTION

3.1 INSTALLATION PROCEDURE

.1 Inspection and Cleaning of Water Main Lines

- .1 Inspect the interior of the water main carefully using CCTV or other means to determine the existence of any conditions that may prevent completion of the pipe bursting process.
- .2 Obtain adequate information for designing and execution of the replacement scheme.
- .3 Clean the water main to a degree that is required for the proper completion of the pipe bursting process.
- .4 Dispose of debris removed from the water main by an approved method.

3.2 BYPASS FLOW IN WATER MAIN LINES AND SERVICE CONNECTIONS

- .1 Provide a detailed scheme to deal with mainline flows for the Owner's approval, taking into account the following:
 - .1 Pumps and bypass lines shall be of adequate capacity to handle the peak flows, and ensure that no upstream flooding occurs during construction.
 - .2 Equipment shall conform to the applicable noise bylaws.
- .2 All service connections attached to the existing water main shall be completely disconnected and isolated from the existing water main before pipe bursting operations commence.
- .3 Provide detailed proposals for dealing with flows in existing service connections.

3.3 INSERTION OR ACCESS PITS

- .1 The location and number of insertion or access pits shall be outlined by the Contractor and submitted in writing for review by the Engineer prior to commencement of work.
- .2 Unless otherwise stipulated, the pits shall be located such that their total number shall be minimized and the length of replacement pipe installed in a single pull is maximized.
- .3 Locations of damaged pipe or sags shall be used for insertion/access pits if directed by the Engineer.
- .4 Pit and/or pipe to be properly bedded with drainage rock or pea gravel to a minimum of 150 mm above and below the pipe at the connection pit.
- .5 Pits to be maintained dry.

3.4 INSTALLATION OF REPLACEMENT PIPE

- .1 As the pipe bursting is advanced through the existing water main pipe, the replacement pipe shall be advanced directly behind the tool to fill the void left by the shattered sewer pipe.
- .2 The installation of the replacement pipe shall not damage other underground utilities in the vicinity. The Contractor shall be responsible for making good any damage incurred.
- .3 Replacement pipe with gashes, nicks, abrasions, or any such physical damage which are larger/deeper than 10% of the wall thickness shall not be used and shall be removed from the construction site.
- .4 The installed replacement pipe shall be continuous over the entire length, from manhole to manhole.

3.5 PIPE JOINING

- .1 Sections of HDPE replacement pipe shall be assembled and joined on the job site above the ground. Jointing shall be accomplished by the heating and butt-fusion method in strict conformance with the manufacturer's printed instructions. Joint: to AWWA C207.
- .2 The butt-fusion method for pipe joining shall be carried out in the field by operators with prior experience in fusing polyethylene pipe with similar equipment using proper jigs and tools per standard procedures outlined by the pipe manufacturer. These joints shall have a smooth, uniform double rolled back bead made while supplying the proper melt, pressure, and alignment. It shall be the sole responsibility of the contractor to provide an acceptable butt-fusion joint.
- .3 All joints shall be made available for inspection by the Engineer before insertion.

3.6 SERVICE CONNECTIONS

- .1 After the replacement pipe has been completely installed and tested, all services shall be reconnected to the replacement pipe.
- .2 The utmost care shall be exercised in the tapping of the water main for the connection, in order to ensure that no damage is caused to the water main.
- .3 The connection to the water main shall be by means of an approved field connection. The connection and any joints between the service and the water main shall be structurally sound and watertight.
- .4 The service connection pipe shall not protrude into the water main.

3.7 ACCEPTANCE

- .1 The installed pipe shall meet the leakage requirements as specified in Section 02520 – Hydrostatic Pressure Testing.

3.8 CONTRACTOR QUALIFICATION

- .1 Pipe bursting contractor shall have successfully installed 3000m or more pipe by pipe bursting over a minimum of 24 month period.
- .2 Pipe bursting contractor shall have performed chlorination of potable water mains per AWWA standards on at least two (2) projects.
- .3 Pipe bursting contractor shall have certificate of training endorsed by the manufacturer of thermal fusion equipment in butt fusing of HDPE pipe, in lieu of certificate, evidence of training may be substituted.
- .4 Pipe bursting contractor shall have certificate of training endorsed by the supplier or manufacturer of HDPE electro-fusion fusion couplers to be used in the method. In lieu of certificate, evidence of training may be substituted.
- .5 Upon request of the Engineer, contractor shall submit that all employees are medically cleared to work on restricted operations and have been trained in hygienic procedures.
- .6 Pipe bursting contractor personnel overseeing pre-chlorination process shall be trained and qualified in process.
- .7 Upon request of Engineer, pipe bursting contractor shall submit list of completed projects with details of type of pipe installation, size, and length of pipe burst, owner contact names and phone numbers.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location, use, and placement “Directional Drilling” specified herein.

1.2 COORDINATION

- .1 The Owner has made application for the proposed work to the appropriate regulatory authorities. Work related to this Section will not be performed until the necessary Approvals and Authorizations have been obtained.

2. PRODUCTS

2.1 GENERAL

- .1 Provide a Certificate of Compliance with the specifications to be furnished by the product pipe supplier.
- .2 The pipe to be free from visual defects such as foreign inclusions, concentrated ridges, pitting, discoloration, varying wall thickness and other deformities.
- .3 The pipe specified on the Contract Drawings is required for the pipe hydraulics. The alternative pipe materials or pipe diameters (I.D. or O.D.) for the pipe must meet or exceed the hydraulic design as determined by the Owner’s Representative. Any additional costs associated with the alternative pipe will be borne by the Contractor. If joining HDPE pipe to PVC pipe provide HDPE pipe with ID to match ID of PVC pipe.

2.2 HIGH DENSITY POLYETHYLENE (HDPE) PRODUCT PIPE

- .1 Refer to Section 02513 – HDPE Pipe and Fittings.

2.3 TRACER WIRE

- .1 Tracer wire will be a 12 AWG solid, PRO-TRACE HDD-CCS PE45. Conductor will be hard-drawn, 21% IACS, copper clad steel, utilizing an ANSI 1045 high carbon steel core (required to meet break load), with rated break load of 1,030 lbs (201,000 psi). Conductor will be extruded with a 45 mil, high-density polyethylene. Tracer wire will be rated for direct burial use at 30 volts and RoHS compliant. Tracer wire will be PLAINSMAN HDD-CCS PE45 as manufactured by Plainsman Manufacturing.
- .2 Approved Products
 - .1 PLAINSMAN HDD-CCS PE45 as manufactured by Plainsman Manufacturing.

2.3 DRILLING FLUID

- .1 Drilling Fluid to be “Poly-xan” drilling mud or approved equivalent meeting NSF L55.

3. EXECUTION

3.1 GENERAL

- .1 Do not proceed with any directional drilling until approval from specific utility has been obtained by Owner.
- .2 Follow the recommendations for planning and execution of horizontal directional drilling in ASTM F1962, latest edition.
- .3 Follow accepted procedures and practices outlined in the HDD Consortium's "Horizontal Directional Drilling Good Practices Guidelines", latest edition as available from North American Society for Trenchless Technology, 1655 N. Ft. Meyer Dr., Suite 700, Arlington, Virginia, USA 22209, telephone (703) 351-5252, or on their web site at www.nastt.org.
- .4 Abide by all stipulations and conditions included in the Approvals and Authorizations of any regulatory authorities.

3.2 PLANNING

- .1 Prepare directional drilling plan, outlining specific procedures and techniques that will be implemented during construction, as well as a schedule for drilling activities. Include details on drilling operations including the pilot hole drilling procedure, the reaming operation, and the pullback procedure; specifications of equipment to be used; site layout including the location of entry and exit pits; handling of mud and cuttings; type of drilling mud to be used; past project experience of the drilling crew annular pressure charts to confirm that the annular pressure will not exceed the overburden pressure etc. Provide details on the installation of the "Tru Track coils" including how they are supported and the duration for which they will be deployed. Provide these plans to the Owner's Representative at least 21 days prior to beginning any work on directional drilling. Modify as required by the Owner's Representative.
- .2 Prepare directional drill drawings identifying proposed horizontal and vertical alignments for each directional drill. Include details on where each directional drill will daylight and how this will accommodate the fixed tie-in locations. Also identify separation between directional drills and existing utilities. Provide these plans to the Owner's Representative at least 21 days prior to beginning any work on directional drilling. Modify as required by the Owner's Representative.
- .3 Prepare Emergency Response Plans and contingency plans for fuel and hazardous waste spills, frac-outs, sediment control, storm runoff, and floods. Provide these plans to the Owner's Representative at least 21 days prior to beginning any work on directional drilling. Modify as required by the Owner's Representative.
- .4 Construct utility crossing with minimum disruption to traffic. All road closures and interruptions are to be approved by the municipality or authority having jurisdiction prior to completing the work. Contractor is responsible for submitting traffic accommodation plans including locations, duration of closure and signage as per the municipality or authority having jurisdiction standards. Provide these plans to the Owner's Representative at least 21 days prior to beginning the work. Modify as required by the Owner's Representative.

- .5 Upon request of the Owner's Representative, directional drill contractor will submit list of completed projects with details of type of pipe installation, size, and length of directional drill, Owner and Owner's Representative contact names, and phone numbers.

3.3 CONSTRUCTION

- .1 Advance the pilot bore along the alignment and to the grade shown on the approved directional drill Drawings, taking into account the diameter of the final bore and the diameter of the carrier pipe. Do not disturb highway, rail grade, canal, utilities, watercourse or other infrastructure.
- .2 Maintain control of all drilling fluids at all times. Dispose of excess materials in designated locations.
- .3 Annular space will not exceed 100 mm larger than the OD of the product pipe for pipes of less than 200 mm diameter. For product pipes 200 to 600 mm reamed diameter to be product pipe diameter x 1.5. For product pipes greater than 600 mm reamed diameter to be product diameter plus 300 mm.
- .4 Restrict open excavation within the approved construction right-of-way to the minimum required to achieve the Work of this section.
- .5 Restrict open excavation within the approved construction right-of-way to the minimum required to achieve the Work of this section.
- .6 Do not deposit or store material or equipment within the road, railway, utility or watercourse right-of-way, without written permission from the right-of-way Owner.
- .7 Do not operate equipment with tracks or cleats on paved surfaces.
- .8 Backfill all access pits from bottom of excavation to pipe invert with gravel and compact to 95% of Standard Proctor Maximum Dry Density. Backfill remaining trench in accordance with typical pipeline bedding and backfill as indicated in the Section 02319 – Trench Excavation and Backfilling.
- .9 Secure the trace wire to the pipe being directionally drilled ensuring the wire is not cut, scraped, or nicked during installation. Termination points will be installed on Pipeline Warning Sign Posts at approximately 2 km spacing or as directed by the Owner's Representative.
- .10 Test the segments of trace wire between termination points for conductivity and continuity. Arrange for the Owner's Representative to observe successful tests for all trace wire installation. Locate and repair any trace wire that does not pass the tests.
- .11 Restore all disturbed areas to pre-construction conditions.
- .12 Provide the Owner's Representative with a plot of the horizontal and vertical alignment of the pilot bore at intervals not exceeding 10.0 m.

3.4 RECORD INFORMATION

- .1 Provide all technical documentation, including Daily Reports with a log of boring operations and guidance system for each drill rod added or withdrawn during drilling and “as-drilled” record drawing of elevations and chainages for each bore.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location use and placement of “PVC Pipe and Fittings” specified herein.

2. PRODUCTS

2.1 LINE CODE CLASSIFICATION

- .1 Use the following code classification to determine pipe type and pressure rating from the drawings:

B3	Series 100
B4	Series 125
B5	Series 160
B6	C900 Class 150 or C905 Class 150

2.2 PIPE

- .1 All pipe are to be cylindrical and straight, with ends cut square to the longitudinal axis and having a smooth finish free from imperfections such as grooves or ripples.
- .2 PVC Class Pipe
 - .1 For pipe sizes 100 mm to 300 mm in diameter, all pipe and joints shall be to the latest revision AWWA C900-81, CSA certified as meeting latest revision CSA 3-B137.3-M86, SDR 18, pressure class 150.
 - .2 For pipe sizes 350 mm to 900 mm in diameter, all pipe and joints shall be to the latest revision AWWA C905-88, CSA certified as meeting latest revision CSA 3-B137.3-M86, SDR 18, pressure class 150.
 - .3 All PVC class pipe to be cast iron outside diameter, bell end, c/w 1 MPa elastomeric gasket push-on joint.
- .3 PVC Series Pipe
 - .1 PVC Series pipe will be bell and gasket joint type or fusible certified for CSA Standard B137.0 and B137.3 SDR 26, Series 160, rigid Poly (Vinyl Chloride) for pressure applications.

2.3 FITTINGS

- .1 Class Pipe
 - .1 For sizes 300 mm and smaller, PVC Fittings to the latest revision AWWA C-907, CSA certified as meeting latest revision CSA 3-B137.2-M89, SDR 18, pressure Class 150, bell ends, c/w 1 MPa elastomeric gasket push-on joint.
 - .2 For sizes 350 mm and larger, use cast iron fittings to the latest revision AWWA C110-87 / ANSI A21.10-1987, pressure Class 150 minimum. Long body only. Interior and exterior of fittings to be factory epoxy coated, with potable grade coating.
 - .3 Joints for cast iron fittings to latest revision AWWA C111-85 / ANSI A21.11-1980, pressure Class 150 minimum, "Tyton Joint" or approved equal.
- .2 Series Pipe
 - .1 All fittings to be PVC, with gasketed joints of the same material as the pipe. Fittings to conform to CSA B137.2 or CSA B137.3.

2.4 TRACER WIRE

- .1 Tracer wire will be a 12 AWG solid, PRO-TRACE HDD-CCS PE45. Conductor will be hard-drawn, 21% IACS, copper clad steel, utilizing an ANSI 1045 high carbon steel core (required to meet break load), with rated break load of 1,030 lbs (201,000 psi). Conductor will be extruded with a 45 mil, high-density polyethylene. Tracer wire will be rated for direct burial use at 30 volts and RoHS compliant.
- .2 Approved Products
 - .1 PLAINSMAN HDD-CCS PE45 as manufactured by Plainsman Manufacturing.

3. EXECUTION

3.1 OPEN CUT INTSALLATION

- .1 Installation and handling of pipe will be according to the manufacturer's recommendations and applicable AWWA Specification for the type of pipe selected or as specified herein.
- .2 PVC pipe and fittings to be installed with a minimum cover of 2.5 m above the crown of the pipe. Pipe and fittings with less than 2.5 m cover will be installed with an insulating frost shield unless otherwise directed by Owner's Representative.
- .3 Install pipe to the lines, grades and elevations shown on the Contract Documents. Lay the pipes on the prepared bed, true to line and grade, with pipe invert smooth and free of sag or high points. Ensure barrel of each pipe is in contact with shaped bed throughout

the full length of pipe. Commence laying at outlet and proceed in upstream direction with bell ends of pipe facing upgrade.

- .4 For ties to existing water mains requiring interruption of the water service, advise the Engineer 48 hours in advance of the proposed interruption for approval. Upon approval notify the occupants, residents and businesses at least 24 hours in advance by way of a written notice and verbal advisory. Submit a copy of the notice to the Owner's Representative for approval prior to distribution. Minimize the period of time of the interruption and schedule the interruption for a non-peak demand time. Notify the fire department of the water supply service interruption to any hydrants.
- .5 Lower pipe into the trench by hand or by mechanical equipment. Lift pipe by means of slings and lower into the trench. By no means will the pipe be lifted with equipment that gouges or scars the pipe or be allowed to be pulled over the ground. Do not roll pipe into the trench. Lumps of earth and rock greater than 25 mm will not be permitted beneath the pipe and must be removed prior to pipe replacement.
- .6 The assembly of the gasket joint will be performed as recommended by the pipe manufacturer and applicable AWWA Specification for the type of pipe selected. In all cases, clean the gasket, the bell or coupling interior, especially the groove area, and the spigot area with a rag, brush or paper towel to remove any dirt or foreign material before the assembling. Inspect the gasket; pipe spigot, bevel, gasket groove and sealing surface for damage or deformation. Apply lubricants as specified by the pipe manufacturer.
- .7 Good alignment of the pipe is essential for easy assembly. Align the spigot to the bell and insert the spigot into the bell until it contacts the gasket uniformly. Firm and steady pressure will be applied either by hand or by bar and block assembly until the spigot easily slips through the gasket. Do not swing or stab the joint or suspend the pipe and swing it into the bell or use excavating equipment to force pipe sections together. Complete each joint before laying next length of pipe.
- .8 Handle pipe in a manner to prevent damage to the pipe walls. Pipe strung along the trench will, if necessary, be supported on timber skids sufficiently protected to prevent injury. Securely close the open end of pipe at the end of each day's work to prevent the entrance of small animals, or the introduction of foreign matter of any nature, and do not be reopen the ends until work is resumed. Exercise care in joining sections of the pipe, in order to minimize any possibility of foreign matter whatsoever being inside the pipeline after the completion. Any obstructions remaining in the line after the completion thereof to be removed.
- .9 Do not install pipe on frozen bedding.
- .10 PVC pipe fittings will have Type 1 backfill in accordance with Section 02319 – Trench Excavating and Backfilling.
- .11 Install sacrificial anodes and corrosion protective tape on all cast iron fittings.
- .12 Provide thrust blocking on all pipe and fitting deflecting more than 5 degrees..

3.2 DIRECTIONAL DRILL INSTALLATION

- .1 For directional drilling installation, refer to Section 02429.

3.3 TOLERANCE

- .1 Maintain constructed grade pipe within the specification given for water and sewer pipes from the lines, grades and elevations shown in the Contract Documents. Where departures occur, return to established grade gradually over a distance of not less than 25 meters.

3.4 RECORD SURVEYS

- .1 Contractor will sufficient time for the Owner's Representative to survey points such as elbows, deflections, and other significant details for record drawings prior to backfilling the pipe.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other sections for location use and placement of “HDPE Pipe and Fittings” specified herein.

2. PRODUCTS

2.1 MATERIAL

- .1 The pipe will be made from polyethylene resin compound qualified as Type III, Category 5, Class C, Grade P34 in ASTM D1248-84. This material will have a long term hydrostatic strength of 1600 psi, when tested and analyzed by ASTM D2837.
- .2 The raw material will contain a minimum of 2% carbon black, well dispersed.
- .3 The pipe will contain no recycled compound except that generated in the manufacturer’s own plant from resin of the same specification from the same raw material supplier.
- .4 Compliance with the requirements of this paragraph will be certified in writing by the pipe supplier upon request.
- .5 The cell classification will be PE 345434C for PE 4710 materials per latest revision of ASTM D3350.

2.2 PIPE

- .1 Ensure pipe is cylindrical and straight, with ends cut square to the longitudinal axis and having a smooth finish free from imperfections such as grooves or ripples.
- .2 Provide pipe and fittings in outside diameter based iron pipe sizes up to 75 mm diameter certified to CSA B 137.1 and AWWA 901 latest revisions and meeting ASTM material specification PE 4710 for hydrostatic design stress of 800 psi.
- .3 Provide pipe and fittings in outside diameter based iron pipe sizes 100 mm diameter and larger certified to CSA B 137.1 and AWWA 906 latest revisions and meeting ASTM material specification PE 4710 for hydrostatic design stress of 800 psi.
- .4 Gravity Sewer pipe will have a light color interior surface that will allow for video inspection of pipe.
- .5 The following information will be continuously indent printed on the pipe, or spaced at intervals not exceeding 1.5 m.
 - .1 Name and/or trademark of the pipe.
 - .2 Nominal pipe size.
 - .3 Pressure rating and/or DR number.

- .4 The letters “PE” followed by the polyethylene type and category, as specified by ASTM D-1248, followed by the hydrostatic design basis.
- .5 Manufactured standard design basis.
- .6 A production code from which the date and place of manufacture can be determined.

2.3 FITTINGS

- .1 Polyethylene fittings will be made from material meeting the same requirements as the pipe.
- .2 Where applicable, fittings will meet the requirements of AWWA C906.
- .3 Molded fittings will be manufactured in accordance with either the latest version of ASTM D2683 (socket fused) or the latest version of ASTM F2620 (butt fused) and will be so marked.
- .4 Mitred fusion and mitred flanged fittings will be FRP reinforced.
- .5 Molded fittings will be constructed of polyethylene pipe with a wall thickness 25% greater than the system design. If molded fittings are to be butt fused, each end of the fitting will be the same thickness as the pipe to which the fitting is to be fused.
- .6 Mechanical Fittings used with polyethylene pipe will be specifically designed for, or tested and found to be acceptable for use with, polyethylene pipe. Mechanical Fittings designed for other materials will not be used unless authorized by the Mechanical Fitting Manufacturer. Special precautions may exist with certain mechanical fittings or additional components may be required. Consult the manufacturer of the fitting and submit shop drawings to the Owner’s Representative for review prior to its use.

2.4 TRACER WIRE

- .1 Tracer wire will be a 12 AWG solid, PRO-TRACE HDD-CCS PE45. Conductor will be hard-drawn, 21% IACS, copper clad steel, utilizing an ANSI 1045 high carbon steel core (required to meet break load), with rated break load of 1,030 lbs (201,000 psi). Conductor will be extruded with a 45 mil, high-density polyethylene. Tracer wire will be rated for direct burial use at 30 volts and RoHS compliant. Tracer wire will be PLAINSMAN HDD-CCS PE45 as manufactured by Plainsman Manufacturing.

3. EXECUTION

3.1 PIPE INSTALLATION

- .1 Installation and handling of pipe will be according to the manufacturer's recommendations and applicable AWWA Specification for the type of pipe selected or as specified herein.

- .2 HDPE pipe and fittings to be installed with a minimum cover of 2.5 m above the crown of the pipe. Pipe and fittings with less than 2.5 m cover will be installed with an insulating frost shield unless otherwise directed by Owner's Representative.
- .3 Install pipe to the lines, grades and elevations shown on the Contract Documents. Pipe bedding as specified. Lay the pipes on the prepared bed, true to line and grade, with pipe invert smooth and free of sag or high points. Ensure barrel of each pipe is in contact with shaped bed throughout the full length of pipe.
- .4 Lower pipe into the trench by hand or by mechanical equipment. Lift pipe by means of slings and lower into the trench. By no means will the pipe be lifted with equipment that gouges or scars the pipe or be allowed to be pulled over the ground. Do not roll pipe into the trench. If the Contractor elects to use a narrow trench, the method of lowering the pipe into the trench will be such that no rocks or lumps of earth fall into the trench beneath the pipe. Lumps of earth and rock greater than 25 mm will not be permitted beneath the pipe and must be removed prior to pipe placement.
- .5 The assembly of thermally butt-fused or electro-fused HDPE pipe will be performed as recommended by the pipe manufacturer and applicable AWWA Specification for the type of pipe selected.
- .6 Employ the services of a certified HDPE fusing technician to perform all butt-fusion and electro-fusion.
- .7 All transitions from HDPE to PVC pipe will require a system with HDPE anchor-fitting concrete anchorblock; HDPE flange with metal backup ring; stainless steel nuts, bolts, and washers; PVC bell by flange fitting and mechanical pipe restrainers necessary to prevent the PVC pipe pulling out of the bell fittings when HDPE pipe shrinkage occurs.
- .8 Handle pipe in a manner to prevent damage to the pipe walls. Pipe strung along the trench will, if necessary, be supported on timber skids sufficiently protected to prevent injury. Securely close the open end of pipe at the end of each day's work to prevent the entrance of small animals, or the introduction of foreign matter of any nature, and do not reopen the ends until work is resumed. Exercise care in joining sections of the pipe, in order to minimize any possibility of foreign matter whatsoever being inside the pipeline after the completion. Any obstructions remaining in the line after the completion thereof are to be removed.
- .9 When installing the pipe bedding/haunching material ensure that the pipe is adequately secured to prevent the pipe from lifting or moving laterally while the pipe bedding/haunching material is being placed and compacted around the pipe.
- .10 For special fittings and tie-ins, cut the pipe to the length required as recommended by the pipe manufacturer without damaging the pipe or its coating. The end will be cut smooth at right angles to the axis of the pipe.
- .11 Do not install pipe on frozen bedding.

- .12 HDPE pipe and fittings will have Type 1 backfill as per Section 02319 – Trench Excavating and Backfilling; sub-section 3.7 Backfilling Schedule.
- .13 Provide thrust blocking on all pipe and fitting deflecting more than 5 degrees.

3.2 TRACER WIRE

- .1 Provide The Contractor must ensure that the tracer wire is not cut, scraped, or nicked during installation. Termination points will be installed on Pipeline Warning Sign Posts at approximately 2 km spacing.
- .2 The Contractor will test and the Owner’s Representative will check the tracer wire. The Contractor is responsible to locate and repair any malfunctions discovered.

3.3 TOLERANCE

- .1 Maintain constructed pipegrade for manhole connection to within - 20 mm to + 20 mm from the lines, grades and elevations shown in the Contract Documents.
- .2 Maintain constructed grade to within -50 mm to +50 mm from the lines, grades and elevations shown in the Contract Documents. Where departures occur, return to established grade gradually over a distance of not less than 25 m or reinstall the pipe to within grade tolerances.

3.3 TESTING AND INSPECTIONS

- .1 Before application for Substantial Completion all Gravity Sewer HDPE main pipe will be inspected by means of video camera for grade tolerances. The Contractor will provide two color copies of the video inspection and the written Final Report to the Owner. Video inspection report to follow the manhole and/or vault numbering and stationing as per the Contract Documents.
- .2 If the video inspection reveals any ovality (out of round) in the pipe, the Contractor will perform a deflection test to ensure those sections of pipe have not deflected in excess of 7.5%. The flexible pipe deflection test will be performed by successfully pulling a mandrel, not less than 92.5% of the base internal diameter (as defined by the CSA or ASTM standard to which the pipe is manufactured), through the pipe. All deflection testing will be performed in conjunction with the video inspections.
- .3 Contractor will inform the Owner’s Representative 48 hours before all testing and inspections are to begin.
- .4 The Owner’s Representative will request random samples of fused joints for testing. The sample will be requested following the completion of the fusion process, but before the next fuse is begun.
- .5 The Contractor will do all work necessary to provide the requested joint and re-fuse the two pieces of pipe. No extra payment will be made for this work.
- .6 The number of fused joints requested for testing will not exceed an average of one joint per 400 metres of HDPE pipe installed.

2450-057-00

- .7 All pipe and fittings installed during the Work will be pressure tested.
- .8 All pipe and fittings on a potable water system affected by installation Work will be flushed and disinfected including bacteriological testing.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location, use and placement of "Valves and Valve Boxes" specified herein.

2. PRODUCTS

2.1 VALVES

.1 Resilient Wedge Gate Valves

- .1 100 mm diameter valves are not permitted.
- .2 Valves sized 150 to 300 mm diameter will be resilient wedge gate valves, conforming to latest revision AWWA C509, c/w fully rubber encapsulated solid wedge, non-rising stem, suitable for direct bury.
- .3 Valves to open counter clockwise. (Turn left to open).
- .4 Valve body to be constructed of cast iron, in accordance with ASTM A126, Class "B". All nuts, bolts, and washers will be stainless steel.
- .5 Interior and exterior of valve to be epoxy coated, as per latest revision AWWA C550.
- .6 Bronze valve stem to be operated by a 50 x 50 mm square operating nut. The valve stem (stuffing box) will contain a double "O" ring seal.
- .7 Valve ends to be flanged.
- .8 Approved Products:
- Mueller a-2360 resilient wedge gate valve
 - clow f-6112 resilient wedge gate valve
 - bibby-ste-croix resilient wedge gate valve
 - american avk co. Resilient wedge gate valve

.2 Resilient Wedge Tapping Gate Valves

- .1 100 mm diameter valves are not permitted.
- .2 Valves sized 150 to 300 mm diameter will be resilient wedge gate valves, conforming to latest revision AWWA C509, c/w fully rubber encapsulated solid wedge, non-rising stem, suitable for direct bury.
- .3 Valves to open counter clockwise. (Turn left to open).
- .4 Valve body to be constructed of cast iron, in accordance with ASTM A126, Class "B". All nuts, bolts, and washers will be stainless steel.

- .5 Interior and exterior of valve to be epoxy coated, as per latest revision AWWA C550.
 - .6 Bronze valve stem to be operated by a 50 x 50 mm square operating nut. The valve stem (stuffing box) will contain a double "O" ring seal.
 - .7 Valve ends to be push-on "Tyton Joint" by flange, or mechanical joint by flange. Push-on and mechanical joints will conform to latest revision of AWWA C111 / ANSI A21.11. Flanged valve ends will meet the requirements of ANSI B16.1, Class 125. Bolts, nuts, washers to be stainless steel.
 - .8 Approved Products
 - Clow F-6115 Resilient Wedge Tapping Gate Valve flange x push-on for sizes 150 and 200 mm diameter.
 - Mueller A-2360 Resilient Wedge Tapping Gate Valve flange x push-on for sizes 150 and 200 mm diameter.
 - Mueller H688-W-40 Resilient Wedge Tapping Gate Valve flange x mechanical joint for sizes 250 and 300 mm diameter.
 - Bibby-Ste-Croix Resilient Wedge Tapping Gate Valve flange x push-on for sizes 150 to 300 mm diameter.
 - .9 Interior and exterior of valve to be epoxy coated, as per latest revision AWWA C550.
 - .10 Approved Products
 - Dresser 450
 - Jenkins Fig. 2544
 - Mueller Linesal III
 - Clow M&H 4500
- .3 Plug Valves
- .1 Valves will be Cast Iron Eccentric Plug Valves suitable for raw wastewater with pressures up to 150 PSI.
 - .2 The valve body and cover will be constructed of ASTM A126 Class B cast iron for working pressures up to 150 PSI.
 - .3 The plug will be one-piece construction and made of ASTM A126 Class B cast iron with a resilient facing per ASTM D2000-BG and ANSI/AWWA C504 requirements.
 - .4 Plugs valves will be quarter-turn, non-lubricated, eccentric type with resilient faced plug. Valves to open counter clockwise (turn left to open).
 - .5 All valves to be flanged with drilling to ANSI B16.1, Class 125. Bolts to be stainless steel.
 - .6 Valves to be operated by 50 mm x 50 mm square operating nut connected to a totally enclosed gear actuator.
 - .7 Interior and exterior of valve to be epoxy coated, as per latest revision AWWA C550.

- .8 Approved Suppliers
 - Val-Matic
 - DeZurik
 - PEC Eccentric

2.2 CAST IRON VALVE BOXES

- .1 To be completely bituminous coated sliding type, adjustable over a minimum of 450 mm. Bottom casing to be large round type with minimum inside diameter of 240 mm. All castings will clearly have the manufacturer's identification cast on them.
- .2 Depth of bury to be 1.83 (6') to 3.05m (10') or as shown on contract documents.
 - .1 Valve operating extension spindle to be 25 x 25 mm square. Spindle length will be such that the operating nut will not be more than 300 mm below the cover when set on the valve-operating nut.
 - .2 Bottom of spindle to fit 50 x 50 mm square valve operating nut and will be riveted to spindle.
 - .3 Top of spindle will have removable 50 x 50 mm square operating nut c/w stonecatcher flange.
 - .4 Top casing to fit over 133 mm (5.25") inside diameter bottom casing.
 - .5 Lid to be 11.35-kg (25-lbs.) minimum, marked "WATER".
 - .6 Approved Products:
 - Norwood "Type C"
 - Trojan Industries "Type C"
 - Approved Equivalent

3. EXECUTION

3.1 VALVE INSTALLATION

- .1 Set and joint all valves in accordance with the manufacturer's recommendations and applicable AWWA Specifications.
- .2 Ensure that the stuffing glands are properly packed with a high-grade packing and tighten gland bolts prior to installation.
- .3 Install concrete base for valves and anchors as per the drawings.
- .4 Provide sacrificial anodes and corrosion protective tape on all valves.
- .5 Set the valve accurately in position and place the valve box carefully over the bonnet with the valve casing perpendicular to the axis of the pipe, and adjust the top box to the grades specified.

2450-057-00

- .6 Secure the extension rod to the valve nut. Install extension rod and valve Box Riser plumb over the valve.
- .7 Backfill for valves and valve boxes shall be consistent with the connecting pipe backfill.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location, use and placement of "Couplings" specified herein.

2. PRODUCTS

2.1 COUPLINGS

.1 Stainless Steel Couplings:

- .1 Designed for joining plain end pipes of equal outside diameter. To be flexible, all stainless steel construction. All welded stainless steel to be "passivated" after welding to eliminate sensitizing of the stainless steel.
- .2 Shell, Sidebars, Nuts, and Bolts to be Type 304 fully passivated stainless steel. Gasket to be continuous ringed S.B.R. rubber conforming to latest revision AWWA C-111 / ANSI A21.11.
- .3 Approved Products:
- Robar 1606 Style 2 - for sizes 100 mm to 350 mm
 - Robar 1606 Style 3 - for sizes 400 mm to 600 mm
 - Robar 1736AS - for sizes 100 mm to 300 mm
 - Robar 1596 - for sizes 100 mm to 300 mm
 - Canpac CS Series - CS2 for sizes 100 mm to 350 mm
CS3 for sizes 400 mm to 600 mm

.2 Epoxy Coated Couplings:

- .1 To be cathodically fitted and protected by cap type anodes. Anodes to be 300-gram zinc alloy caps meeting latest revision ASTM B418, Type 1, threaded onto the coupling bolts. Electrical continuity between bolts and end plates to be achieved by removing the epoxy coating from the end plates, under the nut bearing area or with a factory installed anode strap.
- .2 Epoxy Coated couplings are supplied in the four following configurations:
- Standard Couplings: designed for joining plain end pipes of equal outside diameter.
 - Transition Couplings: designed for connecting pipes of the same nominal size, which have great differences in outside diameter. Transition to be made by "stepped-down" centre ring, c/w special end plate.
 - Reducing Couplings: designed for connecting pipes of different nominal sizes. Reduction to be made by "stepped-down" centre ring, c/w special end plate.
 - Multi Range Couplings: Straight and transition couplings are used to make a non restrained connection between two pipes of the same nominal size but with same or different outside diameters. One range fits all pipe outside diameters, IPS PVC to rough barrel AC.

- .3 Centre ring to be cast ductile iron to latest revision ASTM A536, factory coated with corrosion protective epoxy. Coating thickness to be 0.30 mm (12 mils) minimum, 0.50 mm (20 mils) maximum.
- .4 End plates to be heat-treated cast ductile iron to latest revision ASTM A536, factory coated with corrosion protective epoxy. Coating thickness to be 0.30 mm (12 mils) minimum, 0.50 mm (20 mils) maximum. End plates will be provided with one 6 mm (1/4") SAE J429 Grade 5, NC cadmium plated setscrew to provide electrical conductivity between the end plates and the sleeves.
- .5 Gasket to be S.B.R. rubber conforming to latest revision AWWA C-111 / ANSI A21.11.
- .6 Bolts to be 15.875 mm (5/8") NC trackhead, c/w heavy-duty hex nuts. Material to be low alloy steel conforming to latest revision AWWA C-111 / ANSI A21.11. All bolts (except threaded area) to be factory coated with corrosion protective epoxy. Coating thickness to be 0.30 mm (12 mils) minimum, 0.50 mm (20 mils) maximum.
- .7 Coupling components to be marked as follows:
Centre Ring: Nominal size and manufacturers' name.
End-Plate: O.D. range and manufacturers' name.
Gaskets: O.D. range and manufacturers' name.
- .8 Approved Coupling Products
 - Robar 1506
 - Robar 1519
 - Robar 1596
 - Robar 1726
 - Romac 501
 - Ford Meter Box Co.
 - FC2W Ultra Flex Coupling
 - TPS Hymax 2000
 - TPS Hymax CP
- .9 Approved Anode Products:
 - "Protecto-Caps" 300 P60W

2.2 TAPPING SLEEVES

- .1 Sleeves will be split body type designed to allow tightening of the sleeve bolts from the opposite side of the flange outlet.
- .2 Sleeves will be constructed of stainless steel or corrosion protected mild steel material. Corrosion protected sleeves will be epoxy coated and lined. All welded stainless steel to be "passivated" after welding to eliminate sensitizing of the stainless steel.
- .3 Sleeves to include a 6.35 mm (3/4") NPT test plug for pressure testing of sleeve and installed tapping valve.
- .4 Sleeves to have permanent identification marking to identify the manufacturer's name, nominal size, and O.D. range. All sleeves to be packaged and delivered as a complete unit (i.e. sleeves, gaskets, nuts, and bolts).

- .5 Sleeves to have Class D flanges conforming to the latest revision of AWWA C207, 150 lb. drilling. Flanges to be fixed, not floating.
- .6 Flange materials for stainless steel tapping sleeves to be stainless steel. Flange materials for epoxy coated tapping sleeves to be cast ductile iron.
- .7 Gasket materials as follows:
Flange- Virgin SBR compounded for water service use.
Ring Seal - Buna N, or virgin SBR compounded for water service use.
Liner-3.18 mm (1/8") Neoprene, or virgin SBR compounded for water service use.
- .8 Bolts to be 19 mm (3/4") NC stainless steel c/w heavy hex nuts and washers, lubricated to prevent galling.
- .9 Approved Products:

<u>Stainless Steel</u>	<u>Epoxy Coated Mild Steel</u>
- Robar 6606	- Robar 6506, 6906
- Romac "SST"	- Smith Blair 622
- Ford FTSS	- Romac FTS 420
- Smith Blair 663	

2.3 RESTRAINERS

- .1 Restrain PVC pipe back to nearest fitting. Use cast iron fittings when restrainers are required.
- .2 Approved Products:
Ford Meter Box Co. – Uniflange Restrainers 1300 Series

3. EXECUTION

- .1 Install all couplings, tapping sleeves and restrainers in accordance with manufacturer recommendations.
- .2 Backfill for couplings, tapping sleeves and restrainers will be consistent with the connecting pipe.
- .3 Install sacrificial anodes and corrosion protective tape on all epoxy coated couplings, tapping sleeves and restrainers.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location, use and placement of “Cathodic Protection” specified herein.

2. PRODUCTS

2.1 CORROSION PROTECTIVE TAPES AND WRAPS

- .1 Field installed corrosion protective coatings to be two part paste & tape systems.

- .2 Approved Products:

- **Polyken 900 system:**
No. 930 Joint Wrap Tape
No. 931 Filler Tape
- **Denso of Canada Ltd:**
Denso Paste
Denso Tape
- **Canada Pipeline Accessories Corp.:**
Petro Primer Paste
Petro 40 Tape
Petro Overwrap Tape
- **Polyguard Products Inc.**
Polyguard 600 Primer
Polyguard 600 Series Coating Tape
Polyguard 606 Filler System
- **The Trenton Corporation**
Trenton Tec-Tape Primer
Trenton Tec-Tape Wrapper
Trenton Glas-Wrap
Trenton Fill-Putty

2.2 CATHODIC PROTECTION

- .1 General

- .1 Prior to backfilling, arrange for the Owner’s Representative to witness the installation of the sacrificial anode, wires, cadwelding, etc., and the necessary continuity check. Location of anode packs to be reviewed by the Owner’s Representative.

.2 Sacrificial Anodes

Anode lead wires will be 3 metres in length and will consist of AWG#10/7 stranded copper wire with RWU-90 insulation. Zinc anodes are to be supplied with a white lead wire and magnesium anodes with a blue lead wire. The lead wire will be connected to the core with silver solder. The entire connection will be insulated by filling the recess with an electrical potting compound.

The anode will be packaged in a water permeable cardboard containing a backfill mixture of the following composition:

Ground Hydrated Gypsum	75%
Powdered Wyoming Bentonite	20%
Anhydrous Sodium Sulphate	5%

Backfill will have a grain size so that 100% is capable of passing through a 20 mesh screen and 50% will be retained by a 100 mesh screen. The mixture will be firmly packaged around the anode within the cardboard tube by means of adequate vibration. Cardboard tube size and backfill material volume will be sufficient to provide a maximum thickness of 25 mm of backfill between all parts of the anode and the anode packaging.

All anodes will carry a label identifying the manufacturer's name, type of anode and the net weight. Cardboard tubes used to package anodes will have sufficient strength to permit normal shipping and handling without failure.

Zinc Anodes

Zinc anodes will conform to ASTM B418 Type II. All anodes will have a minimum open circuit potential of -1.10 volts referenced to Cu/CuSO₄. Zinc anodes will have the following composition:

Aluminum	0.005%	maximum
Cadmium	0.003%	maximum
Iron	0.0014%	maximum
Lead	0.003%	maximum
Copper	0.002%	maximum
Zinc	remainder	

Magnesium Anodes

Magnesium anodes will conform to ASTM B843 grade M1C. Anodes will have a minimum open circuit potential of -1.70 volts referenced to Cu/CuSO₄. Minimum acceptable current efficiency is 48%. Testing of these properties will be in accordance with ASTM G97. These anodes will be cast with a perforated galvanized steel core. The weight of the core will not exceed 0.15 kg per meter. One end of the anode will be recessed so that the core is accessible for the lead wire connection.

Magnesium anodes will conform to the following composition (limits are given as maximum weight percent unless shown as a range):

Aluminum	0.01
Manganese	0.50 to 1.3
Silicon	0.05
Copper	0.02
Nickel	0.001
Iron	0.03
Other metallic Impurities	0.05 ea
Magnesium	remainder

3. EXECUTION

3.1 INSTALLATION OF CORROSION PROTECTIVE COATINGS

- .1 Install corrosion protective coatings as per manufacturer's recommendations.
- .2 Ensure steel to be coated is clean so that coating adheres to the surface.
- .3 Allow cadwelds to cool before placing coating over the cadweld.

3.2 INSTALLATION OF SACRIFICIAL ANODES

- .1 Remove the plastic bag from the anodes, leaving the cloth bag or cardboard casing intact.
- .2 Place the anodes a minimum distance of 1.0 m from the main in a horizontal position at approximately the same elevation and parallel to the main.
- .3 Ensure that soil is packed uniformly around the anodes to eliminate voids or air pockets adjacent to the anodes.
- .4 Wet the installed anode and surrounding soil prior to backfilling
- .5 Cadweld anode lead wire to the buried metal item to be cathodically protected.
- .6 Provide one (1) 5.4 kg anode for:
 - .1 each buried valve
 - .2 each buried steel or cast iron fitting
 - .3 each buried steel coupling, topping, sleeve or restrainer
 - .4 each fire hydrant
 - .5 each 6.1 m length of buried steel pipe.
- .7 Provide two (2) 5.4 kg anodes on each end of a steel casing installed by Auger/bore on directional drill method.

3.3 CADWELDING

- .1 Remove a small portion of coating on the metal item to receive the anode lead wire.

2450-057-00

- .2 Thoroughly clean area to be cadwelded and file metal until a shiny, roughened surface is obtained approximately 75 mm square.
- .3 Crimp a copper sleeve onto the bared end of the wire to be cadwelded.
- .4 Use a cadweld mold M108 or equal and powder CA-15 or equal.
- .5 Knock any slag off of the completed cadweld and file smooth any sharp edges.
- .6 Thoroughly coat and cover the cadweld and any area adjacent that has had the coating removed with an adhesive moulded plastic patch.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for the location, use, and placement of “Water Service Connections” specified herein.
- .2 This Section may also be used as a reference section. All materials specified in Part 2, Products, may not necessarily be required.

2. PRODUCTS

2.1 GENERAL

- .1 For service connection sizes 20 mm to 50 mm diameter, pipe to be Pex Tubing unless otherwise noted on the drawings.
- .2 Valves and Valve Boxes for service connection sizes 150 mm to 300 mm diameter to be as specified in Section 02515 – Valves and Valve Boxes.

2.2 PIPE

- .1 Copper Tubing:
 - .1 For services 20 mm to 50 mm diameter, copper tubing conforming to latest revision ASTM B88M, type K, annealed. (As described in AWWA C-800 - Appendix - Collected Standards for Service Line Materials).
- .2 PEX Pipe – (cross linked polyethylene pipe):
 - .1 For services 20 mm to 50mm diameter, cross-linked polyethylene pipe will be manufactured in accordance with CSA B137.5 and ASTM F876 and to comply with NSF 14 and 61 (PW). The Pipe and resin (compound) will be manufactured in an ISO 9001 certified production facility. The degree of cross linking for pipe will not be less than 80% when tested in accordance to ASTM D2765 Method B. Pipe will have CSA / NSF approved pressure rating of:
 - 160 psi @ 23 °C / 73.4 °F
 - 100 psi @ 82 °C / 180 °F
 - 80 psi @ 93 °C / 200 °F
 - .2 The outside diameter of the pipe will be copper tube size (CTS) and will have a standard dimension ratio (SDR) 9.
 - .3 The pipe will carry the following marks every 1.5 meters minimum: manufacturer’s name, nominal size, ASTM, CSA & NSF designations, SDR (standard dimension ratio), pressure/temperature rating, potable tubing, manufacturing date & machine number and footage mark. The pipe will have consecutive footage marks every 1.5 meters (minimum) starting with 0 at the beginning of each coil.

- .4 The pipe will be shipped in protective cardboard boxes marked with the product name and size.
- .5 Use stainless steel inserts when connecting Municipex or Blue 904 pipe to main cocks and service valves.
- .6 Approved Products 20mm to 50mm diameter:
 - Rehau – Municipex
 - IPEX – Blue 904
 - Wirsbo - Aquapex
 - Or approved equal

2.3 COUPLINGS

- .1 Water Service Tubing Couplings:
 - .1 Compression type suitable for 1 MPa working pressure. Couplings to be supplied without internal pipe stop.
 - .2 Approved Products:
 - Ford "Pack Joint" couplings
 - Ford "Grip Joint" couplings
 - Mueller "Oriseal" couplings
 - Emco/Cambridge Brass "Successor" couplings
 - A.Y. McDonald Mfg. "T" Compression couplings for sizes 20 & 25 mm diameter.
- .2 Universal Transition Couplings:
 - .1 To be used to join any type of water service connection pipe in sizes 20 mm to 50 mm.
 - .2 Approved Products:
 - PHILMAC Universal Transition Standard Couplings
 - PHILMAC Universal Transition Reducing Couplings
 - PHILMAC Universal Transition Elbow, Tees and Adaptors

2.4 CORPORATION STOPS, CURB STOPS AND CURB STANDS

- .1 Corporation (Main) Stops:
 - .1 Corporation stops to be brass ball valve construction with or without Teflon coating. Body to be red brass to latest revision ASTM B62, compression type outlet fitting and inlet having AWWA thread conforming to latest revision AWWA C800. Valves to be full round port, reduced port not permitted. All brass fittings and valves will be certified by a NSF or ANSI accredited test lab per ANSI/NSF Standard 61, Section 8. Proof of certification is required.

- .2 Approved Products:
 - Mueller B-25008 c/w "110 Compression" outlet for sizes 20, 25, 38, and 50 mm diameter.
 - Ford FB-1000 "Ballcorp" c/w "Pack Joint" outlet for sizes 20, 25, 38, and 50 mm diameter.
 - Emco/Cambridge Brass c/w "Successor" outlet for sizes 20, 25, 38, and 50 mm diameter.
 - A.Y. McDonald Mfg. "T" Compression outlet for sizes 20, 25, 38, and 50 mm diameter.

- .2 Curb Stops:
 - .1 Curb Stops to be of brass construction. Balls to be Teflon coated brass or industrial chrome plated stainless steel c/w Teflon seats. Body to be red brass without drain. Inlets and outlets to compression type fittings suitable for the specified pipe. Valves to be full port, reduced port not permitted. All brass fittings and valves will be certified by a NSF or ANSI accredited test lab per ANSI/NSF Standard 61, Section 8. Proof of certification is required.
 - .2 Approved Products:
 - Cambridge Brass c/w Successor outlet for sizes 20, 25, 38 and 50 mm diameter.
 - A.Y. McDonald Mfg. "Q" Compression outlet for sizes 20, 25, 38 and 50mm diameter.
 - Ford B44 c/w "pack joint" outlet for sizes 20, 25, 38 and 50mm diameter.

- .3 Curb Stands (Service Boxes):
 - .1 Depth of bury to be 2.7 m (9') to 3.3 m (11'). A minimum of 3.15 m is recommended under roadways or in areas where soil is predominately gravel.
 - .2 Curb stand sliders (top box) will be 31.75 mm (1 1/4") O.D., galvanized Standard Schedule 40, wrought iron pipe conforming to latest revision AWWA C800. Distance from top of cap to bottom of slider to be 610 mm minimum, 1,000 mm maximum.
 - .3 Casing will be 25 mm O.D. (1"), galvanized Standard Schedule 40, wrought iron pipe conforming to latest revision AWWA C800 for 20 and 25 mm valves. For 40 mm and 50 mm valves increase casing to 33.4 mm O.D. with 3.38 mm wall thickness.
 - .4 Cap to be cast-iron, ribbed, marked "WATER" c/w 32mm pentagonal head brass plug. The exterior of the cap is to be bituminous coated.
 - .5 Bottom box to be 90 mm (3.5") I.D. for 20 and 25 mm valves and 150 mm (6") I.D. for 40 and 50 mm valves, cast or ductile iron. The exterior and interior of the bottom box will be factory coated epoxy "Type A" conforming to latest revision AWWA C213.

- .6 The operating rod will be 12.70 mm (1/2") minimum, 15.9 mm (5/8") maximum, supplied as a single unit comprised of a solid AISI Type 304 stainless steel pinned to a manganese bronze clevis with a brass rivet.
 - .7 The operating rod will be manufactured with a "W" centering bend (standard pigtail) to fit a standard 25 mm I.D. galvanized casing pipe. Bottom 25 mm of rod to be forged square (cold forged) complete with 3.5 mm brass or stainless steel rivet to clevis.
 - .8 The manufacturer's name will be embossed onto the clevis, and cast into the bottom boot to the satisfaction of the Owner's Representative.
 - .9 The manufacturer will supply and insert the brass cotter pin into the clevis and apply sufficient bending to prevent the cotter pin from falling out of the clevis during shipping and storage of the rod.
 - .10 Approved Products:
 - Western Water and Sewer
 - Trojan
- .4 Curb Stands Stainless Steel Inserts:
- .1 Use stainless steel inserts when connecting PEX pipe, PE Municipal tubing or Q-line tubing to curb stops and curb stop valves.
 - .2 Approved Products
 - Ford.
 - Mueller.
 - A.Y McDonald.
 - Or approved equal.

2.5 SERVICE SADDLES

- .1 Stainless steel (Type 304 or 304L), bronze (Waterworks Bronze 85-5-5-5 to ASTM B62 or ASTM A40B) or combination of both and free from scale, grease and contaminants. Service saddles to fit nominal pipe sizes 100 to 400 mm and adaptable to the following pipe types and respective O.D. ranges:
 - Non-Isolating Saddles suitable for PVC with C.I.O.D. and rough barrel Asbestos Cement Class 150 Pipe.
 - Isolating Saddles suitable for steel, cast iron and ductile iron pipe.
- .2 Two component (body and strap) design with fastening devices on each side of outlet. Body to be heavy cast stainless steel or cast bronze tapped with AWWA taper (c) threads, stainless steel straps with 13 mm stainless steel bolts and nuts with NC rolled threads lubricated to prevent galling.
- .3 Double 50 mm stainless steel straps with stainless steel bolts and nuts with NC rolled lubricated threads for pipe larger than 100 mm diameter. Single 50 mm stainless steel

straps with stainless steel bolts and nuts with NC roller lubricated threads for 100 mm diameter and smaller.

- .4 Repair clamps to be fabricated, flexible, all T304 stainless steel construction, fully passivated, with double bolt closure (fasteners) minimum. Body to be minimum 300 mm (12") long.
- .5 Outlet to be 20 mm to 50 mm AWWA Taper thread for standard service connections. For use on chlorination points only, outlet to be 20 mm to 50 mm IP thread.
- .6 Fasteners to be 15.88 mm (5/8") NC thread T304 stainless steel. Hex nuts and washers to be T304 stainless steel, lubricated to prevent galling.
- .7 Adequately secure gaskets to metal components to resist shifting. Use Neoprene gaskets for Non-Isolating water services. Use SBR isolating compound of high dielectric strength and low water absorption for isolating water services. The opening in the gaskets will be the same as the nominal diameter of the saddle outlet. Gaskets will extend 6 mm minimum beyond the saddle component's edge. Service saddles will conform to the following table:

Nominal Pipe (mm)	Nominal Outlet (mm)	STRAP TYPE	
		Non Isolating	Isolating
100,150	20, 25	S or D	SW
100	40,50	S	SW
150	40,50	D	SW
200	20, 25	S or D	SW
200	40, 50	D	SW
250,300,400	20, 25, 40, 50	D	SW

Where S – Single strap minimum width 45 mm with two fastening devices, one on each side of the outlet.

D – Double strap, two single straps, minimum width of 45 mm each, complete with four fastening devices, two on each side of the outlet.

SW – Single wide strap, minimum width 100 mm c/w four fastening devices, two on each side of the outlet.

- .8 Service saddles are to be used on all service connections or manual air relief valves tapped to PVC series rated pipe.
- .9 Service saddles to have permanent markings showing Manufacturer's Name, O.D. Range, and Type (i.e. Isolating or Non-Isolating).
- .10 Approved Products:

Non-Isolating Saddles

- Robar 2706
- Or approved equal

Isolating Saddle

- Robar 2786
- Or approved equal

3. EXECUTION

3.1 GENERAL

- .1 Drill and direct tap water mains under normal pressure by means of a tapping machine and thread in corporation main stop with tapping machine. Use only when tapping PVC C900 or C905 pipe. Do not direct tap PVC series pipe. Single and multiple tap service connections will be tapped in the top half of the pipe at the 10:00 o'clock and 2:00 o'clock positions. Adjacent service taps are not to be any closer than 600 mm between services and no closer than 600 mm to a pipe or fitting joint.
- .2 Use a service saddle on all dry tap installation and for all 25 mm and larger services.
- .3 Form a gooseneck with service pipe to the right of the corporation stop, as viewed from the property line to the main, formed so that no flattening of the service occurs.
- .4 Locate corporation curb stop on property line for street servicing or 300 mm outside property line for land servicing or as specified on the applicable drawings.
- .5 Set service boxes plumb over the centre of the corporation curb stop and set the top of service box to proper elevation.
- .6 In areas of clay soil, water service will be a minimum of 2.7 m below the final grade or as specified. In areas where the soil is predominantly gravel, water services will be 3.3 m below final grade or as specified. Where minimum cover on the service cannot be achieved, the service will be installed with an insulating frost shield unless otherwise directed by Owner's Representative.
- .7 Support and centre curb stop on an approved; fiberglass, concrete, or treated wooden block 50 mm x 150 mm x 200 mm.
- .8 Test water service under the operating pressure for a period of one hour. The entire test will be inspected by the Owner's Representative and approved before backfilling.
- .9 Backfill for water service will be consistent with the connecting water main Work.

3.2 REPLACEMENT OF EXISTING WATER SERVICE

- .1 Replace existing service from the main to property line. If the existing curb stand is located within property, notify the Owner's Representative for direction.
- .2 Notify the occupants, residents or business a minimum of 48 hours in advance of any interruptions to the existing service.

- .3 Provide temporary water to occupants, residents or business for interruptions exceeding 24 hours.
- .4 Locate existing water service tie-in location prior to making the service connection to the water main. Install services to existing buildings to best suit the existing service connection location.

3.3 SANITARY, STORM AND WATER SERVICE COMMON TRENCH INSTALLATION

- .1 Lay water and sewer service pipe 300 mm apart when services are in a common trench and the water service pipe size is less than 50 mm. Maintain a horizontal separation of 1.4 m at property line when the water service pipe size is 50 mm or greater. The water service will be centered in the common trench with sanitary on the left side and storm sewer on right side, when viewed from property line to the main. Install each service as described in the appropriate sections for each of the respective services.
- .2 Where the sewer service (or services) are above the water service, lay the sewer services on a shelf of undisturbed ground of such width to ensure complete bedding or, lay water service at a specified depth, backfill and compact to required elevation to accommodate sewer service.
- .3 Prior to commencing backfilling of the trench arrange for the Owner's Representative to inspect the installation of the services.
- .4 If the bedding under a service is disturbed, replace and compact bedding as specified.
- .5 Backfill for services will be consistent with connecting main backfill.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location, use and placement of “Hydrants” specified herein.

2. PRODUCTS

2.1 FIRE HYDRANT

- .1 Hydrants will be ULC (Underwriter Laboratories of Canada), UL (Underwriter Laboratories, US) or FM (Factory Mutual Fire Insurance Company) approved dry barrel compression type conforming to latest revision of AWWA 502. Hydrant inlet elbow connections will be bell-end 150 mm CI. OD. pipe supplied with continuous molded rubber-ring gaskets conforming to latest revision of AWWA C111.
- .2 NBR (Nitrile) gaskets to be installed in areas contaminated or potentially contaminated with organic solvents or petroleum products.
- .3 Hydrants to be of a “dry top” design sealed with O-rings with a grease lubricated operating housing. The drain valve will close as the compression valve starts to open and the interface between removable parts of the main valve assembly and hydrant body will be bronze to bronze.
- .4 The operating nut will be 32 mm x 32 mm (1 ¼ inch x 1 ¼ inch) or three-sided, 38 mm on each side and turn counter-clockwise to open.
- .5 All nuts, bolts, and washers to be stainless steel.
- .6 Outlet nozzles will be fastened into the barrel by threaded connection and supplied with cast iron caps. All hydrants to have two (2) 57 mm hose connections at 180° with Alberta Mutual Aid Thread and one (1) 114 mm pumper connection (4 threads per 25.4 mm, 154 mm OD., root 145 mm with 0.51 mm flat top and bottom
- .7 Hydrants to be supplied with 300 mm-barrel and stem extension located immediately below the grade line flange. The dimension from the grade line flange to centreline of the lowest outlet nozzle is a minimum of 400 mm.
- .8 The exterior of the hydrant 300 mm above and below the grade line flange will be coated with a single component liquid modified polyurethane copolymer as follows:
- Bright Lime Body, C.I.L. #3486, Valspar 20-G-684 or approved equal
 - Black Caps, C.I.L. #3486, Valspar 20-G-684 or approved equal
 - Black Tops, C.I.L. #3486, Valspar 20-G-684 or approved equal

Watermain Diameter
100 mm
150 mm
200 mm and larger

Cap Color
Red
Yellow
Black

The remainder of the hydrant exterior will be coated with a Multi-Component Urethane Coating System as follows:

Primer: The primer will be one of the following or an approved equal:

- Valspar 13-R-159
- Carboline

Top Coat: The top coat will be one the following or approved equal:

- Valspar 89 series
- Carboline 890
- Bar-Rust 235

- .9 The hydrant depth of bury will be defined as the distance from the invert of the suction elbow to 50 mm below the underside of the grade line flange. The minimum depth of bury will be 2.44 m (8').
- .10 Hydrant branch to the main will be 150 mm diameter PVC pipe as per Section 02511 – Water Pipe and Fittings .
- .11 Hydrants to be constructed with Break-a-way Flange, complete with a safety stem (spindle). Coupling is to be located at ground level or 50 mm above finish grade.
- .12 Approved Products:
 - Concord Daigle
 - McAvity M-67
 - Mueller Modern Centurion
 - Clow Canada "Brigadier" M-67
 - AVK
 - Or approved equal

2.2 FLUSHING HYDRANT

- .1 Flushing Hydrants to be dry barrel, freeze proof, designed for working pressure of 1,035 kPa (150 psi) and for bury in a standard 133 mm (5.25") inside diameter cast-iron valve box.
- .2 Plugged, non-draining hydrant can be required and authorized by the Owner's Representative in areas of high groundwater table. Any plugged hydrant drains will be identified in Contractor submitted as-built drawings.
- .3 The hose nozzle is to be brass, 50 mm diameter, c/w brass cap and chain. Nozzle to be located below grade. Nozzle threads to conform to the Alberta Mutual Aid Standard.
- .4 Flushing Hydrant valves to be 50 mm diameter bronze body ball valves designed to automatically drain the barrel when the valve is in the off position. Hydrant inlet to be 50 mm F.I.P. thread integral to the valve body.
- .5 Valve stem adaptor to be stainless steel. Valve stem to be brass, constructed with floating sleeve shroud to allow free movement.

- .6 Flushing Hydrant branches to be 50 mm diameter pipe. Branch pipe, fittings and main connections to conform to Section 02518 – Water Service Connections.
- .7 Flushing Hydrant barrels and valve stem shrouds to be factory coated with epoxy.
- .8 Approved Products:
 - Gil Industries, Aquarius One-O-One GHS 2" Slim Line Hidden Hydrant
 - Gil Industries, Aquarius One-O-One GHS 2" Post Flushing Hydrant
 - Or approved equal

3. EXECUTION

3.1 GENERAL HYDRANT INSTALLATION

- .1 Install Hydrants in accordance with the manufacturer's recommendation and applicable AWWA Specification and as specified herein.
- .2 Backfill for hydrants to be consistent with the connecting pipe
- .3 Install a sacrificial anode on all hydrants.

3.2 FIRE HYDRANT INSTALLATION

- .1 Fire hydrants are to be set plumb with the hose outlets parallel with the edge of the pavement or curb line and the pumper connection facing the roadway with the flange 50 mm to 100 mm above the finish grade of back of curb, back of walk, landscaping, or as directed by the Owner's Representative.
- .2 The service lead will be 150 mm in size. Install a 150 mm gate valve with the valve box, operating rod and lid as per the Contract Documents.
- .3 Install proper drainage for each hydrant, excavate a pit measuring not less than 1.0 m by 0.75 m by 0.9 m deep. Install filter fabric and backfill with washed rock (20 mm Class IA) to a level 150 mm above drain holes. Set hydrant on concrete block. Place concrete thrust blocks as indicated and specified, ensuring that drain holes are unobstructed.
- .4 Locate all new fire hydrant isolation valves in paved areas where possible, unless otherwise directed by the Owner's Representative.
- .5 Install hydrant risers, stem extensions, and associated hardware to set the hydrant flange together as required.

3.3 FLUSHING HYDRANT INSTALLATION

- .1 Post Flushing Hydrant to be installed with traffic break-away coupling located 150 mm above finished grade. Slimline Flushing Hydrant to be installed in valve box with nozzle located below grade.
- .2 Service lead to be 50 mm in size with a minimum of 2.2 m cover.

- .3 Install proper drainage for each hydrant, excavate a pit measuring not less than 500 mm by 500 mm by 500 mm deep. Install filter fabric and backfill with washed rock (20 mm Class IA) to a level of 100 mm above drain holes. Place wood plate and concrete thrust blocks as indicated and specified, ensuring that drain holes are unobstructed.
- .4 Hydrant valve to be readily accessible and operable.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for the location, use, and placement of “Hydrostatic Pressure Testing” specified herein.
- .2 This Section may also be used as a reference section. All materials specified in Part 2, Products, may not necessarily be required.

2. PRODUCTS

- .1 Potable water system
 - Test water must be potable water
- .2 Non-potable water or sanitary forcemain system
 - Test water must be either potable water or clean, non-potable water

3. EXECUTION

- .1 Subject the newly laid pipe to hydrostatic pressure and leakage tests after backfilling. Supply all labour, equipment and materials required to perform the hydrostatic and leakage tests. Equipment will include a pump, pipe connections, pressure gauges with adequate pressure range, fittings, lines, trucks, tanks, and all other necessary equipment.
- .2 Notify the Owner and the Owner’s Representative at least 24 hours prior to starting the tests. The tests are to be witnessed by the Owner’s Representative.
- .3 Do not conduct tests until at least 5 days after placing concrete or 2 days if high early strength concrete is used for thrust blocks.
- .4 Open all valves necessary to test section of pipe.
- .5 Test pipeline in sections not to exceed 3200 m (HDPE)/500 m(PVC) in length unless otherwise authorized by Owner’s Representative.
- .6 Any leaks, breaks, failures, or blockages, which are a result of faulty material and/or workmanship are the sole responsibility of the Contractor at no cost to the Owner.
- .7 Supply all water, materials, equipment and fittings required for pipe pressure and leakage testing.

3.1 PVC PIPE

- .1 After completing the installation of the Pipeline, or a section of the line, the line will be hydrostatically pressure tested. The completed PVC line will be tested at a pressure equal to one and one-half times the maximum operating pressure, but not in excess of the Manufacturer's recommended operating pressure measured at the lowest point in the test section.
- .2 To compensate for initial pipe stretch and to expel all entrapped air, the pipe will be pressurized until pressure is maintained before the test period is started.
- .3 After completion of the initial expansion phase, the pressure will be at the specified level and the test period will commence. The test period will be for a period of 2 hours and will only commence prior to 3:00 p.m.
- .4 After the test period, a measured amount of "make-up" water will be added to the line to return the pipe to the test pressure. The amount of "make-up" water will not exceed the allowance given in Table 1.

Table 1: Allowable Make-up Water for PVC Pipes with Elastomeric Joints (U.S. Gallons per hour per 1,000ft or 50 Joints)							
Nominal Pipe Size		Test Pressure					
(in)	(mm)	(50 psi)	(100 psi)	(150 psi)	(200psi)	(250 psi)	(300 psi)
4	100	0.19	0.27	0.33	0.38	0.43	0.47
6	150	0.29	0.41	0.50	0.57	0.64	0.70
8	200	0.38	0.54	0.66	0.76	0.85	0.94
10	250	0.48	0.68	0.83	0.96	1.07	1.18
12	300	0.57	0.81	0.99	1.95	1.28	1.41
14	350	0.67	0.95	1.16	1.34	1.50	1.65
16	400	0.76	1.08	1.32	1.53	1.71	1.88
18	450	0.86	1.22	1.49	1.72	1.92	2.12
20	500	0.96	1.35	1.66	1.91	2.14	2.35
24	600	1.15	1.62	1.99	2.29	2.56	2.82
30	750	1.43	2.03	2.48	2.87	3.21	3.53
36	900	1.72	2.43	2.98	3.44	3.85	4.24
42	1050	2.01	2.84	3.48	4.01	4.49	4.94
48	1200	2.30	3.25	3.98	4.58	5.13	5.65

3.2 HDPE PIPE

- .1 The test pressure for HDPE pipe will be 50 percent greater than the rated pressure of the pipe at the lowest elevation of the pipe being tested. Pipes with different pressure ratings will be tested separately or as specified by the Owner's Representative.
- .2 The test section should be completely filled with clean water. Take care to bleed off any trapped air. While the test section is filling, vent high points to purge air pockets.

Venting may be provided by loosening flanges, or by using equipment vents. Retighten any loosened flanges before applying test pressure.

- .3 The test procedure consists of two phases: initial expansion phase and test phase. During the initial expansion phase, the test section is pressurized to the test pressure, and enough make-up liquid is added each hour for three (3) hours to return to test pressure.
- .4 The test phase follows immediately, and may be one (1), two (2), or three (3) hours in duration as determined by the Owner’s Representative. At the end of the test time, the test section is returned to test pressure by adding a measured amount of liquid. If the amount of make-up liquid added does not exceed Table 2 values, leakage is not indicated.

Table 2: Test Phase Make Up Amount				
Nominal Pipe Size (IPS)		Make-Up Water Allowance (U.S. Gallons per 100ft. of Pipe)		
(in)	(mm)	1 hour test	2 hour test	3 hour test
4	100	0.13	0.25	0.40
6	150	0.3	0.6	0.9
8	200	0.5	1.0	1.5
10	250	0.8	1.3	2.1
12	300	1.1	2.3	3.4
14	350	1.4	2.7	4.2
16	400	2.7	3.3	5.0
18	450	2.2	4.3	6.5
20	500	2.7	5.5	8.0
22	550	3.5	7.0	10.5
24	600	4.5	8.9	13.3
28	700	5.5	11.1	16.7
32	800	7.0	14.3	22.5
36	900	9.0	18.0	27.0
40	1000	11.0	22.0	33.0
42	1050	12.5	25.0	37.5
48	1200	16.0	32.0	48.0

- .5 The total test time including initial pressurization, initial expansion, and time at test pressure, must not exceed eight (8) hours. If the test is not completed due to leakage, equipment failure, etc., depressurize the test section, then allow it to “relax” for at least eight (8) hours before bringing the test section up to test pressure again.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for the location, use, and placement of “Flushing and Disinfection” specified herein.

1.2 SCOPE

- .1 This standard presents mandatory procedures for the flushing and disinfection of new and repaired potable water mains. All new water mains will be flushed and disinfected before they are placed in service. All water mains taken out of service for inspection, repair or other activities that might lead to contamination of water will be disinfected before they are returned to service.

1.3 PURPOSE

- .1 This section defines the minimum requirements for the disinfection of water mains, including the preparation of water mains, application of chlorine, and sampling and testing for the presence of coliform bacteria.

2. PRODUCTS

- .1 The forms of chlorine that may be used in the disinfection operation are;
- Calcium Hypochlorite solution conforming to AWWA B300
 - Chlorine liquid conforming to AWWA B301

3. EXECUTION

3.1 GENERAL

- .1 The Owner’s Representative will witness flushing and disinfecting operations. The Contractor is responsible for notifying the Owner’s Representative at least four (4) days in advance of commencing the disinfecting process. The Contractor is responsible for making the necessary arrangements for the supply of water for the flushing operation.
- .2 Thoroughly flush each completed section of main and services over 50 mm (2 inches) to remove all foreign matter. When flushing has been completed to the satisfaction of the Owner’s Representative, inject the main with a chlorine solution (e.g. calcium hypochlorite) at a dosage of at least 50 mg/L. The point of application will be at or near the beginning of the pipe extension and the discharge point at or near the end of the line being treated.
- .3 Inject the chlorine solution while the line is being slowly charged to ensure an even distribution. When the main has been fully charged, valve the main off and let stand for 24 hours. During the detention period, operate all valves and hydrants on the line to ensure that all parts have contacted the chlorine solution. The water in the main must have a chlorine concentration of 25-50 mg/L at the end of the 24-hour period. Thoroughly flush the mains to expel all heavily treated water. Take and test water

- samples from the line both chemically and bacteriologically. Provide results to Owners Representative for review.
- .4 Do not put a new main into service until a certificate stating that the water is free from contamination has been issued by a recognized laboratory.
 - .5 Disinfecting, flushing and obtaining water samples from the mains must be carried out in the presence of the Owner's Representative.
 - .6 Ensure that water from the mains in the area will not be used for drinking or other domestic purposes until the mains have been disinfected, samples taken and these samples certified as being free from contamination.
 - .7 Purchase all necessary water for flushing and disinfection from the Owner.
 - .8 Install any necessary chlorination points along the pipeline route in order to properly inject the disinfectant. Connections to be main to be completed at no cost to the Owner. The connections made will be appropriately marked and abandoned to the satisfaction of the Owner's Representative.
 - .9 Ensure that all water flushed from the main is safe to be discharged into the disposal point. Abide by all local and Provincial regulations relative to the discharge of super-chlorinated water.
 - .10 The addition of an additive to the discharge water may be required in order to neutralize the super chlorinated water prior to disposal. Contractor is responsible for all costs related to this work.

3.2 DISINFECTION AND FLUSHING

- .1 The basic disinfection procedure consists of:
 - .1 inspecting all materials to be used to ensure the integrity of the materials;
 - .2 preventing contaminating materials from entering the water main during storage, construction, or repair and noting potential contamination at the construction site;
 - .3 removing, by flushing or other means, those materials that may have entered the water main;
 - .4 chlorinating any residual contamination that may remain, and flushing the chlorinated water from the main;
 - .5 protecting the existing distribution system for backflow caused by hydrostatic pressure test and disinfection procedures;
 - .6 documenting that an adequate level of chlorine contacted each pipe to provide disinfection;
 - .7 determining the bacteriological quality by laboratory test after disinfection;
 - .8 final connection of the approved new water main to the active distribution system.

- .2 Preventive and Corrective Measures During Construction:
 - .1 General:
 - .1 Heavy particulates generally contain bacteria and prevent even very high chlorine concentrations from contacting and killing these organisms. Therefore, the procedures of this section must be observed to assure that a water main and its appurtenances have been thoroughly cleaned for the final disinfection by chlorination. Also, any connection of a new water main to the active distribution system prior to the receipt of satisfactory bacteriological samples may constitute a cross-connection. Therefore, the new main must be isolated until bacteriological tests described in Section 3.3 of this standard are satisfactorily completed.
 - .2 Keeping Pipe Clean and Dry:
 - .1 The interiors of pipes, fittings, and valves must be protected from contamination. Pipe delivered for construction will be strung to minimize the entrance of foreign material. All openings in the pipeline will be closed with watertight plugs when pipe laying is stopped at the close of the day's work or for other reasons, such as rest breaks or meal periods. Rodent-proof plugs may be used when watertight plugs are not practicable and when thorough cleaning will be performed by flushing or other means.
 - .3 Delays:
 - .1 Delay in placement of delivered pipe invites contamination. The more closely the rate of delivery is correlated to the rate of pipe laying, the lower the risk of contamination.
 - .4 Joints:
 - .1 Joints of all pipes in the trench must be completed before work is stopped. If water accumulates in the trench, the plugs will remain in place until the trench is free of water.
 - .5 Packing Materials:
 - .1 Yarning or packing material will consist of molded or tubular rubber rings, rope of treated paper, or other approved materials. Materials such as jute or hemp will not be used. Packing material will be handled in a manner that avoids contamination. If asbestos rope is used, asbestos must be prevented from entering into the water-carrying portion of the pipe.
 - .6 Sealing Materials:
 - .1 No contaminated material or any material capable of supporting prolific growth or microorganisms will be used for sealing joints. Sealing material or gaskets will be handled in a manner that avoids

contamination. The lubricant used in the installation of sealing gaskets must be suitable for use in potable water and must not contribute odors. It will be delivered to the job in closed containers and will be kept clean and applied with dedicated, clean applicator brushes.

.7 Cleaning and Swabbing:

- .1 If dirt enters the pipe, it will be removed and the interior pipe surface swabbed with a 1 to 5% hypochlorite disinfecting solution. If, in the opinion of the Owner's Representative, the dirt remaining in the pipe will not be removed using the flushing operation, then the interior of the pipe must be cleaned using mechanical means, such as a hydraulically propelled foam pig (or other suitable device acceptable to the Owner's Representative) in conjunction with the application of a 1% hypochlorite disinfecting solution. The cleaning method used must not force mud or debris into the interior pipe-joint spaces and must be acceptable to the Owner's Representative.

.8 Wet-trench construction:

- .1 If it is not possible to keep the pipe and fittings dry during installation, the water that may enter the pipe-joint spaces will contain an available chlorine concentration of approximately 25 mg/L. This may be accomplished by adding calcium hypochlorite granules or tablets to each length of pipe before it is lowered into a wet trench or by treating the trench water with hypochlorite tables.

.9 Flooding by storm or accident during construction:

- .1 If the main is flooded during construction, the Owner's Representative may require the following procedure be followed. The decision will be based on site specific conditions.

The main will be cleared of the floodwater by draining and flushing with potable water until the main is clean. The section exposed to the floodwater will then be filled with a chlorinated potable water that, at the end of a 24 hour holding period, will have a free chlorine residual of not less than 25 mg/L. The chlorinated water may then be drained or flushed from the main. After construction is completed, the main will be disinfected using the continuous-feed or slug method.

.10 Backflow Protection:

- .1 When specified by the Owner's Representative, the new water main will be kept isolated from the active distribution system using a physical separation until satisfactory bacteriological testing has been completed and the disinfectant water flushed out. Water required to fill the new main for hydrostatic pressure testing, disinfection, and flushing will be supplied through a temporary connection between the distribution system and the new main. The temporary connection will include an appropriate

cross-connection control device consistent with the degree of hazard (a double check valve assembly or a reduced pressure zone assembly).

In **most** cases a closed gate valve will be considered to be sufficient isolation.

It will be necessary to re-establish the temporary connection after completion of the hydrostatic pressure test to flush out the disinfectant water prior to final connection of the new main to the distribution system.

.3 Pre Flushing

- .1 The source water used for disinfection and pressure testing will be flushed prior to its use to ensure that contaminants or debris are not introduced into the new pipe. Adequate drainage must be provided during flushing. Drainage will not take place away from the construction area.
- .2 Flushing operations are required to produce a minimum water velocity of 0.76 m/s in the water main. The following table provides the reference information between main pipe diameter, require flow in the main pipe to achieve the minimum water velocity and the required outlets to achieve the require flow for a water main with 40 psi.

Pipe Diameter (mm)	Required Flow In Main (l/s)	Size of Tap			Number of 63.5 mm (2½") Hydrant Outlets
		(25 mm)	(38 mm)	(50 mm)	
100	6.3	1	-	-	1
150	12.6	-	1	-	1
200	25.2	-	2	1	1
250	37.9	-	3	2	1
300	56.8	-	-	2	2
400	100.9	-	-	4	2

.4 Final Flushing

- .1 Clearing the main of heavily chlorinated water:
 - .1 After the applicable retention period, heavily chlorinated water should not remain in prolonged contact with pipe. In order to prevent damage to the pipe lining or to prevent corrosion damage to the pipe itself, the heavily chlorinated water will be flushed from the main fittings, valves, and branches until chlorine measurements show that the concentration in the water leaving the main is no higher than that generally prevailing in the distribution system or that is acceptable for domestic use.

.2 Disposing of Heavily Chlorinated Water:

- .1 Under no condition is heavily chlorinated water to be discharged to the Storm Sewer system. Heavily chlorinated water may be discharged to the Sanitary Sewer system with permission from the Owner.

Where discharge to the Sanitary Sewer System is impractical, chlorinated water will be treated with an approved de-chlorinating agent and monitored to ensure that chlorine levels do not adversely affect the environment.

.5 Procedures When Cutting Into or Repairing Existing Mains

The following procedures apply primarily when existing mains are wholly or partially dewatered. After the appropriate procedures have been completed, the existing main may be returned to service prior to the completion of bacteriological testing in order to minimize the time customers are without water.

.1 Trench Treatment:

When an existing main is opened, either by accident or by design, the excavation will likely be wet and may be badly contaminated from nearby sewers. Liberal quantities of hypochlorite applied to open trench areas will lessen the danger from this pollution. Tablets have the advantage in this situation, because they dissolve slowly and continue to release hypochlorite as water is pumped from the excavation.

.2 Swabbing with Hypochlorite Solution:

The interior of all pipe and fittings (particularly couplings and sleeves) used in making the repair will be swabbed or sprayed with a 1% hypochlorite solution before they are installed.

.3 Flushing:

Thorough flushing is the most practical means of removing contamination introduced during repairs. If valve and hydrant locations permit, flushing toward the work location from both directions is recommended. Flushing will be started as soon as the repairs are completed and will be continued until discolored water is eliminated.

.4 Slug Chlorination:

Where practical, in addition to the procedures previously described, the section of the main in which the break is located will be isolated, all service connections shut off, and the section flushed and chlorinated. The dose may be increased to as much as 300 mg/L and the CT reduced to as little as 15 min. After chlorination, flushing will be resumed and continued until discolored water is eliminated and the chlorine concentration in the water exiting the main is no higher than the prevailing water in the distribution system or that which is acceptable for domestic use.

.5 Bacteriological Samples:

Bacteriological samples will be taken after repairs are completed to provide a record for determining the procedure's effectiveness. If the direction of flow is unknown, then samples will be taken on each side of the main break. If positive bacteriological samples are recorded then the situation will be evaluated by the Owner's Representative who can determine corrective action.

.6 Special Procedure for Caulked Tapping Sleeves

Before a tapping sleeve is installed, the exterior of the main to be tapped will be thoroughly cleaned and the interior surface of the sleeve will be lightly dusted with calcium hypochlorite powder.

Tapping sleeves are used to avoid shutting down the main. After the tap is made, it is impossible to disinfect the annulus without shutting down the main and removing the sleeve. The space between the tapping sleeve and the tapped pipe is approximately 13 mm, so that as little as 1000 mg/m² of calcium hypochlorite powder will provide a chlorine concentration of more than 50 mg/L.

3.3 VERIFICATION

.1 Bacteriological Tests:

.1 Standard Conditions:

After final flushing, and before the new water main is connected to the distribution system, two consecutive sets of acceptable samples taken at least 24 hours apart, will be collected from the new main. (NOTE: The pipe, the water loaded into the pipe, and any debris all exert a chlorine demand that can interfere with disinfection).

At least one set of samples will be collected from every 350 m of the new water main, plus one set from the end of the line and at least one set from each branch. All samples will be tested for bacteriological quality in accordance with Standard Methods of the Examination of Water and Wastewater, and must show the absence of coliform organisms.

Testing for chlorine residual and turbidity will also be conducted.

A standard heterotrophic plate count MAY be required at the option of the Owner's Representative, because new material does not typically contain coliforms but does typically contain HPC bacteria.

.2 Special Conditions:

If trench water has entered the new main during construction or if, in the opinion of the Owner's Representative, excessive quantities of dirt or debris have entered the new main, bacteriological samples will be taken at intervals of approximately 60 m and the location will be identified. Samples will be taken of water that has

stood in the new main for at least 16 hours after final flushing has been completed.

.3 Sampling Procedure:

Samples for bacteriological analysis must be collected in sterile bottles treated with sodium thiosulfate as required by Standard Methods for the Examination of Water and Wastewater. No hose or fire hydrant will be used in the collection of samples. (NOTE: For pipe repairs, if no other sampling port is available, well flushed fire hydrants may be used with the understanding that they do not represent optimum sampling conditions). The sampling pipe must be dedicated and clean, and disinfected and flushed prior to sampling. A corporation cock may be installed in the main with a copper-tube gooseneck assembly.

.4 Record of Compliance:

The record of compliance will be the bacteriological test results certifying that the water sampled from the new water main is free of coliform bacteria contamination.

.2 Re-Disinfection

If the initial disinfection fails to produce satisfactory bacteriological results or if other water quality is affected the new main may be re-flushed and must be re-sampled. If check samples also fail to produce acceptable results, the main will be re-chlorinated by the continuous-feed or slug method until satisfactory results are obtained. (NOTE: High velocities in the existing system, resulting from flushing the new main, may disturb sediment that has accumulated in the existing mains. When check samples are taken, it is advisable to sample water entering the new main to determine the source of turbidity).

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunctions with other Sections for the location, use, and placement of “Thrust Blocking” specified herein

2. PRODUCTS

2.1 CONCRETE

- .1 Concrete mix will satisfy the requirements of Exposure Classification C-2 of Table 1 in the latest revision of CAN/CSA A23, and will be in accordance with the following minimum requirements unless shown in the Contract Documents:

- 28 day compressive strength – 20 MPa
 - Maximum nominal size of coarse aggregate – 25 mm
 - Slump – maximum 75 mm
 - Air Content – 4% to 7%
 - Maximum water cementing materials ratio – 0.45
 - Portland Cement – Type 50 or HS, Sulfate Resistant
 - Minimum cement content – 300 kg/m³
 - Fly Ash Content – 20% max.

- .2 Two layers of 6 mil polyethylene to be placed between all fittings, valve, and pipe and the concrete.

3. EXECUTION

- .1 All bends, fittings, valves and all points where there is thrust will be anchored to prevent movement by providing suitable thrust blocking, as shown on the Contract Documents.
- .2 Thrust-blocking material will be purchased from a reputable concrete supplier and will not be manufactured on site.
- .3 Thrust blocking will be placed between solid ground and the fitting to be anchored; the area of bearing between the pipe and the ground in each instance will be that shown on the Contract Documents. The blocking will be so placed that the pipe and fitting joints will be accessible for repair.
- .4 Place concrete thrust blocks between valves, tees, plugs, caps, bends, changes in pipe diameter, reducers, hydrants, and fittings and undisturbed ground as indicated or as directed by the Owner’s Representative.
- .5 Bearing areas will be inspected by the Owner’s Representative prior to placing concrete.
- .6 Keep joints and couplings free from concrete.

2450-057-00

- .7 Do not backfill over concrete for a minimum of 24 hours after concrete is placed.
- .8 Backfill for thrust blocking to be consistent with connecting pipe .

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location, use and placement of “Bituminous Prime Coat, Tack Coat and Fog Coat” specified herein.
- .2 The Work covered in this Section consists of the furnishing of all labour, plant and material and performing all operations in connection with supplying and placing “Bituminous Prime Coat, Tack Coat and Fog Coat” as specified and/or in accordance with industry standards established by the Asphalt Institute.

2. PRODUCTS

2.1 PRIME COAT, TACK COAT, FOG COAT

- .1 The asphalt required will be SS-1 emulsified asphalt and SS-1H emulsified asphalt conforming to the current issue of ASTM D2028 for Asphalt, Cut Back (Rapid Curing Type) or ASTM D2027 for Asphalt, Cut Back (Medium Curing Type).

2.2 SAND COVER

- .1 The materials for sand cover will consist of clean granular mineral material approved by the Owner’s Representative, all of which will pass a 5mm sieve.

3. EXECUTION

3.1 APPLICATION TEMPERATURE

- .1 The application temperature of the prime, fog and tack coat will be as specified by the Manufacturer. The ambient air temperature will be at least 4 degrees C. when applying the prime, tack or fog coat.

3.2 PRIME COAT

- .1 Immediately prior to applying the prime coat the surface of the base course will be brought to uniform cross-section by patching all depressions and defective areas using an approved patching material and by removing all bumps and irregularities. All loose and foreign material will be removed from the surface.
- .2 The prime coat will consist of a ratio of two parts SS-1 emulsified asphalt to one part water and applied uniformly at a rate of 1.75 to 2.25 l/m², depending on the surface's absorption characteristics. The prime coat will be applied to a uniformly damp base course when the ambient air temperature is at least 4 degrees Celsius. The prime coat will be allowed to cure for a minimum of two hours or until full curing has taken place.
- .3 To ensure uniformity of application a drip pan will be inserted under the nozzles when the application is stopped, and building paper will be spread over the treated surface to allow sufficient distance on restarting so that the nozzles are operating at full force when

the untreated surface is reached. The building paper will then be removed and destroyed. A narrow spout pouring pot or hand spray will be used to apply primer material necessary to touch up spots unavoidably missed by the distributor.

- .4 Work adjacent to the roadway will be completely protected from the application operation by a suitable covering. Any unnecessary splashing of the concrete will be cleaned at the expense of the Contractor. Maintain the primed surface until the surface course has been placed. Maintenance will include spreading any additional sand and patching any breaks in the primed surface with additional asphaltic material.

3.3 TACK COAT

- .1 Apply tack coat between successive lifts of asphaltic concrete. The surface will be free from foreign material prior to application of the Tack Coat. Sweep the asphalt surface prior to the tack coating, if required. The Tack Coat will consist of a ratio of one part SS-1H emulsified asphalt to one part water and applied at a uniform rate of 0.5 litres per square metre. The Tack Coat will be allowed to cure for a minimum of two hours or until full curing has taken place.

3.4 FOG COAT

- .1 The surface will be free from foreign material prior to application of the fog coat. The fog coat, if required, will consist of a ratio of one part SS-1H emulsified asphalt to one part water and applied at a uniform rate of 0.5 l/m². The fog coat will be allowed to cure for a minimum of two hours or until full curing has taken place.
- .2 Traffic may be permitted to run on the completed fog coat immediately after the asphalt has cured.

3.5 SAND COVER

- .1 The prime coat should preferably be entirely absorbed by the base course and therefore require no sand cover. If, however, the asphalt has not been completely absorbed 24 hours after application, then just sufficient sand will be spread over the surface to blot up excess prime coat and prevent it from being picked up by any traffic.

3.6 EQUIPMENT

- .1 The pressure distributor used for applying asphaltic material will distribute the asphaltic material in a uniform spray without atomization, in the amount and between the limits of temperature specified. Suitable means for accurately indicating the temperature of the asphaltic material will be provided at all times.
- .2 The thermometer well will be so placed as not to be in contact with a heating tube. The distributor will be so designed that the normal width of application will be not less than 2 metres with provision for the application of lesser width when necessary.
- .3 If provided with heating attachments the distributor will be so equipped and operated that the asphaltic material will be circulated or agitated throughout the entire heating process.

2450-057-00

- .4 The distributor will be equipped with a speed indicator registering metres per minute and a meter registering litres per minute passing through the nozzles. Both of these gauges will be readily visible to the operator of the distributor.

3.7 DEFICIENT APPLICATION

- .1 Areas that have uneven, non uniform, excessive or deficient application will be repaired immediately at the expense of the Contractor.

3.8 QUALITY OF MATERIALS

Submit data from an independent accredited testing laboratory as required by the Engineer to substantiate that the quality of materials proposed meet these specifications. Provide manufacturer's data as requested by the Owner's Representative.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location, use and placement of “Hot Mix Asphaltic Concrete” specified herein.
- .2 The Work includes the supply of aggregates and asphalt cement, asphalt plant mixing, transporting, placement, finishing and compaction to requirements specified herein.
- .3 Asphalt concrete Mix A and Mix C of this specification will be used for construction of Arterial and Collector roadways or other high loading applications, as designated by the Owner.
- .4 Asphalt concrete Mix B of this specification will be used for construction of Residential roadways or other low traffic areas, as designated by the Owner.

1.2 DEFINITIONS

- .1 “RAP” is defined as Recycled Asphalt Product that is obtained from the cold milling of hot mix asphaltic concrete
- .2 “A Lot” is a portion of the work being considered for acceptance, and is defined as one day of plant production for each mix type. Any portion of the work may be deemed a lot at the discretion of the Owner’s Representative.
- .3 “Job Mix Formula” is defined as the aggregate proportioning (including RAP), target gradation, asphalt content and air void content from the Mix Design that subject to approval by the Owner’s Representative.

1.3 SAMPLES

- .1 At least two (2) weeks prior to commencing work, inform the Owner’s Representative of proposed source of aggregates and provide access for sampling.
- .2 At least four (4) weeks prior to commencing work submit to the Owner’s Representative one 5L container of asphalt cement proposed for use, if requested.
- .3 Identify the supplier of the asphalt cement.
- .4 Provide access for Owner’s Representative to sample material actually incorporated in the work as required.

1.4 SUBMISSIONS

- .1 Submit proposed asphalt concrete mix design and trial mix design results to Owner’s Representative for review and approval at least two (2) weeks prior to commencing.
- .2 Submit new mix design at least two (2) weeks prior to contemplated change in source of asphalt cement or aggregate.

- .3 Trial mix designs will be performed by an independent testing consultant and submitted under the signature and professional seal of a qualified materials engineer to the Owner's Representative.

1.5 DELIVERY AND STORAGE

- .1 Aggregates:
 - .1 Deliver and stockpile aggregates in accordance with the requirements of this Section.
 - .2 Stockpile minimum of 50% of the total amount of aggregate required before commencing production of trial mix design.
 - .3 Handle and transport aggregates to avoid segregation, contamination and degradation.
 - .4 Stockpile aggregates in sufficient quantities to meet project schedules. When hauling into stockpiles after plant mixing commenced, do not deposit material against working face of stockpile.
 - .5 Separate aggregate stockpiles by substantial dividers or stockpiles far enough apart to prevent intermixing.
 - .6 Reject intermixing or contaminated materials. Remove and dispose of rejected materials as directed by the Owner's Representative within 48 hours of rejection.
 - .7 Construct stockpiles in uniform lifts using trucks or rubber tired loading equipment, being careful to avoid segregation by spillage of material over the ends of previously placed lifts. Do not use conveyors or tracked equipment in stockpile construction.
 - .8 Provide a previously stabilized stockpile base or provide a compacted sand base not less than 300mm in depth to prevent contamination. Alternatively, stockpile aggregates on ground but do not incorporate bottom 300mm of pile into work.
- .2 Asphalt Cement:
 - .1 Provide approved storage, heated tanks and pumping facilities for asphalt cement.
 - .2 Provide, upon request, freight and waybills for asphalt cement shipments received.
 - .3 Stockpile minimum of 100% of total amount of RAP required before commencing production of trial mix design.
 - .4 Handle and transport RAP to avoid segregation, contamination and degradation.
 - .5 Separate aggregate and RAP stockpiles by substantial dividers or stockpiles far enough apart to prevent intermixing.

- .6 Reject intermixing or contaminated materials. Remove and dispose of rejected materials as directed by the Owner's Representative within 48 hours of rejection.
- .7 Conveyors may be allowed to stockpile RAP subject to approval by the Owner's Representative. No equipment will be allowed on the RAP stockpile. Construct stockpiles being careful to avoid segregation by spillage of material over the ends of previously placed lifts.
- .8 Provide free draining gravel stockpile base not less than 300 mm in depth to prevent contamination of RAP.

2. PRODUCT

2.1 MATERIALS

- .1 Aggregates:
 - .1 Coarse aggregate is aggregate retained on the 5,000 µm sieve and fine aggregate is aggregate passing the 5,000 µm sieve.
 - .2 Aggregate material will be crushed stone or gravel consisting of hard, durable, angular particles, free from clay lumps cementation, organic materials, frozen material and any other deleterious materials.
 - .3 Gradations to be within limits specified, when tested to ASTM C-136 and ASTM C-117 with sieve sizes to CAN/CGSB 8-GP-2M rather than ASTM E11.
 - .4 Aggregates from source will be processed to meet the following requirements:
 - .1 Natural fines to be pre-screened and stockpiled with more than 10% of material retained on 5,000 µm sieve and 100% passing the 10,000 µm sieve.
 - .2 Pre-screened aggregates delivered to crushing plant will be pre-screened and will contain not more than 5% passing the 5,000 µm sieve.
 - .3 Crushed aggregates will be separated and stockpile in accordance with the following:
 - .1 Coarse aggregates to contain not more than 40% of materials passing the 5,000 µm sieve.
 - .2 Fine aggregate to contain not more than 20% of the materials retained on the 5,000 µm sieve.

.5 Physical properties for aggregates:

Requirement	ASTM Test Method	Mix A Base	Mix B Surface	Mix C Surface
Los Angeles Abrasion Gradation B % Loss	C131	30.0 max.	30.0 max.	30.0 max.
Magnesium Sulphate (% loss)	C88			
Coarse Aggregate:		12.0 max.	12.0 max.	12.0 max.
Fine Aggregate:		12.0 max.	12.0 max.	12.0 max.
Lightweight Particles % by mass	C123	1.5 max.	1.5 max.	1.5 max.

.6 Blend Sand:

- .1 To consist of natural or manufactured sand passing 5,000 µm sieve.
- .2 Stockpile volumes will be maintained to ensure a minimum of 5,000 tonne of plant mix production at all times.

.7 Mineral Filler:

- .1 Finely ground particles of limestone, hydrated lime, Portland cement or other non-plastic mineral matter, thoroughly dry and free from lumps.
- .2 Add mineral filler when necessary to meet job mix aggregate gradation.

.8 Blended Aggregates:

- .1 Aggregate gradation requirements, including RAP:

Sieve Size (µm)	Percent Passing Sieve Size			
	Mix Type A	Mix Type B	Mix Type C	Mix Type M
25,000	100			
20,000	83 – 95		100	
16,000	74 – 90	100	97 – 100	
12,500	64 – 80	95 – 100	80 – 95	100
10,000	56 – 72	85 – 95	70 – 85	95 – 100
5,000	40 – 58	60 – 75	55 – 70	65 – 85
2,500	30 – 46	45 – 60	36 – 55	–
1.25	22 – 40	28 – 45	26 – 45	–
0.630	15 – 33	20 – 36	18 – 38	–
0.315	10 – 27	15 – 28	12 – 28	–
0.160	8.0 – 18	6.0 – 18	8.0 – 16	–
0.080	4.0 – 8.0	4.0 – 8.0	4.0 – 8.0	4.0 – 8.0

.2 Physical properties for blended aggregates:

Requirement	ASTM Test Method	Mix A Base	Mix B Surface	Mix C Surface
Coarse Aggregate Fracture (retained on 5.0 mm sieve size) (% of fractured particles (2 or more faces) by mass)	–	60 min.	70 min.	90 min.
Flat and Elongated Particles (retained on 5.0 mm sieve size (length to thickness ratio greater than 5:1))	–	10 max.	10 max.	10 max.
Flat and Elongated Particles (retained on 5.0 mm sieve size (length to thickness ratio greater than 3:1))		20 max.	20 max.	20 max.
Manufactured Sand * (fine aggregate < 5.0 mm), %		50	50	75
Sand Equivalent Value (Mechanical Method), %	D2419	40 min.	45 min.	45 min.
Maximum RAP (total mass), %	–	20 max.	20 max.	20 max.

*mixes incorporating RAP, 50% of the RAP fines to be considered manufactured sands.

.3 Reclaimed Asphalt Pavement (RAP):

- .1 RAP will be obtained from the cold milling of hot mix asphaltic concrete.
- .2 Gradation of virgin aggregate plus RAP will meet the gradation of combined aggregates indicated above when RAP is used.

.2 Asphalt Cement:

- .1 Asphalt Cement will be prepared by the refining of petroleum and shall not foam when heated to 177° C.
- .2 The tolerance allowed by ASTM for testing precision will be applied for acceptance of asphalt cement.

- .3 Asphalt cement will meet the following requirements:

Requirement	ASTM Test Method	Values
Kinematic Viscosity at 135°C, mm ² /sec	D2170	200 – 300
Absolute Viscosity at 60°C, 300mm, hg Vacuum, Pa.S	D2171	60 – 100
Penetration at 0°C, 200g, 60 sec; dmm	D5	30 min.
Flash Point (Cleveland Open Cup), °C	D92	201 min.
Thin Film Oven Test Penetration after test at 25°C, 100g, 5sec.; % of Original	D5	50 min.
Ductility at 25°C and 5 cm/min.; cm	D113	100 min.
Solubility in Trichloroethylene, % by Mass	D2042	99.5 min.

- .4 At least two (2) weeks prior to commencing work, the Contractor will submit to an approved testing laboratory for design mix, at least 5 litres in a new metal container of the asphalt cement he intends to use in the work along with the name of the supplier of the asphalt cement. Additionally the Contractor will provide if required, a current temperature – viscosity chart for the asphalt cement showing Kinematic Viscosity in mm²/sec over a temperature range of 105° C to 175° C, and submit the manufacturer's test data and certification that the asphalt cement meets the requirements within these specifications. The Contractor will pay for all shipping costs and for all laboratory tests.

2.2

MIX DESIGN

- .1 Mix A, B, and C:
- .1 The Contractor will retain a qualified independent testing consultant to perform trial asphalt mix designs. Trial mix designs are to be submitted to the Owner's Representative for review.
 - .2 The mix design will follow the Marshall Method of mix design as outlined in the latest edition of the Asphalt Institute Manual Series No. 2 (MS-2), and will include five (5) separate trial values of asphalt content.
 - .3 Contactor will pay for all trial mix designs and submissions.
 - .4 Include the following data with the trial mix design submission:
 - .1 Aggregate specific gravity and absorption.
 - .2 Sand equivalent, coarse aggregate fracture, flat and elongated particles, and percent manufactured sand values.
 - .3 Asphalt cement supplier/refinery, specific gravity and mixing and compaction temperatures, based on temperature – viscosity properties of asphalt cement.
 - .4 Aggregate gradation and blending proportions including design asphalt content.

- .5 Maximum theoretical density of each trial asphalt content.
- .6 Where RAP is to be incorporated into the mix supply, RAP gradation, RAP asphalt cement content and design recycle percentage.
- .7 Data to satisfy the requirements of following sections.
- .5 Design Mix:
 - .1 Mix A and Mix C – By Marshall method, 75 blows on each face of test specimens using mechanical compactor.
 - .2 Mix B – By Marshall method, 50 blows on each face of test specimens using mechanical compactor.
- .6 Mix Physical Properties:

Property	Mix A	Mix B	Mix C	Mix M
Marshall Stability @ 60°C; kN	10.0 min.	8.0 min.	12.0 min.	6.0 min.
Marshall Flow , mm	2.0 – 4.0	2.0 – 4.0	2.0 – 4.0	2.0 - 4.0
Air Voids (%)	4.3– 4.7	3.3 – 3.7	3.8 – 4.2	2.8 – 3.2
Voids in Mineral Aggregate, %	12.0 min.	14.0 min.	13.5 min.	15 min.
Voids filled with Asphalt, %	60 – 70	70 – 80	65 – 80	70 – 85
Asphalt Film Thickness, um	6.0 min.	7.0 min.	7.0 min.	7.0 min
Tensile Strength Ratio (%) ¹	70 min.	75 min.	75 min.	–

¹ Tested in accordance with AASHTO T283 including optional freeze cycle.

2.3 JOB MIX FORMULA:

- .1 Subject to approval by the Owner’s Representative, the aggregate proportioning (including RAP), target gradation, asphalt content and air void content from the Mix Design will become the Job Mix Formula for the supply of hot mix asphalt.
- .2 Once established, no alterations to the Job Mix Formula will be permitted unless the Contractor submits a new Job Mix Formula and it is approved by the Owner’s Representative.
- .3 If the sum of any alteration to the Job Mix Formula is in excess of any one of the following limits, a new Mix Design is required.
 - .1 + or – 5% passing the 5,000 µm sieve size.
 - .2 + or – 1% passing the 80 µm sieve size.
 - .3 + or – 0.30% asphalt content.

- .4 Properties of the revised Job Mix Formula shall conform in properties to all requirements of this specification.

2.4 TOLERANCES:

- .1 All mixtures will be supplied to the approved Job Mix Formula within the range of tolerances specified.
- .2 Asphalt cement content: + or – 0.3% of approved Job Mix Formula value
- .3 Aggregate Gradation:

Aggregate Passing Sieve Size (µm)	Tolerance (% By Mass)
Max. to size 5,000	+ or – 4.0
2,500 and 1,250	+ or – 3.0
630, 160 and 315	+ or – 2.0
80	+ or – 1.0

- .4 Temperature: Mix temperature at point of plant discharge will not vary from that specified in the Job Mix Formula by more than + or – 10°C.
- .5 Air Voids: + or – 1.0% of the Job Mix Formula value.
- .6 Mixture Properties: Marshall Stability, Marshall Flow, Voids Filled with Asphalt, Voids in Mineral Aggregate and Film Thickness as per Mix Design.
- .7 Moisture in Mix: Maximum permissible moisture at point of plant discharge is 0.3% by mass of mix.
- .8 Asphalt cement recovered from freshly produced hot mix by the Abson Method, ASTM D1856 and subsequently tested in accordance with ASTM D5, will retain a minimum value of 50% of its original penetration value.

3. EXECUTION

3.1 CONTINUITY OF PRODUCTION

- .1 During the time period that work is in progress on any project for which this specification is in effect, and at the discretion of the Owner’s Representative, the plant may be limited to producing only the mix type required for that project.

3.2 PREPARATION OF HOT MIX MATERIAL

- .1 Preparation of Mineral Aggregate:
 - .1 The mineral aggregates will be dried to ensure the mix is discharged containing not more than 0.2 percent moisture, heated so that when delivered to the mixing unit, they will be at as low a temperature as is consistent with proper mixing and laying and in no case to exceed 163°C. The mineral aggregate may be fed

simultaneously into the same dryer, but in all cases immediately after heating, they will be screened into bins.

- .2 Where reclaimed asphalt pavement (RAP) will be incorporated into the mix, the virgin aggregate may be heated to a higher temperature such that when dry mixed with the RAP the temperature is less than 163° C. The RAP will be passed over a 50 mm screen prior to entering the plant.
- .3 For batch plants RAP will be introduced into the weigh hopper after some aggregate has been weighed. For approved drum or continuous plant RAP will be introduced through a calibrated cold feeder.

.2 Preparation of Asphalt Cement:

- .1 The asphalt cement will be carefully heated to a specified temperature between 118° C and 150° C depending on the temperature viscosity relationship, by approved means designed to secure uniform heating of the storage tank. The temperature differential aggregates and asphalt cement will at no time be more than 4° C.

.3 Composition of Mixture:

- .1 The mineral aggregate and asphalt cement will be mixed in a manner to produce a homogeneous mixture in which all particles of the mineral aggregate are uniformly coated and in such proportions as to produce a mixture having asphalt cement content as indicated by the approved job mix formula. When the mixture is prepared in a twin pug mixer, the volume of mineral aggregate and asphalt cement will not be so great as to extend above the tops of the mixer blades when the blades are in a vertical position.
- .2 After the hot aggregate and mineral filler have been charged into the mixer, and thoroughly mixed for a period of not less than fifteen (15) seconds, as directed by the Owner's Representative, the asphalt cement will be added and the mixing continued for a period of at least twenty-five (25) seconds, and not more than forty-five (45) seconds.
- .3 Asphalt cement recovered from freshly produced hot mix by the Adson Method, ASTM D1856, and subsequently tested in accordance with ASTM D5, will retain a minimum value of fifty percent (50%) of its original penetration value.

3.3 COMPLIANCE WITH SPECIFICATIONS

.1 Aggregate Gradation:

- .1 When the gradation does not comply with tolerances set forth in Section 2.1.1 of this specification, the Owner's Representative will initiate the following action:
 - .1 When two (2) consecutive gradation analyses identify non-compliance with the specified tolerances, the Contractor will be served notice and a third test will be initiated.

- .2 If continued non-compliance is indicated from the third test, the Contractor will suspend production. He will not commence production again until he has demonstrated that corrective action has been taken and that the aggregate gradation is within the specified tolerance limits.

.2 Asphalt Temperature:

- .1 Plant mix which does not meet temperature requirements of Section 2.1.2, at the point of plant discharge will be rejected.

3.4 PREPARATION FOR PAVING

.1 General:

- .1 The Contractor will give the Owner's Representative a minimum of six (6) hours notice of his intention of commencing paving over any previously approved primed or tacked surface.
- .2 The hot asphaltic mixture will be laid upon a dry firm base, true to grade and cross-section and free from all screening or other loose or foreign material. No hot mix will be spread when the sub-base is wet or when other conditions prevent proper spreading, finishing or compaction.
- .3 If undercutting, and subsequent backfill with asphaltic concrete is done, the backfill operation will be performed sufficiently far ahead of the paving operation to allow the asphaltic concrete time to cool down enough to support equipment.

.2 Asphalt Placing Temperature:

- .1 No asphalt will be dispatched to the field unless the temperature as issued by Environment Canada, is rising and meets the following minimum temperature requirements:
 - .1 Thickness less than 50 mm require +7° C.
 - .2 Thickness 50mm and less than 70 mm require +4° C.
 - .3 Thickness greater than 70 mm to 100 mm +2° C.
- .2 A tolerance will be permitted for plant start-up temperature.
- .3 No surface lift asphalt will be placed regardless of temperature until the road base is 5° C or higher.
- .4 For the asphalt base lifts ≥ 100 – Compaction requirements shall govern.

- .3 Hours of Operation:
 - .1 No loads of asphalt will be dispatched from the plant after sunset or during hours of darkness unless loads can be placed and compacted in accordance with these specifications, and suitable artificial illumination is provided, all subject to the approval of the Owner's Representative.

- .4 Transportation of Hot Asphaltic Mixtures:
 - .1 To protect the load from adverse weather conditions during transit, trucks will carry at all times tarpaulins of sufficient weights and size to cover the entire open area of the truck box. Regardless of weather conditions, tarpaulins will be used when ordered by the Owner's Representative.
 - .2 Vehicles used for the transportation of hot mix asphalt from the plant to the site of work will have tight metal boxes previously cleaned of all foreign matter, the inside surface may be lightly lubricated with a thin oil or soap solution just before loading. Excess lubrication will not be permitted.
 - .3 The speed and weight of hauling trucks will be regulated so that, if in the opinion of the Owner's Representative, no damage will occur to any portion of the work underway. Any damage to the prime coat or the bituminous mat caused by the Contractor's equipment will be repaired by the Contractor at his own expense.

3.5 SPREADING AND FINISHING EQUIPMENT

- .1 Asphalt Spreader:
 - .1 The track mounted spreading machine will be self-propelled and capable of placing a uniform layer of asphalt mix to a depth shown on the plans or as ordered by the Owner's Representative.
 - .2 The screed will include a tamping bar or vibratory strike-off device for use when required. The screed will strike-off the mix to the depth and cross-sections specified and produce a finished surface of uniform texture.
 - .3 Control of the screed will be by automatic sensing devices. Longitudinal control will be accomplished by a sensor, which follows a string-line, ski, or other reference. The grade sensor will be movable and mounts provided so that grade control can be established on either side of the paver. A slope control will also be provided to maintain the proper transverse slope of the screed.

- .2 Hand Tools:
 - .1 Only lutes will be used during the spreading operation and when the asphalt is worked by hand in areas in which the paver cannot reach.
 - .2 Tamping irons used to consolidate the material along curbs, gutters and other structures inaccessible to the rollers will not weigh less than 11 kg and will have a bearing area not exceeding 310 sq. cm. Mechanical compaction equipment, satisfactory to the Owner's Representative, may be used instead of tamping irons.

- .3 For purposes of checking the finished surface, Contractors must provide and carry on each paving machine a 3 metre straight edge with an attached level.
- .4 The Contractor will supply propane torches for heating joints.

3.6 SPREADING OPERATIONS

- .1 Pre-levelling for Asphalt Concrete:
 - .1 Pre-levelling of uneven or broken surfaces over which asphalt concrete is to be placed will be accomplished by the use of asphaltic concrete placed with a grader, paver, hand or by a combination of these methods as directed by the Owner's Representative.
 - .2 After placement, the asphalt concrete used for pre-levelling will be compacted thoroughly with a pneumatic-tired roller.
- .2 Asphalt Spreading Operation:
 - .1 The asphaltic concrete will be laid to the design thickness as shown on the contract drawings or as specified. New construction where an established; i.e. curb, is lacking, a string-line reference will be required. The maximum spacing between string-line stakes will not exceed 10 metres. The line will be tensioned to 450 N and secured. Adjacent mats on the same lift are to be controlled by use of the grade sensor. No relaxation of the above procedure will be permitted without written approval of the Owner's Representative.
 - .2 The spreader will be operated in such a manner as to distribute the asphaltic concrete mix to proper cross-section, width and thickness without causing segregation of the mix. Small segregated areas that may occur will be corrected immediately. The forward motion of the spreader will be controlled so that no irregularities in the pavement surface caused by excessive speed. The rate of placement of the mixture will be uniform, and will be co-ordinated with the production rate of the asphalt plant without intermittent operation of the spreader.
 - .3 Any failure of the machine to produce a smooth, uniformly dense mat, free from irregularities, will be corrected immediately to the satisfaction of the Owner's Representative.
- .3 Areas Inaccessible to Spreaders:
 - .1 Areas that are inaccessible to the spreading machine may be paved by other methods, as directed by the Owner's Representative. Graders or approved types of truck-attached spreaders will be used to pave inaccessible or irregularly shaped areas. Hand raking will be kept to a minimum.
 - .2 In small areas or where the use of mechanical equipment is not practical, the mix may be spread and finished by hand. The asphaltic mixture will be dumped on the area and immediately thereafter distributed into place by shovels and spread with lutes in a loose uniform layer of uniform density and correct depth. Material must be handled so as to avoid segregation. Excessive oiling of tools will not be tolerated. Loads will be dumped any faster than can be adequately

distributed by the rakers. Raking must be carefully and skilfully done, in such a manner that after the first passage of the roller over the mixture, a minimum amount of additional patching will be required.

3.7 COMPACTION EQUIPMENT

- .1 The Contractor will supply sufficient compaction equipment to:
 - .1 Provide a compaction rate that will equal or exceed the placing rate of the spreader.
 - .2 Ensure full compaction of the asphaltic concrete before the temperature of the mat falls below 80° C.

3.8 COMPACTION PROCEDURES

- .1 General:
 - .1 The rollers will be kept in continuous motion while on the hot mat in such a manner that all parts of the pavement receive equal compression.
 - .2 The surface of the mixture after compaction will be smooth and true to established section and grade. Areas of .09 sq. m. or more in which any mixture shows an excess or deficiency of asphalt, or uneven distribution of asphalt due to insufficient mixing, or which become loose, broken, ravelled, mixed with dirt, or is in any way defective, will be removed and replaced with fresh asphalt at the Contractors' expense and be immediately compacted to conform with the surrounding area.
 - .3 Areas inaccessible to the roller will be compacted with mechanical or hand tampers.

3.9 JOINTS

- .1 Longitudinal and Transverse Joints:
 - .1 Longitudinal and transverse joints will be made in a careful manner.
 - .2 Paving joints will not be placed in the same vertical plane. Longitudinal joints will be offset at least 150 mm and transverse joints will be offset at least 2.0 m.
 - .3 Edges which additional pavement is to be placed will be vertically formed to true line. A lute will be used immediately behind the paver when required to obtain a true line and vertical edge.
 - .4 The exposed edges of all cold asphalt joints and the face of the concrete curb and gutter will be cleansed and painted with a thin coat of asphalt tack oil.
 - .5 In making the joint along any adjoining pavement and after the hot mixture is placed by the paver, just enough of the material will be carried back to fill any space left open. This joint will be properly "set up" with the back of the lute at proper height and level to receive the maximum compression under the rolling.

- .6 At the end of each day's paving of the surface course and upper lift of the base course mix, the uncompleted paving mats will be provided with vertically cut transverse joints. Joints between old and new pavements or between successive days' work will be carefully made in such a manner as to ensure a thorough and continuous bond between the old and new surfaces.

3.10 SURFACE SMOOTHNESS

- .1 General:
 - .1 The completed surface of the top or wearing surface will be of uniform texture, smooth, uniform as to crown and grade, and free from defects of all kinds. Tolerances in both profile and crown are:
 - .1 Base Course – 10 mm in 5 m.
 - .2 Surface Course – 6 mm in 5 m.
 - .2 When the surface smoothness does not comply with tolerances, the pavement surface will be corrected by the addition of asphalt concrete mixture of an appropriate class to low places or the removal of material from high places by methods satisfactory to the Owner's Representative. Correction of defects will be carried out until there are no deviations anywhere greater than the allowable tolerances.
- .2 Repair of Defective Areas:
 - .1 Asphalt spreaders will be required for areas greater than 90 sq. m. The required equipment will be on site before placing of asphalt hot mix may commence.
 - .2 Where sixty percent (60%) of the road requires patching and/or several other patches are required across the width of the street it will be necessary to extend the treatment across the full width of the street.
 - .3 Placing of a patch on top of another will not be acceptable and in these cases the original asphalt must be removed.
 - .4 Where, in the opinion of the Owner's Representative, possible bridging exists, it will be necessary to remove the asphalt and the defective area. The base course will be brought back up to proper grade and use full depth asphalt patching.
 - .5 All patches should be square with no jagged edges.
 - .6 Asphalt patches should retain the proper cross-section and the edges will be properly feathered out.
 - .7 Asphalt skin patching will be subject to the temperature requirements for asphalt surfacing.

3.11 TESTING

.1 Quality Control:

- .1 Quality control is the responsibility of the Contractor throughout every stage of the Work from aggregate processing to the final accepted product. Tests performed by the Owner's Representative will not be considered as quality control tests.
- .2 The Contractor will be totally responsible for production of materials and construction that meet all specified requirements.
- .3 All quality control will be conducted by qualified personnel. The Contractor will bear the cost of all quality control testing and consulting services.
- .4 Pre-Production Quality Control Requirements are as follows:

Quality Control Requirement	Test Standard	Minimum Frequency
Asphalt Cement Certification	--	Once per Year or for change in supplier
Aggregate Physical Properties	See 2.2.5	Once per Year or for change in source
Crushed Coarse Aggregate Gradation Analysis and Fracture Content Manufactured Sand Aggregate Gradation Natural Fine Aggregate Gradation Blend Sand Aggregate Gradation	ASTM C 136 ASTM D 5821 ASTM C 117 ASTM C 126 ASTM C 117 ASTM C 126 ASTM C 117 ASTM C 126	One for every 1000 tonne of each class of material processed into stockpile, or one analysis for each material every production day when production rate is less than 1000 tonne.
Reclaimed Asphalt Pavement (RAP) Asphalt Content and Extracted Aggregate Gradation	ASTM D 2172 ASTM C 117 ASTM C 136	One for each 500 tonne delivered to stockpile, or one for each location when delivery rate is less than 500 tonne
Penetration of asphalt cement recovered from RAP by Abson Method	ASTM D 1856 ASTM D 5	One for each 2000 tonne delivered to stockpile
Trial Mix Design by Marshall Method	ASPHALT INSTITUTE MS-2	One per mix type every 3 years, or as required for a change in asphalt cement supply, aggregate gradation or aggregate source. *
Plant Calibration	--	As required

* A laboratory/plant job mix formula verification is required each year when a trial mix design is not conducted.

- .5 Pre-Production Quality Control test data will be reported to the Owner's Representative one week prior to commencing the project, or as requested.

.6 Post Production Quality Control Requirements are as follows:

Quality Control Requirement	Test Standard	Minimum Frequency
Hot Mix Asphalt Analysis (including Asphalt Content, Aggregate Gradation, Marshall Density and Void Properties)	ASTM D 6307 ASTM C 117 ASTM C 136	One for every 500 tonne of each mix type supplied under this specification. *
Quality Control Charts (including 3 test running average for Binder Content, Aggregate Gradation, Marshall Density and Void Properties)	ASTM D 6307 ASTM C 117 ASTM C 136 ASTM D 3203 ASSHTO T312	For each hot mix analysis. Test results and updated 3 test running average to be submitted to the Owner's Representative as they become available.
Hot Mix Asphalt Temperature	--	Minimum frequency not specified.
Cold Feed Aggregate Analysis	ASTM C117 ASTM C 136	Minimum frequency not specified.
Maximum Relative Density of Hot Mix Asphalt	ASTM D 2041	Minimum frequency not specified.
Compaction Monitoring (Core or Nuclear Density)	ASTM D 2726 ASTM D 2950	Minimum frequency not specified. **

* Where an individual test indicates non-compliance, another test shall be initiated immediately.

** Coring is subject to approval by Owner's Representative.

.7 Post-Production Quality Control test data will be reported to the Owner's Representative daily as the work proceeds.

.2 Quality Control Compliance:

.1 Asphalt Content, Aggregate Gradation and Mixture Properties

.1 The test data derived by Post-Production Quality Control mix testing, will be compared to the tolerances set forth in the production tolerances, Section 2.4, of this specification. The Contractor will document, and make available to the Owner's Representative, any adjustments made to correct noncompliance with the specified tolerances.

.2 The Contractor will suspend mix production when the 3 test running average for any property is outside of the specified tolerance limits for three consecutive tests. Supply will not commence again until it is demonstrated that corrective action has been taken.

.2 Hot Mix Asphalt Temperature

.1 Plant mix that does not meet temperature requirements of the production tolerances, Section 2.4, at the point of plant discharge will be subject to rejection at the discretion of the Owner's Representative.

.3 Acceptance Sampling and Testing:

- .1 Within this specification, certain requirements, limits and tolerances are specified regarding supplied materials and workmanship. Compliance with these requirements will be determined from acceptance testing as described in this section.
- .2 Acceptance testing is the responsibility of the Owner's Representative.
- .3 Initial acceptance testing will be undertaken free of cost to the Contractor.
- .4 A lot is a portion of the work being considered for acceptance, and is defined as one day of plant production for each mix type. Any portion of the work may be deemed a lot by the Owner.
- .5 Acceptance Testing requirements are as follows:

Quality Acceptance Requirement	Test Standard	Minimum Frequency
Hot Mix Asphalt Analysis (including Binder Content, Aggregate Gradation, Marshall Density, Maximum Relative Density, Void Properties, Marshall Stability and Flow)	ASTM D 6307 ASTM C 117 ASTM C 136 ASTM D 2041 ASTM D 3203 AASHTO T 312	For each mix type, one test for each 3500 sq.m. of placement, or three tests per lot, whichever is greater.
Compaction Testing (Core Density) and Thickness Determination	ASTM D 2726 ASTM D 3549	For each mix type, one test for each 2000 sq.m. of placement, or three tests per lot, whichever is greater.
Hot Mix Asphalt Temperature	–	No minimum frequency.

.6 Acceptance Sampling Procedures:

- .1 Loose mix samples will be acquired from the Work site in accordance with Alberta Transportation Test (ATT) procedure ATT-37. Auger samples may be used if approved by both the Owner's Representative and the Contractor.
- .2 The timing of mix sampling will be stratified, with each sample representing a similar production quantity.
- .3 Core locations will be selected using stratified random sampling procedures. The lot will be divided into segments meeting or exceeding the minimum frequency indicated in the Acceptance Testing requirements (Section 3.11.3) and of approximately equal area. In each segment, a test site will be located using random numbers to determine the longitudinal and transverse coordinates.
- .4 Areas within 3 m of transverse joints, or 0.3 m of a mat edge, are excluded from compaction acceptance sampling and testing.

- .7 Reporting Protocols
 - .1 Test reporting accuracy will be as stipulated in the referenced test procedures, including:
 - .1 Gradation to the nearest whole number, except the percent passing the 80 mm sieve, which will be reported to the nearest 0.1%.
 - .2 Binder content to the nearest 0.01%
 - .3 Air voids and compaction to the nearest 0.1%.
 - .4 Thickness to the nearest whole millimeter (mm).
 - .2 Lot averages will be reported to the same accuracy as test results.
- .4 Appeal of Acceptance Testing Results:
 - .1 General
 - .1 The Contractor may appeal the results of acceptance testing for Compaction Standard, Asphalt Content or Air Voids for any lot subject to rejection or unit price reduction. The notice of appeal will be in writing and submitted to the Owner's Representative within 48 hours of receipt of the acceptance testing results.
 - .2 Appeals will only be considered if cause can be shown and the post-production quality control requirements have been satisfied.
 - .3 Quality Control tests initiated after the Contractor's receipt of the acceptance test results will not be considered when evaluating cause for appeal.
 - .4 Only Quality Control testing during production for the subject project will be considered when evaluating cause for appeal.
 - .2 Asphalt Content Appeal
 - .1 A stratified random sampling plan will be developed by the Owner's Representative with the same number of segments as the original number of samples for the subject lot. Sufficient core sample will be acquired from each segment to enable asphalt content determinations.
 - .2 For asphalt content appeal testing, the Contractor will have the option for the testing to be done by the testing laboratory undertaking the project acceptance testing, or an independent testing laboratory selected by the Owner's Representative.
 - .3 The average of the appeal test results will be used for acceptance and unit price adjustment, and shall be binding on both the Owner and the Contractor.

- .4 If the average appeal test result verifies that any unit price reduction or rejection applies for that Lot, the costs of the appeal sampling and testing will be borne by the Contractor. If the results show that a penalty or rejection no longer applies, the sampling and appeal costs will be the responsibility of the Owner.
- .3 **Compaction Standard or Air Void Appeals**
 - .1 The testing laboratory conducting the project acceptance sampling and testing will routinely retain companion samples sufficient for the determination of maximum relative density and/or Marshall density.
 - .2 For compaction standard or air void (Marshall Density) appeal testing, the Contractor will have the option for the testing to be done by the testing laboratory undertaking the project acceptance testing, or an independent testing laboratory selected by the Owner's Representative.
 - .3 The average of the appeal tests will be used for acceptance and unit price adjustment, and will be binding on both the Owner and the Contractor.
 - .4 If the new compaction standard verifies that any unit price reduction or rejection applies for that Lot, the costs of the appeal sampling and testing will be borne by the Contractor. If the result shows that a unit price reduction no longer applies, the appeal testing costs will be the responsibility of the Owner.
 - .5 If the new average air void content result verifies that any unit price reduction applies for that Lot, the costs of the appeal testing will be borne by the Contractor. If the results show that a unit price reduction no longer applies, the sampling and appeal costs will be the responsibility of the Owner.
- .4 **Core Density and Thickness Appeals**
 - .1 Core density and thickness appeals will only be considered if a case can be made that the stratified random sampling plan was biased or testing was in error.

3.12 END PRODUCT ACCEPTANCE OR REJECTION

- .1 **General:**
 - .1 The Contractor will provide an end product conforming to the quality and tolerance requirements of this specification. Where no tolerances are specified, the standard of workmanship will be in accordance with accepted industry standards.
 - .2 Acceptance of any Lot at full or increased payment will occur if there are no obvious defects and the Lot mean results for asphalt content, pavement density, air voids and thickness meet or exceed the specified tolerances. No obvious defects include roller marks, tire marks, cracking or tearing, excessive bleeding, and surface segregation.

.3 Unit price reductions will only be applied on the basis on full acceptance testing in accordance with the Acceptance Testing Requirements Section 3.11.3.5.

.2 Asphalt Content:

.1 For full payment, the Lot Mean Asphalt Content must be within + 0.30% of the approved Job Mix Formula value, as specified in Section 2.4.

.2 Payment adjustment for asphalt content is as follows:

Asphalt Content Deviation from Job Mix Formula Value (%)	Payment Adjustment Factor (PA_{AC})
+ or - 0.30 or less	1.00
+ or - 0.31 to + or - 0.50	As per Chart A
Greater than + or - 0.50	Reject *

* Subject to removal and replacement at the discretion of the Owner's Representative.

.3 Pavement Compaction:

.1 For full or increased payment, the Lot Mean Pavement Compaction must be equal to or greater than 93% of the Lot Mean Maximum Relative Density.

.2 Payment adjustment for pavement compaction is as follows:

Pavement Compaction % of Maximum Relative Density	Payment Adjustment Factor (PA_{COM})
93.5 to 95.5 *	1.02 **
93.0 to 93.4	1.00
90.0 to 92.9	As per Chart B
Less than 90.0	Reject ***

* Where no individual test result is less than 93%, otherwise the payment adjustment factor is 1.00.

** For Category A Projects only.

***Subject to removal and replacement at the discretion of the Owner's Representative.

.4 Air Void Content:

.1 For full payment, the Lot Mean Air Voids must be within + or - 1.0% of the Job Mix Formula value, as specified in Section 2.4.

.2 Payment adjustment for air void content is as follows:

Air Void Content % Deviation from Job Mix Formula Value	Payment Adjustment Factor (PA _{AV})
Less than 1.0	1.00
1.0 to 2.0	As per Chart C
Greater than 2.0 (Lower Lifts)	0.80
Greater than 2.0 (Upper Lifts)	0.60

.5 Thickness (New Construction and Top Lift Only):

- .1 Pavement of any type found to be deficient in thickness by more than 6% mm will be removed and replaced by pavement of specified thickness, at the Contractor's expense.
- .2 The Lot Mean Thickness for any Lot will be determined on the basis of the acceptance cores described in the Acceptance Testing Requirements, Section 3.11.3.4. Core thickness will be determined in accordance with ASTM D 3549.
- .3 If the deficiency of any individual core exceeds 6% mm, additional cores may be extracted in the proximity to the location of the core of excessive deficiency, to identify the extremities of the pavement area subject to be removed and replaced. The Contractor will pay for such additional coring.
- .4 For full payment, the Lot Mean Thickness must not be deficient by greater than 2%.
- .5 Payment adjustment for thickness is as follows:

Thickness Deficiency (% of Specified Thickness)	Payment Adjustment Factor * (PA _T)	
	Total Thickness (Single or Multiple Lifts)	Top Lift Thickness (Multiple Lifts)
2% or Less	1.00	1.00
2% to 6% Deficient	As Per Chart D	As Per Chart D
More than 6% Deficient	Reject **	Reject **

* A single Thickness Payment Adjustment Factor shall be applied, Total Thickness or Top Lift Thickness, whichever results in the greatest adjustment.

** Subject to removal and replacement at the discretion of the Owner's Representative.

.6 Smoothness:

- .1 The completed asphalt concrete surface will be true to the dimensional and tolerance requirements of the specifications and drawings. Unless detailed otherwise in the contract documents, the tolerances in both profile and crown are:
 - .1 Base Course – 10 mm in 3 m
 - .2 Surface Course – 5 mm in 3 m

.2 When deviations in excess of the above tolerances are found, the pavement surface will be corrected by methods satisfactory to the Owner's Representative. Correction of defects will be carried out until there.

.7 Segregation:

.1 The finished surface will have a uniform texture and be free of segregated areas. A segregated area is defined as an area of the pavement where the texture differs visually from the texture of the surrounding pavement.

.2 All segregation will be evaluated by the Owner's Representative to determine repair requirements.

.3 The severity of segregation will be rated as follows:

.1 Slight - The matrix of asphalt cement and fine aggregate is in place between the coarse aggregate particles, however there is more stone in comparison to the surrounding acceptable mix.

.2 Moderate - Significantly more stone than the surrounding mix, and exhibit a lack of surrounding matrix.

.3 Severe - Appears as an area of very stony mix, stone against stone, with very little or no matrix.

.4 Segregated areas will be repaired by the Contractor as directed by the Owner's Representative. The following methods of repair are identified.

.1 Slight - Squeegee asphalt to completely fill the surface voids.

.2 Moderate - slurry seal for full mat width.

.3 Severe - removal and replacement or overlay.

.5 All repairs will be regular in shape and finished using good workmanship practices to provide an appearance suitable to the Owner's Representative.

.6 Any other methods of repair proposed by the Contractor will be subject to the approval of the Owner's Representative.

.7 Repairs will be carried out by the Contractor at their expense.

3.13 PAYMENT ADJUSTMENT FOR NON-COMPLIANCE

- .1 The Unit Price applicable to each Lot quantity of asphalt concrete will be calculated as follows:

$$\text{Adjusted Unit Bid Price} = (\text{Unit Bid Price}) \times (\text{PA}_{AC}) \times (\text{PA}_{COM}) \times (\text{PA}_{AV}) \times (\text{PA}_T)$$

Where:

PA_{AC} = Asphalt Content Payment Adjustment

PA_{COM} = Pavement Compaction Payment Adjustment

PA_{AV} = Air Void Payment Adjustment

PA_T = Thickness Payment Adjustment

CHART A ASPHALT CONTENT PAYMENT ADJUSTMENT FACTOR

— SURFACE LIFTS - - - LOWER LIFTS

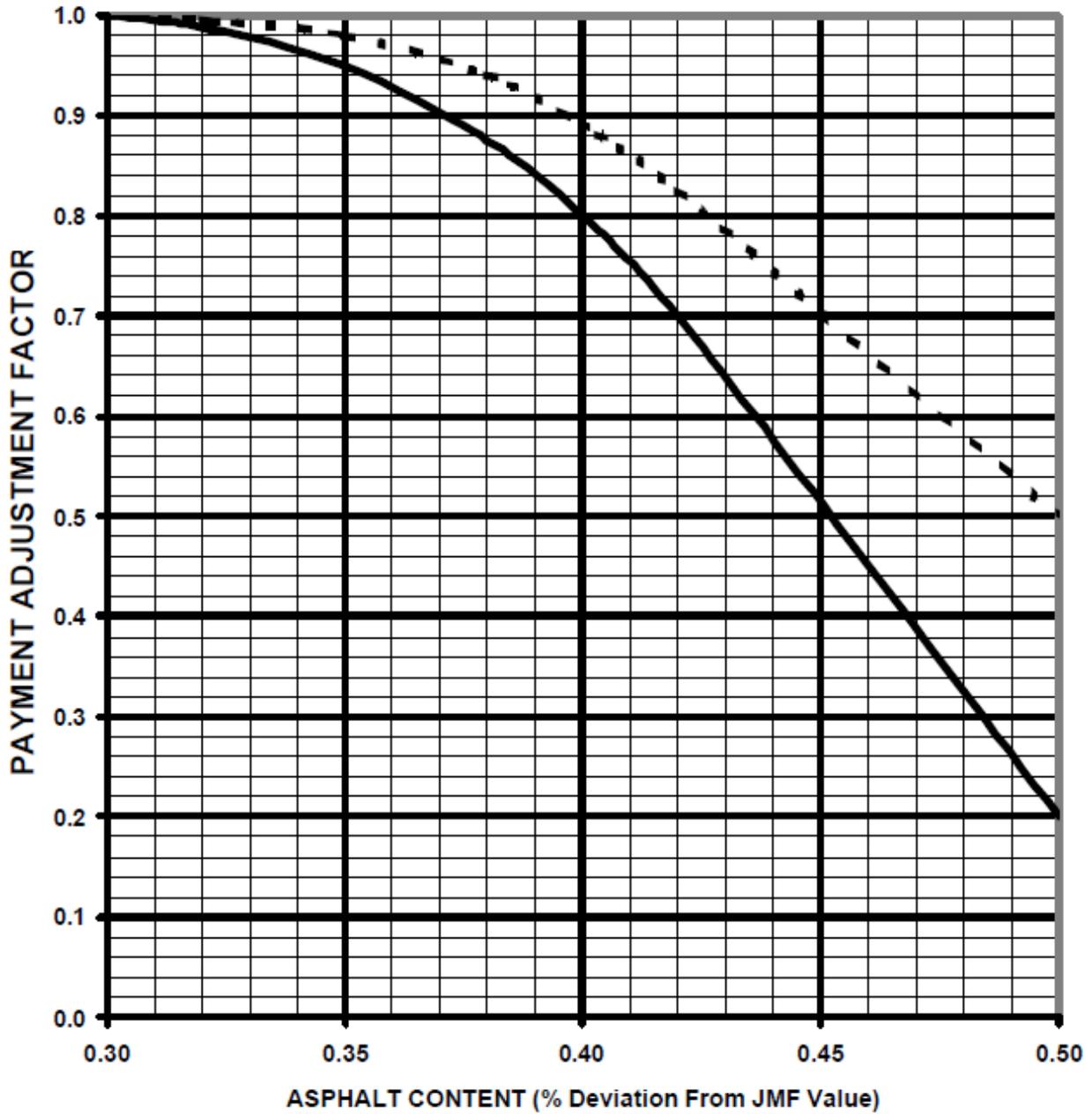


CHART B COMPACTION PAYMENT ADJUSTMENT FACTOR

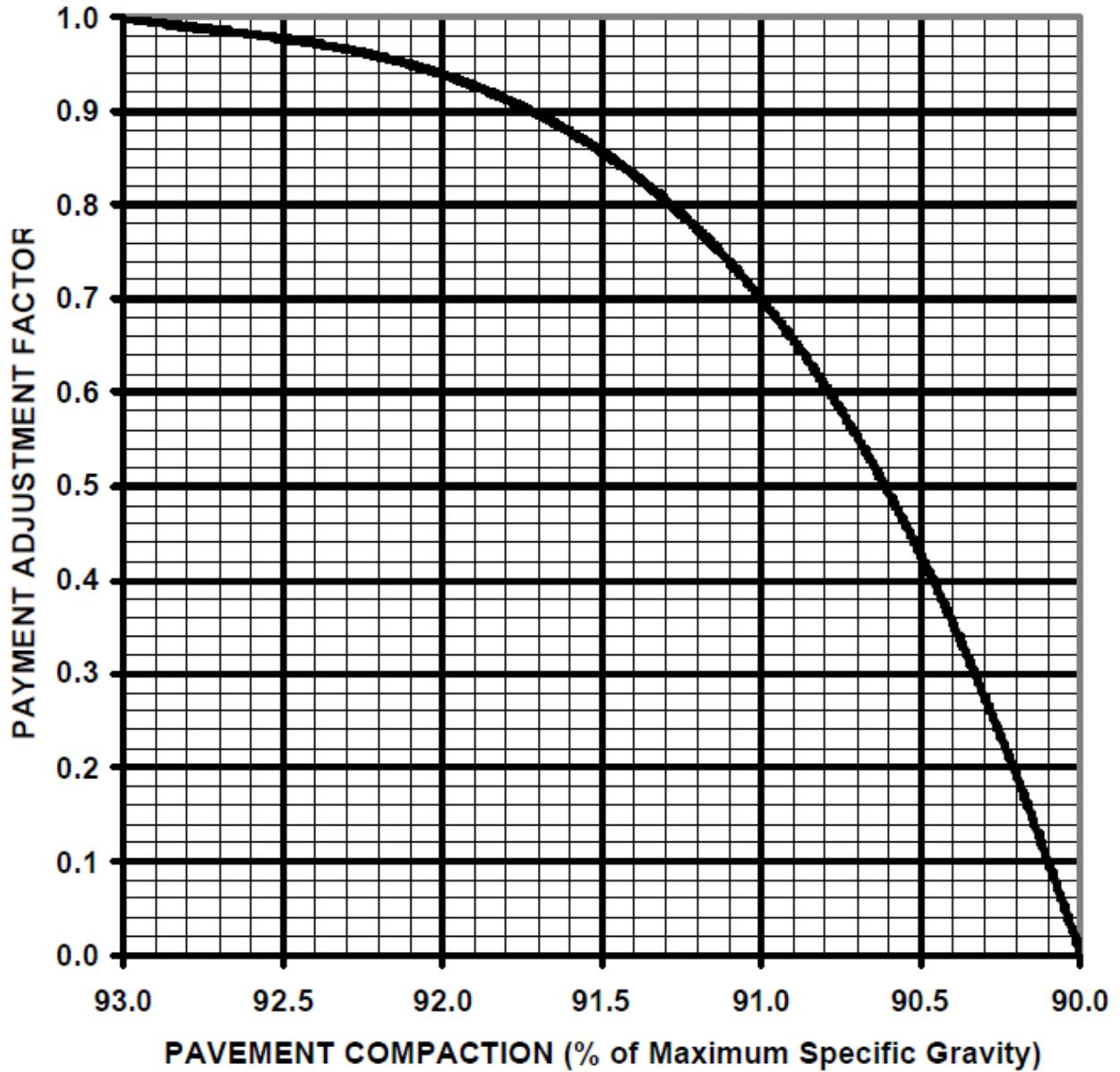


CHART C AIR VOID CONTENT PAYMENT ADJUSTMENT FACTOR

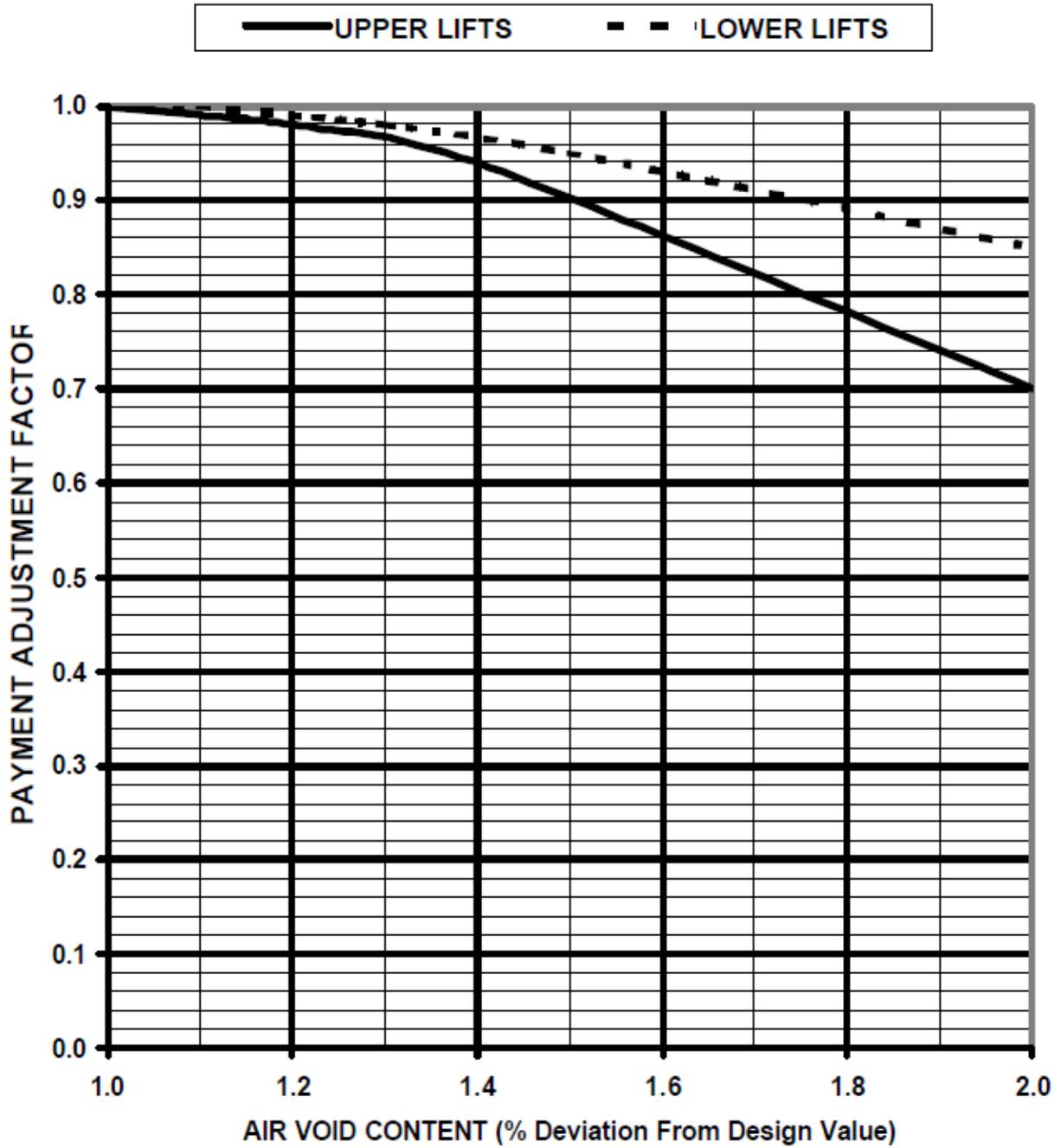
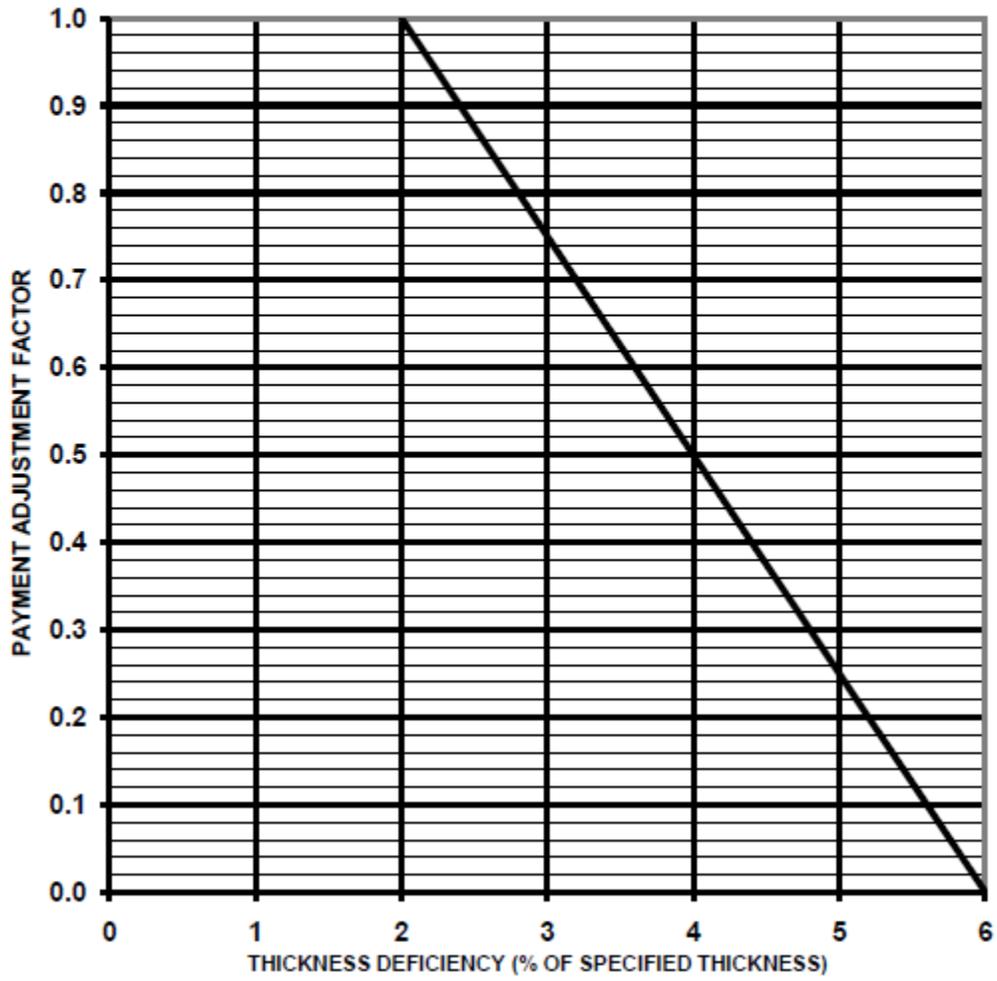


CHART D
AVERAGE THICKNESS
PAYMENT ADJUSTMENT FACTOR



END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this section in conjunction with other sections for location and use of appurtenance adjustment specified herein.

2. EXECUTION

2.1 GENERAL

- .1 Bring all manholes, catch basins, water valve boxes and other appurtenances to the finished grade of the road, parking lot, median strip or landscaped areas. Complete this work prior to placement of the concrete structures, sod, seed or final lift of asphalt.
- .2 Repair or replace water valves, catch basins, manholes and other appurtenances damaged as a result of construction at no cost to the Owner. No tolerance will be allowed in the shape of the finished surface in the vicinity of any utility appurtenance.
- .3 Raise or lower manhole frames and covers to grade by the addition and/or deletion of manhole components including frames, frame riser rings, manhole barrels and collars, as required. The completed manhole adjustment work will be in accordance with the precast concrete manhole standards. All work to be inspected and approved by the Owner's Representative before it will be considered complete.
- .4 Raise or lower catch basin frames and grates to grade by the addition, deletion and/or modification of catch basin components including frames, collars, slab tops and barrel, as required. The completed catch basin adjustment work will be in accordance with the precast concrete catch basin standards. All work to be inspected and approved by the Owner's Representative before it will be considered complete.
- .5 Raise or lower water valve boxes to grade by the addition, deletion and/or modification of water valve components including top box, top box riser, casing and extension spindle, as required. The completed water valve box adjustment work will be in accordance with the valve and valve box standards. All work to be inspected and approved by the Owner's Representative before it will be considered complete.
- .6 Do not proceed with paving final surface lift until all necessary manhole, catch basin, valve and other appurtenance adjustments have been completed.
- .7 Raise or lower manholes and catch basins frames using riser rings and collars a minimum of 50 mm and a maximum of 350 mm. A maximum of two adjusting rings (collars) are permitted in any one manhole.
- .8 Ramp asphalt or gravel at 40:1 slope to all projecting manholes, catch basins, valves and other appurtenances as required.

2450-057-00

- .9 Where the top/final lift of asphalt is not placed in the same year as base lift, set manhole frames and covers; catch basin frames and grates; valve boxes; and other surface appurtenances to interim asphalt grade or graveled surface grade.

2.2 TOLERANCES

- .1 The final manhole, catch basin, water valve box and other appurtenances will be within -10 mm and +10 mm of finish grade or as approved by the Owner's Representative.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this section in conjunction with other sections for location, use and placement of “Pavement Markings” specified herein.

1.2 REFERENCES

- .1 Pavement markings to be in accordance with the latest edition of the “Manual of Uniform Traffic Control Devices for Canada” by the Traffic Association of Canada (TAC).
- .2 CAN/CGSB-1.5-M91, Low Flash Petroleum Spirits Thinner
- .3 CGSB 1-GP-12C-68, Standard Paint Colors
- .4 CGSB 1-GP-71-83, Method of Testing Paints and Pigments
- .5 CGSB 1-GP-74M-79, Paint, Traffic, Alkyd

2. PRODUCTS

2.1 MATERIALS

- .1 Paint: CGSB 1-G-12C, yellow 505-308, black 512-301, white 513-301
- .2 Thinner: CAN/CGSB-1.5
- .3 Glass beads: Overlay type: CGSB 1-GP-74M

3. EXECUTION

3.1 EQUIPMENT REQUIREMENTS

- .1 Paint applicator must be an approved pressure type (mobile) distributor capable of applying paint in a single, double and dashed lines. Applicator to be capable of applying marking components uniformly, at rates specified, and to dimensions as indicated, and to have positive shut-off.
- .2 Distributor to be capable of applying reflective glass beads as an overlay on freshly applied paint as required.

3.2 CONDITION OF SURFACES

- .1 Pavement surface must be dry, free from ponded water, frost, ice, dust, oil, grease and other foreign materials.
- .2 Complete any surface preparation requirements recommended by the paint manufacturer.

3.3 APPLICATION

- .1 Provide traffic control as required to apply markings.
- .2 Owner's Representative to review Contractor pavement markings layout prior to paint application. Contractor to co-ordinate the review.
- .3 Unless otherwise approved by Owners Representative, apply paint only when air temperature is above 10°C, wind speed is less than 60km/h, and no rain is forecast within the next four (4) hours.
- .4 Apply traffic paint evenly at rate of 3 m²/L.
- .5 Do not thin paint unless approved by Owner's Representative.
- .6 Symbols and letters to conform to dimensions indicated.
- .7 Paint lines to be of uniform color and density with sharp edges.
- .8 Thoroughly clean distributor tank before refilling with paint of different color.
- .9 Apply glass beads at a rate of 200 g/m² of painted area immediately after application of paint.
- .10 Protect pavement markings until dry.
- .11 Protect adjacent structures, buildings, sidewalks, landscaping and other surface features against spillage and over-spray during painting operations.

3.4 PAVEMENT MARKINGS

- .1 Directional Dividing Line
 - .1 100 mm wide single solid yellow "Directional Dividing Line" along the center line of all paved roads.
- .2 Stop Line
 - .1 600 mm wide solid white "Stop Line" at each stop sign. The "Stop Line" to extend from the lip of gutter to the painted road centerline.
- .3 Parking Stall Line
 - .1 100 mm wide single solid white "Parking Stall Line" along three sides of each parking stall.
- .4 Handicap Parking Symbol
 - .1 100 mm wide white Handicap symbol and border line with light blue fill.
 - .2 Handicap parking symbols to be located along the entrance of the parking stall.

3.5 CLEAN UP

- .1 Remove spillage and over-spray of paint from pavement, sidewalks, building and other surface features. Use methods and materials without damaging and leaving visible residue on substrates.

3.6 TOLERANCE

- .1 Paint markings to be within – 12 mm and + 12 mm of dimensions indicated.

END OF SECTION

2450-057-00

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location use and placement of “Concrete Sidewalks, Curb & Gutters and Swales” specified herein.

1.2 SUBMITTALS

- .1 Provide concrete mix design for review.
- .2 Submit product literature for curing compound.
- .3 Provide shop drawings for review with profiles and dimensional information for any sidewalks, curb & gutters and swales that differ from the detailed drawings.

1.3 TESTING

- .1 Owner may appoint and pay for services of testing agency to do the following:
 - .1 Test fine and coarse aggregate.
 - .2 Take three test cylinders from load, or fraction thereof, of each type of concrete placed in any one day. Test cylinders will be cured on job-site under same conditions as concrete it represents.
 - .3 Test one cylinder in 7 days and remaining two cylinders in 28 days.
 - .4 Take at least one slump test and one entrained air test for each set of test cylinders taken.
 - .5 Take one additional test cylinder when the temperature is likely to fall below 5°C within 48 hours after placement and no provisions have been made to heat the concrete to greater than 10°C. Test cylinder will be cured on job-site under same conditions as concrete it represents and to be tested in 7 days.
 - .6 Immediately report results of field tests to the Contractor, for information only.
- .2 Submit the following to testing firm's laboratory:
 - .1 Proposed concrete mix design.
 - .2 Samples of fine and coarse aggregate, obtained in accordance with CSA A23.2-94, Sampling Aggregates For Use in Concrete.
 - .3 Results of Petrographic Examination to CSA A23.2-94, of aggregate representative of materials to be used for project.
- .3 Advise testing firm in advance of concrete placement.

2450-057-00

- .4 The Owner may order additional testing at any time. Pay for those tests which indicate failure to comply with requirements.

2. PRODUCTS

2.1 GENERAL

- .1 The Work covered in this Section consists of the furnishing of all labour, plant and material and performing all operations in connection with waste excavation, sub-grade preparation, granular base, forming, supply and placement of reinforcing, supply and placement of concrete, surface finishing, jointing, concrete protection, backfilling, tolerances, maintenance and incidental items required to complete this item of Work.

2.2 MATERIALS

- .1 Concrete:
 - .1 Concrete will be produced to provide 32 MPa minimum compressive strength at 28 days. Maximum course aggregate size will be 25 mm, aggregates will comply with latest revision of CAN3-A23.1. Water/cement ratio will meet CAN3-A23.1, Table 7, for Class A Exposure. Slump will be 40 mm to 75 mm at time of placement. Air content will be 5.5% to 8% at time of placing. Submit a mix design to the Owners Representative two weeks prior to commencing work for approval.
 - .2 After September 15, Concrete will be produced to provide 27.5 MPa minimum compressive strength at 7 days and 32 MPa minimum compressive strength at 28 days. Maximum course aggregate size will be 25mm, aggregates will comply with latest revision of CAN3-A23.1. Water/cement ratio will meet CAN3-A23.1, Table 7, for Class A Exposure. Slump will be 40mm to 75mm at time of placement. Air content will be 6% to 8% at time of placing. Submit a mix design to the Owner's Representative two weeks prior to commencing work for approval.
- .2 Cement:
 - .1 Cement will meet the requirements of CAN3-A5 and will be Portland Cement, Type HS Sulfate Resistant.
- .3 Granular Base:
 - .1 Refer to Section 02273.
- .4 Curing Compound:
 - .1 Curing Compound will comply with latest revision of ASTM C309 and be a Fugitive Dye Type.

- .5 Formwork:
 - .1 Formwork will be steel or wood, free from warps, dents, nail-holes and other defects and will be of adequate strength to restrain concrete loads.
 - .2 Form release agent will be a non-staining mineral type with chemically active release agents containing compounds that react with free lime to provide water soluble soap, such as Formshield by W.R. Grace.
- .6 Admixtures:
 - .1 Air-entraining admixture will comply with latest revision of CAN3-A266.1
 - .2 Water reducing admixture will be a type WN complying with latest revision of CAN3-A266.2
 - .3 Admixtures to be used only when approved by the Owner's Representative.
- .7 Reinforcing:
 - .1 Reinforcing will be clean and free from defects, kinks, loose rust or mill scale at the time concrete is placed. Remove any coatings of hardened mortar and mill scale from the steel.
 - .2 Cold drawn steel wire will meet the requirements of ASTM Designation A-82.
 - .3 Wire mesh will meet the requirements of ASTM Designation A-185.
 - .4 Bar reinforcing will meet ASTM Designation A-184 and ASTM Designation A-304 intermediate grade new billet deformed steel.
- .8 Accessories:
 - .1 Form oil: non-staining mineral type.
 - .2 Formwork: pre-manufactured and profiled steel or wood forms.
 - .3 Poured Joint Filler: Asphalt elastic compound to ASTM D1190-96.
 - .4 Preformed Joint Filler: asphalt impregnated type to ASTM D1751-83.
 - .5 Curing Compound: to ASTM C309-97, Type 2 white pigmented, Class B resin-based, liquid membrane-forming type.

3. EXECUTION

3.1 SUBGRADE PREPARATION

- .1 Subgrade will be excavated to the grade and section required to meet final curb and gutter, swale and sidewalk grades, alignments shown the contract documents and as specified by the Owner's Representative.
- .2 Excavation includes the removal and disposal of all material of whatever nature encountered, taken within the boundaries necessary for preparation and construction of concrete sidewalk, curb and gutter or monolithic sidewalk, catch basins and other structures to the required cross-section, alignment and depth. Remove all deleterious matter encountered at subgrade level and replace with approved gravel fill compacted in place. The subgrade must provide a uniform bearing capacity over the area of the structure. Excavation behind the concrete structure will be limited to 500 mm unless otherwise specified by the Owner's Representative. Where existing lawns are encountered the Contractor will cut the sod in a neat straight line to facilitate restoration with full width sod placement. Stockpile sufficient suitable earth materials necessary to backfill the concrete structures. Dispose of surplus excavated materials.
- .3 Compact the top 150 mm of the subgrade to a minimum of 95% of Standard Proctor Density prior to placing granular materials.
- .4 Where unstable material is encountered during excavation, notify the Owner's Representative and if directed, excavate the unstable material and backfill the area with approved pit-run gravel fill. The Contractor will be responsible for the replacement, at his own expense, of any failure of the sidewalk, swale or curb and gutter which, in the opinion of the Owner's Representative, was caused by an unstable base.

3.2 GRANULAR BASE

- .1 Granular base will be placed and compacted to a uniform 75 mm minimum thickness below all concrete curb and gutter, sidewalk, swales and other structures. Granular base will be compacted to minimum of 98% of Maximum Standard Proctor Density. If there is a possibility of excessive absorption of water from the concrete by the gravel base, sprinkle the base with water as required.

3.3 FORMING

- .1 Vertical surfaces will be formed to full depth. Forms will be securely positioned to the required lines and grades. All forms will be coated with form release agent.
- .2 Extruding and slip forming will be permitted subject to evaluation of the form cross section and mechanical equipment being proposed. Automatic grade and alignment control will be required.
- .3 Do not place concrete until forms and/or string lines have been reviewed by the Owner's Representative.

3.4 CONCRETE

- .1 Ready mixed concrete will be mixed and delivered in accordance with the requirements set forth in ASTM Designation C-94, CSA Standard A.23.1.3 or the latest revision thereof and will be subject to all provisions herein relative to materials, strength, proportioning, consistency, measurement and mixing.
- .2 Hand mixing is not permitted.
- .3 For site mixing, Contractor will submit specifications for batching and mixing equipment to the Owner's Representative for approval.
- .4 Deliver concrete to the point of deposit, rehandling of concrete will not be permitted. Concrete placement temperature will not be less than 20 degrees C or greater the 25 degrees C. Concrete operations will be continuous until the section, panel or scheduled pour is completed with the interval between placement of successive batches not greater than 45 minutes.
- .5 Place the concrete in a manner to prevent segregation of ingredients taking special care to place the concrete against the forms, particularly in corners, in order to prevent voids, rough areas and honeycombing.
- .6 Place concrete to the full specified depth. After spreading, strike-off and compact with an approved vibrating screed operating at a minimum of 5000 cycles per minute. Take every precaution to make all concrete solid, compact, watertight and smooth. Prevent concrete spillage into valve boxes, catch basins and related appurtenances.
- .7 Concrete surfaces will be finished to a smooth uniform finish, free of open texturing and exposed aggregate. Excess mortar will not be worked to the surface by excess trowelling. Neat cement will not be used as a drier to facilitate finishing. A broom finish surface will be applied to provide a non-skid texture. Outside edges of sidewalks and each edge of joints will be finished with a 50 mm edging tool having a 6 mm radius. Maintain the concrete structures cross section, grade and alignment when constructing the joint and when completing the concrete finishing.
- .8 Finish surfaces will be to within 3 mm in 3 metres from line, level or grade as measured with a straight edge placed on the surface. End all pours at a construction joint.
- .9 Provide 300mm long 10M rebar dowels at 300 mm on-centre to tie in to existing concrete structures and tie into successive pours. Drill 12 mm diameter by 150 mm deep holes in concrete structure. Set dowels into holes with hammer.
- .10 After initial set of concrete, the face of curb form will be removed and the curb will be finished with an approved nylon brush pulled lengthwise along the curb and gutter. Take adequate care in removing forms to avoid marring the concrete, patch as may be necessary immediately after removal of forms.
- .11 All concrete will be cured and protected in accordance with CAN3-A23.1. Spray exposed surfaces with curing compound immediately after form removal and/or patching. After the application is complete and set the surface will have a uniform appearance and colour.

- .12 Contractor will mark the sidewalk or curb and gutter with an approved marking tool indicating Contractor's name and year constructed. The letters and numerals of the marking tool will be 40 mm high. Make marks at the ends of each block and if the construction begins or terminates within the middle of the block, the Contractor will also mark these locations. Mark the corner of each apron and driveway.
- .13 Contractor will take all necessary action to ensure the cross section, grade and alignment of the concrete structure is maintained until the concrete has hardened sufficiently. This may include the installation of hand forms on extruded or slip formed concrete.
- .14 Heavy equipment used for road construction will not be used near the concrete for a period of 7 days after the pour or until the concrete has reached 70% of the specified 28 day compressive strength.

3.5 SURFACE, EXPANSION AND CONTRACTION JOINTS

- .1 Surface joints will be 15 mm deep by 5 mm wide and constructed by means of a marking tool or other approved method. Surface joints will be constructed parallel and perpendicular to the concrete structure edge as shown on the Standard Drawings.
- .2 Contraction joints will be constructed 35 mm deep by 5 mm wide where shown on the drawings, but not more than 3 metres apart, by means of marking tool or other approved method. Round joint edges with an edger having a radius of 6 mm. Where sidewalk is adjacent to curb, joints of curb and gutters and sidewalk will coincide.
- .3 Expansion joints will be installed around manholes and catch basins and along any buildings or permanent structures or where specified. Use an approved mastic pre-formed material, 15 mm by 90 mm cross-section, laid plumb and straight 6 mm below the finished sidewalk grade.
- .4 Saw cut joints as required with a concrete saw capable of producing a true straight joint of constant depth.
- .5 Carefully fit, cut and mark the sidewalk around all openings, iron covers, manholes, vaults, valve boxes, lamp standards, hydrants, poles and other surface installations. The surface joint must be neatly tooled and marked. Place expansion joint material to the full depth of the sidewalk around all surface structures.
- .6 Construct surface, expansion and contraction joints ensuring the cross section, grade and alignment of the concrete structure is maintained.

3.6 FINISHING

- .1 Remove forms on the face concrete structures after initial set of concrete.
- .2 Do not add water before or during finishing operation.
- .3 Finish concrete surfaces as follows:
 - .1 Do not trowel surfaces while bleed water is still present. Work surfaces as little as possible to achieve finish.

- .2 Edge Finishing: finish edges, including joints, with 50 mm wide edging tool having 6 mm radius edge.
- .3 Where broom finish is specified, use approved nylon brush to provide uniform texture and pattern.
- .4 Ensure all joints, edges and surface works have a uniform, consistent and sealed finish.
- .5 Ensure the concrete structure cross section, grade and alignment tolerances are achieved when finishing is complete.

3.7 DRIVEWAYS

- .1 Driveways will be constructed where shown on the drawings or where directed by the Owner's Representative.

3.8 PROTECTION

- .1 The Contractor will provide all equipment, materials and labour necessary to protect the concrete work from rain, dust, frost or other weather elements. The Contractor will provide all barricades, temporary structures, tarps and other measures for the protection of the concrete structures for a period of 5 days after finishing.
- .2 If mean daily temperature falls below 5° C, provide cold weather protection as set out in CAN3-A23.1
- .3 The Contractor will provide and maintain all equipment, materials and labour necessary to protect the concrete work from people, vehicles, animals and to protect the public. Protection of the concrete structures and the public include barricades, flashers, signage, temporary ramps, temporary walkways, flagging, construction fencing and other protective measures.
- .4 The Contractor will remain onsite to address any concrete finish issues that may arise until the concrete has sufficiently cured where the surface cannot be easily marked.

3.9 WHEEL CHAIR RAMPS

- .1 Wheel Chair Ramps will be constructed at all intersections for new construction or in existing sidewalks as shown on the drawings and as directed by the Owner's Representative.

3.10 REINFORCING

- .1 Reinforce monolithic and separate sidewalk, at public lanes, private and commercial driveways, with 10M bars @ 300 mm on-centre longitudinally with 50 mm cover of concrete on the edges and as shown on the Drawings.
- .2 Reinforce curb & gutter and swales at public lanes, commercial driveways, and road crossings with 10M bars as shown on the Drawings.

- .3 Reinforce aprons, private and commercial driveways with 10M bars @ 300 mm on-centre longitudinally and transversely with 50 mm cover of concrete on the edges.
- .4 Bar reinforcement will be supported above the compacted granular subgrade to ensure 50 mm cover of concrete. When overlapping bar reinforcement, the overlap length will be 36 bar diameters with the bars wired together.
- .5 Reinforce concrete structures as shown on the drawings, as indicated in the specifications and as directed by the Owner's Representative.

3.11 BACKFILL

- .1 Concrete will be cured for 7 days prior to backfilling. All concrete will be backfilled to the require grades to accommodate landscape and hard surface works.
- .2 In landscaped areas adjacent to the concrete structures, backfill with suitable earth materials compacted to minimum of 95% of Maximum Standard Proctor Density. Compact the backfill to the grade necessary to accommodate the specified surface restoration treatment (topsoil, sod, granular material, mulch, landscape features, etc.).
- .3 In hard surface areas adjacent to concrete structures, backfill with suitable earth materials compacted to minimum of 98% of Maximum Standard Proctor Density. Compact the backfill to the grade necessary to accommodate the specified surface restoration treatment (concrete paving stone, asphalt, foundation, etc.).

3.12 ROAD RESTORATION

- .1 Where the concrete structures are to be constructed on a road that is gravelled or paved, the excavation for the installation will be limited to 500 mm from the edge of the concrete structure. Excavation beyond the limits will be the responsibility of the Contractor and any additional costs removals and rehabilitation work will be at the Contractors expense.
- .2 Asphalt will be saw cut to achieve a neat vertical face for the rehabilitation work tie-in. Remove and dispose of materials necessary to effect construction of the work. Rehabilitate the road to specified structural sections with the specified granular and asphalt materials.

4. TOLERANCES

- .1 Concrete structures will be constructed to meet the following tolerances for the finish concrete surfaces:
 - .1 Trueness of surface: 6 mm maximum deviation in 3 m length.
 - .2 Elevation: 10 mm maximum deviation from design.
 - .3 Alignment: 15 mm maximum deviation from design.
 - .4 Cross section: 5 mm maximum deviation from design.

- .2 Concrete structures determined to be non-compliant with the tolerances will not be measured for payment or will be replaced as directed by the Owner's Representative.

5. ADJUSTMENT OF PAYMENT FOR LOW STRENGTH CONCRETE

- .1 Where the average applicable 28-day or 7-day compressive strength of the test cylinders exceeds the minimum design strength, the concrete will be paid for at the contract unit prices.
- .2 Where compressive strengths of the test cylinders for any portion of the work falls below the requirements specified herein, payment will be as follows:

% Minimum Allowable Strength	% Payment
100% or greater	100%
80% - 99.9%	$\frac{\text{Bid Unit Price} \times \text{Ave. Test Strength}}{\text{Minimum Allowable Strength}}$
70% - 79.9%	No payment or replace if directed by the Owner's Representative
Less than 70%	Replacement

6. MAINTENANCE STANDARDS

- .1 Maintenance standards will apply from substantial performance of the contract through to the warranty period and final acceptance for all sidewalks, curb and gutters, swales and other related concrete structure works. Maintenance work will be completed before the expiration of the warranty period unless the deficiencies are hazardous to the Public then the maintenance work will be performed immediately by the Contractor.

6.1 SURFACE CONDITION

- .1 Where the surface of a section of concrete exhibits a loss of surface mortar and/or aggregate more than 3 mm deep or if there is evidence of loose or lifting mortar, replace that section of concrete as directed by the Owner's Representative.
- .2 A replacement section of concrete is a 3.0m length of curb and gutter, swale or similar concrete structure, and a 1.5 m length of sidewalk flag section or similar concrete structure.
- .3 Where possible, replacement sections of concrete to be defined by existing surface, expansion or contraction joints.

6.2 SIDEWALK FAILURES

- .1 Replacement of affected sections will be required when one or more of the following exists:
 - .1 Any crack greater than 3 mm in width.
 - .2 Any crack with vertical displacement or chipping or spalling edges.
 - .3 Any longitudinal crack greater than or equal to 1.5 mm in width.
 - .4 Displacement at a joint of greater than or equal to 12 mm.
 - .5 Dished surface of sidewalk where water ponds.
 - .6 Reverse crossfall or crossfall greater than 8% or less than 0.7%.
 - .7 Random cracking of any size.
 - .8 Spalling or loss of mortar to the finish surface.
 - .9 Any feature considered detrimental to pedestrian safety or the walk appearance.

6.3 SECTIONAL REPLACEMENT

- .1 All breakout must end at a contraction, expansion or surface joint. Saw cut edge of surface mark to a minimum depth of 30 mm. Contraction joints may be hand chiselled to produce a true straight joint. The concrete edge must be exposed and cleaned to produce a good bond. Replacement sections will be connected to adjacent concrete structures with 150mm long 10M rebar dowels at 300mm on-centre.
- .2 Saw cuts may be permitted to separate curb and gutter from the sidewalk flag section on monolithic sidewalks, at the discretion of the Owner's Representative.

6.4 GROUTING

- .1 Grouting of cracks is not permitted.

6.5 MORTAR, TAR AND/OR ASPHALT ON WALK

- .1 Mortar, tar and/or asphalt on the flag section of the concrete sidewalk is not permitted.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this section in conjunction with other sections for location, use and placement of “Grass Seeding” specified herein.

1.2 DELIVERY STORAGE AND HANDLING

- .1 Provide seed in standard containers clearly labeled with the following information:
- .1 Supplier’s name and address
 - .2 Lot Number
 - .3 Net Mass
 - .4 Names and percentages of individual seed species
- .2 Protect seed from moisture, mould and damage while in transit and storage.
- .3 Provide fertilizer in standard containers clearly labeled with the following information:
- .1 Supplier’s name and address
 - .2 Specified Composition
 - .3 Net Mass

2. PRODUCTS

2.1 MATERIALS

- .1 Provide seed mixture to the following composition:

Grass Seed Mixture

Creeping Red Fescue	35% by weight
Kentucky Bluegrass	35% by weight
Fairway Crested Wheatgrass	20% by weight
Diploid Annual Ryegrass	10% by weight

- .2 Seed mix to be blended by a qualified seed processor. Contractor to provide a copy of the certification of the seed mix to the Owner.
- .3 Provide seed and seed mixture that are free of all prohibited noxious weed seeds.
- .4 All seed to be stored in a dry weatherproof storage place and to be protected from damage by heat, rodents and other causes.
- .5 Provide Canada No. 1 Grade seed in accordance with the Government of Canada Seeds Act and Seeds Regulations. Do not provide seeds which are wet, mouldy, or otherwise damaged.

- .6 Provide fertilizer in accordance with Government of Canada Fertilizer Act and Fertilizers Regulations. Fertilizer is to be compatible with the seed mixture and the soil conditions.

3. EXECUTION

3.1 GENERAL

- .1 Prepare topsoil surface for seeding as specified in Section 02201.
- .2 Apply materials during calm weather and on ground free of frost and standing water.
- .3 Measure the quantities of materials by weight.

3.2 APPLICATION OF SEEDS

- .1 Apply seed mixture using a “Brillion” Seeder in two (2) perpendicular directions at the total application rates of 110 kg per hectare or by a hand broadcast seeder followed by raking.
- .2 Apply seed mixture during calm weather (less than 8 km/hr wind) and on ground free of frost and standing water.
- .3 Perform seeding operations at such a time of the year when climatic conditions are suitable for establishing grass stands.
- .4 Fine grade and loosen the surface to plow depth to obtain a proper seed bed without undue loss from high winds or ordinary rainfall.
- .5 Where the work adjoins existing vegetation, blend the application at least 300 mm into adjacent vegetated areas.
- .6 Protect seeded areas against damage.
- .7 Regulate the drill so that the seed is properly placed in the soil to a depth of 20 to 32 mm.
- .8 Where seeded areas are not hydro mulched, apply 16-20-00 fertilizer uniformly at the rate of 78.5 kg per hectare using a fertilizer attachment.

3.3 MAINTENANCE

- .1 Watering to be carried out when the seed is first applied to prevent grass and the underlying soil from drying out.
- .2 Provide maintenance of turf areas including all measures necessary to establish and maintain grass in healthy and vigorous growing condition.
- .3 Irrigated Areas - Re-apply seed to all areas that do not show a uniform stand of grass. Perform such reapplication to allow for establishment prior to Substantial Performance of the Work. For irrigated areas, a uniform stand of grass will be considered growth that shows

no bare spots greater than 50mm by 50mm in size and provides a minimum of ninety-five percent ground cover.

- .4 Non-Irrigated Areas - Re-apply seed to all areas that do not show a uniform stand of grass. Perform such reapplication to allow for establishment prior to Substantial Performance of the Work. For non-irrigated areas, a uniform stand of grass will be considered growth that shows no bare spots greater than 150mm by 150mm in size and provides a minimum of ninety percent ground cover.
- .5 Re-apply seed to all areas that do not show a uniform stand of grass. Perform such reapplication to allow for establishment prior to Substantial Performance of the Work. A uniform stand of grass will be considered growth that shows no bare spots greater than 0.25 square metres in size and provides a minimum of eighty percent ground cover.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this section in conjunction with other sections for location, use and placement for “Sodding” specified herein.

1.2 DELIVERY, STORAGE AND HANDLING

- .1 Use all means necessary to protect material before, during and after installation. Provide adequate protection to materials which may deteriorate if exposed to elements.
 - .1 Fertilizer:
 - .1 Packaged in waterproof bags, with label clearly indicating net mass, analysis and manufacturer.
 - .2 Store on pallets and protect from the elements.
 - .2 Nursery sod:
 - .1 The sod to be cut by approved methods in accordance with recommendations of the Nursery Sod Growers Association of Alberta.
 - .2 Deliver sod rolled or flat to prevent tearing or breaking. Broken or irregular pieces are unacceptable.
 - .3 Deliver sod to site within 24 hours of being lifted.
 - .4 Sod to be protected during transportation to prevent drying out and to arrive at the site in a fresh and healthy condition.
 - .5 Sod to be installed immediately after arrival. If there is any delay in installation, sod to be kept moist and cool at all times until installation.

1.3 MAINTENANCE PERIOD

- .1 Maintain sodded areas from time of sodding until six weeks after date of Interim Acceptance of the Work.

2. PRODUCTS

2.1 MATERIAL

- .1 Fertilizer:
 - .1 Use complete commercial fertilizer, minimum of 50% of elements derived from organic sources.
 - .2 Owner’s Representative may adjust specified fertilizer after topsoil test analysis results are received, with no change in Contract Price.

- .2 Nursery Sod:
 - .1 Freshly cut and healthy with strong, fibrous root system, free from stones and burned or bare spots, cultivated in nursery field as turf grass crop containing maximum of 2% of other grass species, and maximum of two broad leaf weeds and ten other weeds per 40 m². Thickness of sod soil portion to be maximum of 40 mm and minimum 25 mm.
- .3 Water:
 - .1 Obtain water from source on site supplied by Owner where possibly or supply water as necessary.

2.2 SOD TYPE

- .1 The grass sod to be a certified No. 1 cultivated turf grass sod from Canada No. 1 seed.
- .2 Grass sod to be grown and sold in accordance with the classification of the Southern Alberta Turf Grass Association.

3. EXECUTION

3.1 FERTILIZING

- .1 Apply fertilizer only after final grade has been approved by Owner's Representative.
- .2 Apply 12-51-0 fertilizer at 3 kg/100 m².
- .3 Spread evenly with calibrated mechanical distributor.
- .4 Mix thoroughly into upper 50 mm of topsoil.

3.2 LAYING SOD

- .1 Obtain the approval of the Owner's Representative for the; sod bed finish grades, final tilth, surface flatness and fertilizer application before laying sod.
- .2 Firm the sod bed by rolling before laying sod.
- .3 Sod when ground is not frozen.
- .4 Rake and wet soil immediately before sodding. Stagger sod joints and butt tightly. No pieces to overlap. No visible open joints to exist after sod is laid.
- .5 Sod to be laid smooth and flush with adjoining grass areas.
- .6 Finish elevation of sod to match adjoining sidewalks, edging, paving and curbs.

- .7 Place sod so that watering will not interfere with other work.
- .8 Water immediately in sufficient quantities to obtain moisture penetration through sod and into upper 100 mm of topsoil.
- .9 After watering, roll sod to ensure sod contact with topsoil and to remove minor depressions and irregularities. Ensure sod has sufficient moisture content to achieve proper rolling.

3.3 LAYING SOD ON SLOPES

- .1 Install rolls of sod transverse to the steepest slope and secure at regular intervals to prevent slippage. Maintain until there is a sufficient root catch.
- .2 Apply water in sufficient quantities to prevent grass and underlying soil from drying out.

3.4 PROTECTION OF SODDED AREAS

- .1 Immediately after sodding, erect snow fence barricades and warning signs to protect sodded areas from traffic until grass is established.
- .2 Keep site well drained and landscape excavations dry.
- .3 Clean up immediately soil or debris spilled onto pavement, or concrete.

3.5 MAINTENANCE

- .1 Apply water in sufficient quantities to prevent grass and underlying soil from drying out.
- .2 Areas with no irrigation system: supply labour, all hoses and attachments necessary to provide adequate watering to prevent grass and underlying soil from drying out.
- .3 Cut grass first time when it reaches height of 60 mm and maintain to minimum height of 50 mm. Do not cut more than 30% of blade at any one mowing. Remove clippings.
- .4 Repair areas which show root growth failure, deterioration, bare or thin spots, or which have been damaged by any means, including replacement operations.
- .5 Fertilize sod areas six weeks after sodding with 27-14-0 fertilizer. Spread evenly at rate of 3 kg/100 m², water in well.
- .6 Postpone fertilizing until spring if application falls after August 15th.
- .7 Repeat rolling of sod as required to maintain a smooth grass surface.

3.6 ACCEPTANCE

- .1 Sodded areas will be accepted by Owner at end of maintenance period provided:
 - .1 Sodded areas are properly established.
 - .2 Turf is free of bare and dead spots.
 - .3 No surface soil is visible when grass cut to height of 50 mm.

3.7 CLEAN-UP

- .1 Broom clean pavement and sidewalks. Clear soil and rubble from underground or surface storm sewer lids.
- .2 Leave site in neat and clean condition. Remove excess material from site.

END OF SECTION

1. GENERAL

1.1 INTENT

- .1 Read this Section in conjunction with other Sections for location, use and placement of “Restoration of Sitework” specified herein.

2. PRODUCTS

- .1 Not Applicable.

3. EXECUTION

3.1 RESTORATION - GENERAL

- .1 Restore all existing areas and sitework damaged or disturbed due to earthwork or other work of this Contract, back to their original condition or better.

3.2 LANDSCAPE WORK

- .1 Protect the integrity of the existing landscape features by implementing construction procedures that will minimize damages.
- .2 Restore all landscape features damaged or disturbed by the work, back to their original condition or better. All costs associated with this work will be borne by the Contractor.
- .3 Maintain all trees within the work site.
- .4 Minimize damage to trees, plants and shrubs during the course of construction.
- .5 Attend to damaged trees, plants or shrubs by qualified personnel.
- .6 All grassed areas will be restored with topsoil and grass seed mixture or sod.
- .7 Topsoil and grass seed or sod reconstruction limits will be laid out by the Owner’s Representative when rough grading has been completed.
- .8 All landscape work will be completed to the satisfaction to the Owner.

3.3 IRRIGATION WORK

- .1 Maintain all irrigation system works, unless otherwise noted.
- .2 Restore all irrigation system components damaged or disturbed by the work, back to their original condition or better. All costs associated with this work will be borne by the Contractor.

- .3 All irrigation repair work will be constructed in accordance with the latest edition of the City of Lethbridge Construction Standards.
- .4 All irrigation work will be completed to the satisfaction to the Owner.

3.4 CONCRETE STRUCTURE WORK

- .1 Protect the integrity of existing concrete structures. This includes utilizing suitably sized equipment and implementing construction procedures that will minimize concrete damage.
- .2 Replace any concrete structures damaged or disturbed, outside of the construction limits. All costs associated with this work will be borne by the Contractor.

3.5 ASPHALT WORK

- .1 Protect the integrity of existing road, lane and driveway structures. This includes utilizing suitably sized equipment and implementing construction procedures that will minimize pavement damage.
- .2 Replace any asphalt pavement damaged or disturbed, outside of the construction limits. All costs associated with this work will be borne by the Contractor.

3.6 GRAVEL WORK

- .1 Restore any gravel damaged or disturbed outside of the construction limits, back to their original condition or better. All costs associated with this work will be borne by the Contractor.

END OF SECTION



an **Englobe** company

www.mpe.ca