ENGINEERING LIMITED

May 30, 2025

2025 PRESSURE REDUCTION STATION REPLACEMENT.
DISTRICT OF MACKENZIE.

TENDER DOCUMENTS

Client: District of Mackenzie

L&M Project No.: 1044-79

L&M ENGINEERING LIMITED

1210 Fourth Avenue, Prince George, BC V2L 3J4

Phone: (250) 562-1977

TABLE OF CONTENTS

Appendixes are provided in seperate files.

Invitation to Tender

PRESSURE REDUCTION STATION REPLACEMENTS
DISTRICT OF MACKENZIE
INVITATION TO TENDERERS

DESCRIPTION OF WORK:

Installation of Pressure Reduction Station Replacements. Work includes decommissioning old systems and installing new Station Replacements.

TENDER DOCUMENTS: Electronic Tender Documents are available through www.bcbid.gov.bc.ca All amendments to this tender, including amended documents, plans and specifications (where applicable), are issued on www. bcbid.gov.bc.ca.

Hardcopies of tender documents can be obtained from the office of L&M Engineering Limited at 1210 4th Av. Prince George, BC during normal business hours with advanced notice of one day, for a non-refundable fee of $150 per document set.

SITE MEETING: A MANDATORY site meeting to review the proposed works and location of tender will be held on June 10th, 2025 at 10:00 AM PST meeting at the District public works yard. Bidders are requested to RSVP with L&M Engineering for their attendance 2 days in advance of the site meeting.

DEADLINE FOR QUESTIONS: Bidder questions will be received up to end of day on June 20, 2025.

CLOSING DATE: This Tender will close on June 26th, 2025 at 2:00pm PST.

SUBMISSION REQUIREMENTS: Complete hardcopy bid packages will be received at the Offices of L&M Engineering Limited). Electronics for submissions are allowed per the definitions of Section 4 of the instructions to tenders.

All Tender inquiries shall be directed to:

L&M Engineering Limited
Luke McDonald
1210 – 4th Avenue
Prince George BC V2L 3J4

Phone: (250) 562-1977
Fax: (250) 562-1967
Email: lmcdonald@lmengineering.bc.ca

Instructions to Tenderers Part 1

(FOR USE WHEN UNIT PRICES FORM THE BASIS OF PAYMENT TO BE USED ONLY WITH THE GENERAL CONDITIONS AND OTHER STANDARD DOCUMENTS OF THE UNIT PRICE MASTER MUNICIPAL CONSTRUCTION DOCUMENTS.)

**(TO BE READ WITH "INSTRUCTIONS TO TENDERERS - PART II"
CONTAINED IN THE EDITION OF THE PUBLICATION
"MASTER MUNICIPAL CONSTRUCTION DOCUMENTS" SPECIFIED IN ARTICLE 2.2 BELOW)**

Owner: *District of Mackenzie*
(NAME OF OWNER)

Contract: *2025 Pressure Reduction Station Replacement*
(TITLE OF CONTRACT)

Reference No. _____
(OWNER'S CONTRACT REFERENCE NO.)

1.0 Introduction

1.1 These Instructions apply to and govern the preparation of tenders for this *Contract*. The *Contract* is generally for the following work:

The removal and replacement of a pressure reduction station.

(BRIEF DESCRIPTION OF THE WORK)

1.2 Direct all inquiries regarding the *Contract*, to:
Luke McDonald

Principal

(NAME AND POSITION OF INDIVIDUAL WHO WILL ANSWER INQUIRIS)

Address: _____

Phone: _____ - _____ - _____

Fax: _____ - _____ - _____

2.0 Tender Documents

2.1 The tender documents which a tenderer should review to prepare a tender consist of all of the *Contract Documents* listed in Schedule 1 entitled "Schedule of Contract Documents". Schedule 1 is attached to the Agreement which is included as part of the tender package. The *Contract Documents* include the drawings listed in Schedule 2 to the Agreement, entitled "List of *Contract Drawings*".

2.2 A portion of the *Contract Documents* are included by reference. Copies of these documents have not been included with the tender package. These documents are the Instructions to Tenderers - Part II, General Conditions, Specifications and Standard Detail Drawings. They are those contained in the publication entitled "Master Municipal Construction Documents - General Conditions, Specifications and Standard Detail Drawings". Refer to Schedule 1 to the Agreement or, if not specified in Schedule 1, then the applicable edition shall be the most recent edition as of the date of the *Tender Closing Date.* All sections of this publication are by reference included in the *Contract Documents*.

2.3 Any additional information made available to tenderers prior to the *Tender Closing Time* by the *Owner* or representative of the *Owner,* such as geotechnical reports or as-built plans, which is not expressly included in Schedule 1 or Schedule 2 to the Agreement, is not included in the *Contract Documents*. Such additional information is made available only for the assistance of tenderers who must make their own judgment about its reliability, accuracy, completeness and relevance to the *Contract*, and neither the *Owner* nor any representative of the *Owner* gives any guarantee or representation that the additional information is reliable, accurate, complete or relevant.

3.0 Submission of Tenders

3.1 Tenders must be submitted in a sealed envelope, marked on the outside with the above *Contract* Title and Reference No., and must be received by the office of:

Luke McDonald

Principal

on or before:

Tender Closing Time: 2 : 00 , p m local time
Tender Closing Date: June 26th , 2025

at

Address: 1012 4th Ave. Prince George.

Fax: - -

3.2 Late tenders will not be accepted or considered, and will be returned unopened.

4.0 Additional Instructions to Tenderers

4.1 Hardcopies of tender documents can be obtained from the office of L&M Engineering Limited with advanced notice of one day for a non-refundable fee of $150 per document set.

4.2 Electronic Tender Documents are available through the following online service. www.bcbid.gov.bc.ca

All amendments to this tender, including amended documents, plans and specifications (where applicable), are issued on www.bcbid.gov.bc.ca. Bidders shall be solely responsible for checking the online service for updates, addendums and changes as may be issued. The Owner will not issue notification to bidders unless specific agreement is made

4.3 Supplemental to Section 3.0: Allowable Electronic Format for Submissions.

i. Submissions by email will be accepted by L&M Engineering Limited at the following email address: lmcdonald@lmengineering.bc.ca
ii. Bidders shall be fully responsible to ensure the successful transmission of emailed submissions. The Owner and Engineer accept no responsibility for failure of a bidder's transmission.
iii. Format of Email submissions:

iii.1 Contained in **one** email only.
iii.2 Stating the Bidders name, Tender Title/Number in the email subject line.
iii.3 PDF format files only with a total combined file size not exceeding 10 MB.
iii.4 PDF format submissions must be organized, legible and free of corrupted data or other file errors.
iii.5 Contain no malware, macro, computer virus, applications, programs, or scripts.

iv. When required, emailed bonding and surety documentation shall be of a certified electronic format, issued by the bonding agency.
v. Time of receipt for bid submission will be as per the automated UTC time stamp as logged by the serving infrastructure of the engineer, converted to local time.

4.4 Unless otherwise stated, all Tender Openings will be private. Bidders are not invited to attend the openings. Publication of bidders and bid pricing will be at the discretion of the Engineer or Owner.

4.5 Limitations, Rights of the Owner.

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i. The Owner does not bind himself to accept the lowest priced Tender or any Tender.

ii. This Tender process does not constitute an offer by the Owner. No contract results from the issuance of the Invitation to Tender or receipt of Tenders, except only with a Tenderer, if any, whose Tender is accepted by the Owner, and except that each Tenderer agrees that its Tender will be irrevocable for the period specified.

Instructions to Tenderers Part II

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(FOR USE WHEN UNIT PRICES FORM THE BASIS OF PAYMENT - TO BE USED ONLY WITH THE GENERAL CONDITIONS AND OTHER STANDARD DOCUMENTS OF THE UNIT PRICE MASTER MUNICIPAL CONSTRUCTION DOCUMENTS.)
(DO NOT USE WITHOUT REFERENCE TO "INSTRUCTIONS TO TENDERERS - PART I")

5.0 Tender Requirements

5.1 A tender must be on the Form of Tender as provided and be signed by the authorized signatory(s) as follows:

5.1.1 signature(s) must be in original handwriting;

5.1.2 if the tenderer is a partnership or joint venture then the name of the partnership or joint venture and the name of each partner or joint venturer must be included, and each partner or joint venturer must sign personally; if a partner or joint venturer is a corporation then such corporation must sign as indicated in paragraph 5.1.3 below; and

5.1.3 if the tenderer is a corporation then the full name of the corporation must be included, together with the names and signatures of authorized signatories.

5.2 A tender must be accompanied by tender security ("*Bid Security*") in the form of:

5.2.1 a bid bond issued by a surety licensed to carry on the business of suretyship in British Columbia in a form reasonably satisfactory to the *Owner*; or

5.2.2 cash, bank draft or letter of credit in a form acceptable to the *Owner*;

in an amount equal to 10% of the *Tender Price*.

5.3 A tender must include the following Appendices:

5.3.1 Appendix 1 - the Schedule *of Quantities and Prices*;

5.3.2 Appendix 2 - a "*Preliminary Construction Schedule*", generally in the form attached as Appendix 2 to the Form of Tender, and showing *Substantial Performance* by the date or within the duration, shown in paragraph 2.2 of the Form of Tender;

5.3.3 Appendix 3 - name and brief description of the previous experience of the *Superintendent* the tenderer will use for the *Work*;

5.3.4 Appendix 4 - a list of previous comparable work, including a brief description of that work, approximate contract value, and references (with phone numbers); and

5.3.5 Appendix 5 - a complete list of all subcontractors, if any, that the tenderer will use for the *Work* including full names.

5.4 The successful tenderer will, within 15 *Days* of receipt of the written *Notice of Award*, be required to deliver to the *Owner* the items listed in FT5.1.1, including a Performance Bond and a Labour and Material Payment Bond as described in FT5.1.1(a),failing which the provisions of FT6.1 will apply.

6.0 Qualifications, Modifications, Alternative Tenders

6.1 Tenders which contain qualifications, or omissions, so as to make comparison with other tenders difficult, may be rejected by the *Owner*.

6.2 A tenderer may, at the tenderer's election, submit an alternative tender ("*Alternative Tender*") which varies the materials, products, designs or equipment from those approved under the *Contract Documents*, or approved by the *Owner* as *Approved Equals* as the case may be, but an *Alternative Tender* must be in addition to, and not in substitution for, a tender which conforms to the requirements of the *Contract Documents*.

6.3 The only *Alternative Tender* that the *Owner* may accept is an *Alternative Tender* submitted by that tenderer whose conforming tender, submitted as required by paragraph 6.2 of these Instructions to Tenderers - Part II, would have been accepted by the *Owner* in preference to other conforming tenders, if no *Alternative Tenders* had been invited.

7.0 *Approved Equals*

7.1 Prior to the *Tender Closing Time and Date* a tenderer may request the *Owner* to approve materials, products, or equipment ("*Approved Equal*") to be included in a tender in substitution for items indicated in the *Contract Documents*.

7.2 Applications for an *Approved Equal* must be in writing, and supported by appropriate supporting information, data, specifications and documentation.

7.3 If the *Owner* decides in its discretion to accept an *Approved Equal*, then the *Owner* will issue an addendum to all tenderers.

7.4 The *Owner* is not obligated to review or accept any application for an *Approved Equal*.

8.0 Inspection of the *Place of the Work*

8.1 All tenderers, either personally or through a representative, are responsible to examine the *Place of the Work* before submitting a tender. A tenderer has full responsibility to be familiar with and make allowance in the tender for all conditions at the *Place of the Work* that might affect the tender, including any information regarding subsurface soil conditions made available by the *Owner*, the location of the *Work*, local conditions, topographical soil conditions, weather and access. Unless otherwise specified in the *Contract Documents*, a tenderer is not required to do subsurface investigations. By submitting a tender, a tenderer represents that the tenderer has examined the *Place of the Work*, or specifically elected not to. No additional payments or time extensions shall be claimable or due because of difficulties relating to conditions at the *Place of the Work* which were reasonably foreseeable by a contractor qualified to undertake the *Work*.

8.2 Tenderers are referred to GC 11.2.1 regarding ***Concealed or Unknown Conditions***.

9.0 Interpretation of *Contract Documents*

9.1 If a tenderer is in doubt as to the correct meaning of any provision of the *Contract Documents*, the tenderer may request clarification from the person named in paragraph 1.2 of the Instructions to Tenderers - Part I.

9.2 If a tenderer discovers any contradictions or inconsistencies in the *Contract Documents* or its provisions, or any discrepancies between a provision of the *Contract Documents* and conditions at the *Place of the Work* as observed in an examination under paragraph 8 of the Instructions to Tenderers - Part II, the tenderer shall immediately notify the person named in paragraph 1.2 of the Instructions to Tenderers - Part I.

9.3 If the *Owner* considers it necessary, the *Owner* may issue written addenda to provide clarification(s) of the *Contract Documents*.

9.4 No oral interpretation or representations from the *Owner* or any representative of the *Owner* will affect, alter or amend any provision of the *Contract Documents*.

10.0 Prices

10.1 The Tendered Price will represent the entire cost excluding *GST* to the *Owner* of the complete *Work* based on the estimated quantities in the *Schedule of Quantities and Prices* of the Form of Tender. Notwithstanding the generalities of the above, tenderers shall include in the tendered prices (including unit prices, lump sum prices, or other forms of pricing) sufficient amounts to cover:

10.1.1 the costs of all labour, equipment and material included in or required for the *Work*, including all items which, while not specifically listed in the *Schedule of Quantities and Prices*, are included in the *Work* specifically or by necessary inference from the *Contract Documents*;

10.1.2 all assessments payable with respect to labour as required by any statutory scheme such as unemployment insurance, holiday pay, insurance, CPP and all employee benefits and the Workers Compensation Act;

10.1.3 all overhead costs, including head office and on-site overhead costs, and all amounts for the *Contractor's* profit.

10.2 The tendered prices and all subcontracts must allow for compliance with all applicable laws regarding trade or other qualifications of employees performing the *Work*, and payment of appropriate wages for labour included in or required for the *Work*.

11.0 *Taxes*

11.1 The tendered prices shall cover all taxes and assessments of any kind payable with respect to the *Work*, but shall not include *GST*. *GST* shall be listed as a separate item as required by GC 19.2

12.0 Amendment of Tenders

12.1 A tenderer may amend or revoke a tender by giving written notice, delivered by hand, mail or fax, to the office referred to in paragraph 3.1 of the Instructions to Tenderers - Part I at any time up until the *Tender Closing Date and Time*. An amendment or revocation that is received after the *Tender Closing Date and Time* shall not be considered and shall not affect a tender as submitted.

12.2 An amendment or revocation must be signed by an authorized signatory of the tenderer in the same manner as provided by paragraph 5.1 of these Instruction to Tenderers - Part II.

12.3 Any amendment that expressly or by inference discloses the tenderer's *Tender Price* or other material element of the tender such that, in the opinion of the *Owner*, the confidentiality of the tender is breached, will invalidate the entire tender.

12.4 An acceptable form of a tender amendment which tenderers may, but are not required to, use is as follows:

"*Contract*: _____
(TITLE OF CONTRACT)

Reference No. _____
(OWNER'S CONTRACT REFERENCE NO.)

TO: _____
(NAME OF OWNER)

We the undersigned wish to amend our tender which we submitted for the above *Contract* by deleting the following tendered prices or items from our tender:

_____
_____
_____
(TENDERED PRICES AND/OR TENDER ITEMS IN THE TENDER THAT ARE TO BE AMENDED)

and substituting the following revised tendered prices or items:

_____
_____
_____
(REVISED TENDERED PRICES OR TENDER ITEMS)

The extensions in our tender should be adjusted accordingly, and our ***Tender Price*** as set out in Appendix 1 of our submitted **Form of Tender**, and on the ***Schedule of Quantities and Prices***, increased/decreased by $_____, excluding *GST*. We have not included our revised ***Tender Price*** in order to preserve the confidentiality of our tender.

Signed and delivered the ____ day of _____, 20____."

12.5 If a tender amendment or revocation is sent by fax the tenderer assumes the entire risk that equipment and staff at the office referred to in paragraph 3.1 of the Instructions to Tenderers - Part I will properly receive the fax containing the amendment or revocation before the *Tender Closing Date and Time*. The *Owner* assumes no risk or responsibility whatsoever that any fax will be received as required by paragraph 12.1 of these Instructions to Tenderers - Part II, and shall not be liable to any tenderer if for any reason a fax is not properly received.

13.0 Duration of Tenders

13.1 After the *Tender Closing Time*, a tender shall remain valid and irrevocable as set out in paragraph 5.1 of the Form of Tender.

14.0 Qualifications of Tenderers

14.1 By submitting a tender a tenderer is representing that it has the competence, qualifications and relevant experience required to do the *Work*.

15.0 Award

15.1 The *Owner* reserves the full right, in its sole discretion and according to its own judgement of its best interest to,:

15.1.1 reject any or all tenders;

15.1.2 waive any defect or deficiency in a tender which does not materially affect the tender or the *Tender Price* relative to other tenders and accept that tender;

15.1.3 accept any tender, including an *Alternative Tender* which, in accordance with paragraph 6.3 of these Instructions to Tenderers - Part II, the *Owner* may accept.

In exercising its discretion the *Owner* will have regard to the information provided in the Appendices to the Form of Tender as described under IT5.3 including the proven experience of the tenderer, and any listed subcontractors, to do the *Work*. In no event shall the *Owner* be liable for a tenderer's costs of preparing a tender.

15.2 Tenderers will not be permitted to alter or amend tendered prices included in a tender after the *Tender Closing Time*. If prior to an award of the *Contract* the *Owner* identifies changes the *Owner* wishes to make to the *Contract Documents*, then such changes shall be dealt with after the award of the *Contract* as *Changes*, and the provisions of GC 7 shall apply.

15.3 The *Owner* will notify the successful tenderer in writing.

15.4 If there are any discrepancies in the *Schedule of Quantities and Prices* between the unit prices and the extended totals then the unit prices shall be deemed to be correct, and corresponding corrections shall be made to the extended totals. If a unit price or extended total has been omitted, the following shall apply:

a) If a unit price is given but the corresponding extended total has been omitted, then the extended total shall be calculated from unit price and the estimated quantity, and inserted as the extended total;

b) If an extended total is given but the corresponding unit price has been omitted, then the unit price shall be calculated from the extended total and the estimated quantity, and inserted as the unit price;

c) If both the unit price and the corresponding extended total for a tender item have been omitted, then the following test shall be applied to determine whether the tender shall be rejected as incomplete:

(i) the highest of the unit prices tendered by other tenderers for that tender item shall be used as the test unit price, and the corresponding test extended total shall be calculated from the test unit price and the estimated quantity;

(ii) if the test extended total for the tender item exceeds 1% of the revised total *Tender Price*, including the test extended total, or if the revised total *Tender Price*, including the test extended total, alters the ranking of the tenderers according to lowest *Tender Price*, then the omitted unit price for that tender item is deemed to materially affect the *Tender Price* relative to other tenders and the tender shall be rejected;

iii) if the tender is not rejected under subparagraph (ii) of this IT 15.4(c), then the unit price and the extended total for that tender item shall both be deemed to be zero, and the costs for that tender item shall be deemed to be included in other tender item prices;

d) In no event shall page totals in the *Schedule of Quantities and Prices* or the total *Tender Price* be used to calculate missing extended totals or unit prices.

16.0 *Subcontractors*

16.1 The *Owner* reserves the right to object to any of the subcontractors listed in a tender. If the *Owner* objects to a listed subcontractor(s) then the *Owner* will permit a tenderer to, within 5 days, propose a substitute subcontractor(s) acceptable to the *Owner* provided that there is no resulting adjustment in the *Tender Price* or the completion date set out in paragraph 2.2 of the Form of Tender. A tenderer will not be required to make such a substitution and, if the *Owner* objects to a listed *Subcontractor(s)*, the tenderer may, rather than propose a substitute subcontractor(s), consider its tender rejected by the *Owner* and by written notice withdraw its tender. The *Owner* shall, in that event, return the tenderer's bid security.

17.0 *Optional Work*

17.1 If the *Schedule of Quantities and Prices* includes any tender prices for *Optional Work*, as defined in GC 1.48, then tenderers must complete all the unit prices for such *Optional Work*. Such tender prices shall not include any general overhead costs, or other costs, or profit, not directly related to the *Optional Work*. Tenderers are directed to GC 9.4.2.

17.2 Notwithstanding that the *Owner* may elect not to proceed with the *Optional Work*, the tender prices for any *Optional Work*, including the extended totals for *Optional Work* unit prices, shall be included in the *Tender Price* for the purpose of any price comparisons between tenders.

END OF Instructions to Tenderers - Part II

Form of Tender

Note to Bidders.

This Form of Tender, along with the appendices and bonding and surety requirements listed in section 4.1 below, are all that you are required to submit.

There is no need to include the Form of Agreement or other sections of the tender document in your submission.

Do not substitute your own forms for the standard appendix forms provided. For example, do not substitute personnel resumes for Appendix 3, gnat charts or excel sheets for Appendix 2 or full company equipment charge out lists for Appendix 6.

If you want to present ideas for changes to design, or qualify your bid, it must be done as an addition to your Tender submission, not as a substitution. An accompanying letter is a good way to do this. Refer to Section 6.0 of the Instructions to Tender.

If you submitted and want to make a change, refer to Section 12 of the Instructions to Tender for guidance.

FOR USE WHEN UNIT PRICES FORM THE BASIS OF PAYMENT - TO BE USED ONLY WITH THE GENERAL CONDITIONS AND OTHER STANDARD DOCUMENTS OF THE UNIT PRICE MASTER MUNICIPAL CONSTRUCTION DOCUMENTS.

Owner: District of Mackenzie
(NAME OF OWNER)

Contract: 2025 Pressure Reduction Station Replacements
(TITLE OF CONTRACT)

Reference No. _____
(OWNER'S CONTRACT REFERENCE NO.)

To *Owner*:

WE, THE UNDERSIGNED:

1.1 have received and carefully reviewed all of the *Contract Documents*, including the Instructions to Tenderers, the specified edition of the "Master Municipal Construction Documents - General Conditions, Specifications and Standard Detail Drawings" and the following Addenda:

_____

_____

_____ ;
(ADDENDA, IF ANY)

1.2 have full knowledge of the *Place of the Work*, and the *Work* required; and

1.3 have complied with the Instructions to Tenderers; and

ACCORDINGLY WE HEREBY OFFER

2.1 to perform and complete all of the *Work* and to provide all the labour, equipment and material all as set out in the *Contract Documents*, in strict compliance with the *Contract Documents*; and

2.2 to achieve Substantial Performance of the Work on or before _____; and
(WORK DURATION OR DATE)

2.3 to do the *Work* for the price, which is the sum of the products of the actual quantities incorporated into the *Work* and the appropriate unit prices set out in Appendix 1, the "*Schedule of Quantities and Prices*", plus any lump sums or specific prices and adjustment amounts as provided by the *Contract Documents*. For the purposes of tender comparison, our offer is to complete the *Work* for the "*Tender Price*" as set out on Appendix 1 of this Form of Tender. Our *Tender Price* is based on the estimated quantities listed in the *Schedule of Quantities and Prices*, and excludes *GST*.

WE CONFIRM:

3.1 that we understand and agree that the quantities as listed in the *Schedule of Quantities and Prices* are estimated, and that the actual quantities will vary.

WE CONFIRM:

4.1 that the following appendices are attached to and form a part of this tender:

4.1.1 Appendices 1-5 as required by paragraph 5.3 of the Instructions to Tenderers – Part II; and

4.1.2 Appendices 6

4.1.3 *Consent of Surety* for Performance and Material Payment Bond; and

4.1.4 the *Bid Security* as required by paragraph 5.2 of the Instructions to Tenderers – Part II.

WE AGREE:

5.1 that this tender will be irrevocable and open for acceptance by the *Owner* for a period of_____60_____ calendar days from the day following the *Tender Closing Date and Time*, even if the tender of another tenderer is accepted by the *Owner*. If within this period the *Owner* delivers a written notice ("*Notice of Award*") by which the *Owner* accepts our tender we will:

5.1.1 within 15 *Days* of receipt of the written *Notice of Award* deliver to the *Owner*:

a Performance Bond and a Labour and Material Payment Bond, each in the amount of 50% of the Contract Price, covering the performance of the Work including the Contractor's obligations during the Maintenance Period, issued by a surety licensed to carry on the business of suretyship in the province of British Columbia, and in a form acceptable to the Owner;

a Baseline Construction Schedule, as provided by GC 4.6.1;

a "clearance letter" indicating that the tenderer is in Worksafe BC compliance; and

a copy of the insurance policies as specified in GC 24 indicating that all such insurance coverage is in place and;

5.1.2 within 2 *Days* of receipt of written "*Notice to Proceed*", or such longer time as may be otherwise specified in the *Notice to Proceed*, commence the *Work*; and

5.1.3 sign the Contract Documents as required by GC 2.1.2.

WE AGREE:

6.1 that, if we receive written *Notice of Award* of this *Contract* and, contrary to paragraph 5 of this Form of Tender, we:

6.1.1 fail or refuse to deliver the documents as specified by paragraph 5.1.1 of this Form of Tender; or

6.1.2 fail or refuse to commence the *Work* as required by the *Notice to Proceed*,

then such failure or refusal will be deemed to be a refusal by us to enter into the *Contract* and the *Owner* may, on written notice to us, award the *Contract* to another party. We further agree that, as full compensation on account of damages suffered by the *Owner* because of such failure or refusal, the *Bid Security* shall be forfeited to the *Owner*, in an amount equal to the lesser of:

6.1.3 the face value of the *Bid Security*; and

6.1.4 the amount by which our *Tender Price* is less than the amount for which the *Owner* contracts with another party to perform the *Work*.

OUR ADDRESS IS AS FOLLOWS:

_____

_____

_____

Phone: _____

Fax: _____

Attention: _____

This Tender is executed this
_____ day of _____, 20 _____.

Contractor:

_____
(FULL LEGAL NAME OF CORPORATION, PARTNERSHIP OR INDIVIDUAL)

_____
(AUTHORIZED SIGNATORY)

_____
(AUTHORIZED SIGNATORY)

District of Mackenzie
PRV Station Replacement
Appendix 1 Schedule of Approximate Quantities

Job # 1044-63

	Description	Units	Quantity	Unit Price	Extended Amount
SECTION 1 - General					
1.1	Mobilization & Demobilization	LS	1	$ -	$ -
1.2	Demolition and Salvage	LS	1	$ -	$ -
1.3	Hydro Vactor Locates	LS	1	$ -	$ -
SECTION 2 - Surface Works - Road Repair - Optional Work.					
2.1	Asphalt Removal	Sq.m	85	$ -	$ -
2.2	Asphalt Paving 65mm thickness	Sq.m	85	$ -	$ -
2.3	New Concrete Curb and Gutter - Errect Curb	lm	0	$ -	$ -
2.3	New Concrete Curb and Gutter - Roll Curb	lm	26	$ -	$ -
2.4	Aggregates				
	a) WGB - Road and Pathway Rehabilitation - 150mm	Sq.m	85	$ -	$ -
	b) SGSB- Road Rehabilitation - 450mm	Sq.m	85	$ -	$ -
SECTION 3 - Water Works					
3.1	PRV Station, Supply and Installation.	LS	2	$ -	$ -
3.2	Connection to Existing Mains, per station.	Ea	2	$ -	$ -
SECTION 4 -Miscellaneous					
4.1	75mm Thickness Topsoil and Grass Seeding	LS	2	$ -	$ -
4.2	Storm Service c/w Line	lm	35		
4.3	Conenction to Storm Main	Ea	2	$ -	$ -
				Subtotal	$ -
				GST	$ -
				TOTAL	**$ -**

Note:
Refer to the corresponding Measurement and Payment Description for a scope of work for each listed item.

Quantities are estimated based on assumed limits of excavation/disturbance. 3m of road way. 3m either side of water tie in.

2005 Pressure Reduction Station Replacement

See paragraph 5.3.2 of the Instructions to Tenderers – Part II.

Indicate Schedule with bar chart with major item descriptions and time.

MILESTONE
DATES:_____

ACTIVITY	CONSTRUCTION SCHEDULE									
	1	2	3	4	5	6	7	8	9	10

Tenderer's Initials _____

Pressure Reduction Station Replacements

(TITLE OF CONTRACT)

See paragraph 5.3.3 of the Instructions to Tenderers – Part II.

Name: _____

Experience:

Dates: _____

Project Name: _____

Responsibility: _____

References: _____

Dates: _____

Project Name: _____

Responsibility: _____

References: _____

Dates: _____

Project Name: _____

Responsibility: _____

References: _____

Dates: _____

Project Name: _____

Responsibility: _____

References: _____

Pressure Reduction Station Replacements

(TITLE OF CONTRACT)

See paragraph 5.3.4 of the Instructions to Tenderers – Part II.

PROJECT	OWNER / CONTACT NAME PHONE and FAX	WORK DESCRIPTION	VALUE ($)
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		

Pressure Reduction Station Replacements

(TITLE OF CONTRACT)

See paragraph 5.3.5 of the Instructions to Tenderers – Part II.

TENDER ITEM	TRADE	SUBCONTRACTOR NAME	PHONE NUMBER

Tenderer's Initials _____

SCHEDULE OF FORCE ACCOUNT RATES

The Tenderer offers to do force account Work for the following rates for personnel and equipment. Equipment rates include operator, fuel, maintenance, overhead and profit. Personnel rates include payroll cost of labor and all payroll burdens, room and board if applicable, overhead and profit.

PERSONNEL

OCCUPATION OR TRADE	HOURLY RATE

EQUIPMENT

DESCRIPTION AND MAKE	MODEL AND SIZE	HOURLY RATE

Form of Agreement

BETWEEN *OWNER* AND *CONTRACTOR*

This agreement made in duplicate this

_____ day of _____, 20_____.

Contract: 2025 Pressure reduction Station Replacement
Site: District of Mackenzie

Reference No.:
1044-79

BETWEEN:

The District of Mackenzie
PO Bag 340 1 Mackenzie Boulevard Mackenzie, BC V0J 2C0

(NAME AND OFFICE ADDRESS OF CONTRACTOR)

(the "*Owner*")

AND:

(NAME AND OFFICE ADDRESS OF CONTRACTOR)

(the "*Contractor*")

The *Owner* and the *Contractor* agree as follows:

Article 1 The Work Start / Completion Dates

1.1 The *Contractor* will perform all *Work* and provide all labour, equipment and material and do all things strictly as required by the *Contract Documents*.

1.2 The *Contractor* will commence the *Work* in accordance with the *Notice to Proceed*. The *Contractor* will proceed with the *Work* diligently, will perform the *Work* generally in accordance with the construction schedules as required by the *Contract Documents* and will achieve *Substantial Performance* of the *Work* on or before _____ subject to
(INSERT DATE OF SUBSTANTIAL PERFORMANCE)
the provisions of the *Contract Documents* for adjustments to the *Contract Time*

1.3 Time shall be of the essence of the *Contract.*

Article 2 Contract Documents

2.1 The "*Contract Documents*" consist of the documents listed or referred to in Schedule 1, entitled "Schedule of Contract Documents", which is attached and forms a part of this Agreement, and includes any and all additional and amending documents issued in accordance with the provisions of the *Contract Documents*. All of the *Contract Documents* shall constitute the entire *Contract* between the *Owner* and the *Contractor*.

2.2 The *Contract* supersedes all prior negotiations, representations or agreements, whether written or oral, and the *Contract* may be amended only in strict accordance with the provisions of the *Contract Documents.*

Article 3 Contract Price

3.1 The price for the *Work* ("*Contract Price*") shall be the sum in Canadian dollars of the following

1.1.1 the product of the actual quantities of the items of Work listed in the Schedule of Quantities and Prices which are incorporated into or made necessary by the Work and the unit prices listed in the Schedule of Quantities and Prices; plus

1.1.2 all lump sums, if any, as listed in the *Schedule of Quantities and Prices*, for items relating to or incorporated into the *Work*; plus

1.1.3 any adjustments, including any payments owing on account of *Changes* and agreed to *Extra Work*, approved in accordance with the provisions of the *Contract Documents.*

3.2 The *Contract Price* shall be the entire compensation owing to the *Contractor* for the *Work* and this compensation shall cover and include all profit and all costs of supervision, labour, material, equipment, overhead, financing, and all other costs and expenses whatsoever incurred in performing the *Work*.

Article 4 Payment

4.1 Subject to applicable legislation and the provisions of the *Contract Documents*, the *Owner* shall make payments to the *Contractor*.

4.2 If the *Owner* fails to make payments to the *Contractor* as they become due in accordance with the terms of the *Contract Documents* then interest calculated at 2% per annum over the prime commercial lending rate of the Royal Bank of Canada on such unpaid amounts shall also become due and payable until payment. Such interest shall be calculated and added to any unpaid amounts monthly.

Article 5 Rights and Remedies

5.1 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.

5.2 Except as specifically set out in the *Contract Documents*, no action or failure to act by the *Owner*, *Contract Administrator* or *Contractor* shall constitute a waiver of any of the parties' rights or duties afforded under the *Contract*, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach under the *Contract*.

Article 6 Notices

6.1 Communications among the *Owner*, the *Contract Administrator* and the *Contractor*, including all written notices required by the *Contract Documents*, may be delivered by hand, or by fax, or by pre-paid registered mail to the addresses as set out below:

The *Owner*:

District of Mackenzie

PO Bag 340 1 Mackenzie Boulevard Mackenzie BC V0J 2C0

Fax:

Attention: Diane Smith

The *Contractor*:

Fax:

Attention:

The *Contract Administrator*:

L&M Engineering

1210 Fourth Avenue Prince George, B.C V2L 3J4

Fax:

Attention: Luke McDonald

6.2 A communication or notice that is addressed as above shall be considered to have been received

1.1.4 immediately upon delivery, if delivered by hand; or

1.1.5 immediately upon transmission if sent by fax and received in hard copy; or

1.1.6 after 5 *Days* from date of posting if sent by registered mail.

6.3 The *Owner* or the *Contractor* may, at any time, change its address for notice by giving written notice to the other at the address then applicable. Similarly if the *Contract Administrator* changes its address for notice then the *Owner* will give or cause to be given written notice to the *Contractor.*

6.4 The sender of a notice by fax assumes all risk that the fax is received in hard copy.

Article 7 General

7.1 This *Contract* shall be construed according to the laws of British Columbia.

7.2 The *Contractor* shall not, without the express written consent of the *Owner*, assign this *Contract*, or any portion of this *Contract*.

7.3 The headings included in the *Contract Documents* are for convenience only and do not form part of this *Contract* and will not be used to interpret, define or limit the scope or intent of this *Contract* or any of the provisions of the *Contract Documents*.

7.4 A word in the *Contract Documents* in the singular includes the plural and, in each case, vice versa.

7.5 This agreement shall ensure to the benefit of and be binding upon the parties and their successors, executors, administrators and assigns.

IN WITNESS WHEREOF the parties hereto have executed this Agreement the day and year first written above.

Contractor:

(FULL LEGAL NAME OF CORPORATION, PARTNERSHIP OR INDIVIDUAL)

(AUTHORIZED SIGNATORY)

(AUTHORIZED SIGNATORY)

Owner:

District of Mackenzie

(AUTHORIZED SIGNATORY)

(AUTHORIZED SIGNATORY)

(INCLUDE IN LIST ALL DOCUMENTS INCLUDING, IF ANY, SUPPLEMENTARY GENERAL CONDITIONS, SUPPLEMENTARY SPECIFICATIONS,SUPPLEMENTARY STANDARD DETAIL DRAWINGS.)

Schedule 1 Schedule of Contract Drawings

The following is an exact and complete list of the *Contract Documents*, as referred to in Article 2.1 of the Agreement.

***NOTE*:** The documents noted with "*" are contained in the "Master Municipal Construction Documents - General Conditions, Specifications and Standard Detail Drawings", edition dated _____, 2019____. All sections of this publication are included in the *Contract Documents.*

8.1 Form of Agreement, including all Schedules;

8.2 Supplementary Conditions (L&M Engineering Limited, Supplemental Conditions, 2023);

8.3 General Conditions*;

8.4

8.5 Standard Specifications*;

8.6

8.7

8.8 Executed Form of Tender, including all Appendices;

8.9 *Contract Drawings* listed in Schedule 2 to the Agreement –"List of *Contract Drawings*";

8.10 Instructions to Tenderers - Part I;

8.11 Instructions to Tenderers - Part II*;

8.12 All Addenda:

_____

_____

_____

_____

_____

_____

_____

_____

(ADDENDA, IF ANY)

(COMPLETE LISTING OF ALL DRAWINGS, PLANS AND SKETCHES WHICH ARE TO FORM A PART OF THE CONTRACT, OTHER THAN STANDARD DETAIL DRAWINGS AND SUPPLEMENTARY STANDARD DETAIL DRAWINGS.)

Schedule 2 List of Contract Drawings

TITLE	DRAWING NO.	DATE	REVISION NO.	REVISION DATE
Construction Notes	C001	28/05/25	1	28/05/25
Construction Details	C002	28/05/25	1	28/05/25
Overall Site Plan	C003	28/05/25	1	28/05/25
P.R.S #4 Mackenzie Boulevard	C004	28/05/25	1	28/05/25
Section and Details	C005	28/05/25	1	28/05/25

General Conditions

1.0 DEFINITIONS

In the *Contract Documents* the following capitalized and italicized words and definitions will apply. Where a definition refers to a paragraph in the *Contract Documents* the definition is contained in that paragraph and the defined term is indicated as capitalized, in quotations and in brackets.

1.1	**Abnormal Weather**	1.1.1	**"*Abnormal Weather*"** means a weather condition that affects the *Place of the Work*, that is more severe or of a longer duration than the weather conditions that a person experienced with the *Place of the Work* would reasonably anticipate and that has a materially adverse effect on the *Contractor's* performance of the *Work*.
1.2	**Additional Instructions**	1.2.1	**"*Additional Instructions*"** has the meaning set out in GC 3.3.2.
1.3	**Additional Items**	1.3.1	***"Additional Items"*** means all new items of work added through *Change Orders* after award of the *Contract*.
1.4	**Adjusted Baseline Schedule**	1.4.1	**"Adjusted Baseline Schedule"** means the schedule produced by the Contractor by updating the Baseline Construction Schedule with adjustments to Milestone Dates necessitated by Change Orders or other Contract Documents.
1.5	**Alternative Tender**	1.5.1	**"Alternative Tender"** has the meaning set out in paragraph 6.2 of the Instructions to Tenderers.
1.6	**Approved Equal**	1.6.1	**"*Approved Equal*"** has the meaning set out in paragraph 7.1 of the Instructions to Tenderers.
1.7	**Approved Equipment Rental Rate Guide**	1.7.1	***"*Approved *Equipment Rental Rate Guide"*** means the most current version of the Equipment Rental Rate Guide authorized by the Government of British Columbia, commonly known as the B.C. 'Blue Book'.
1.8	**Baseline Construction Schedule**	1.8.1	***"Baseline Construction Schedule"*** means the schedule prepared by the Contractor which sets out the planned start and completion dates for the major activities of the *Work* in accordance with GC 4.6 Construction Schedule.
1.9	**Bid Security**	1.9.1	**"*Bid Security*"** has the meaning set out in paragraph 5.2 of the Instructions to Tenderers.
1.10	**Builders Lien Act**	1.10.1	**"*Builders Lien Act*"** means Builders Lien Act, S.B.C. 1997, c.45, as the same may be amended from time to time.
1.11	**Certificate of Substantial Performance**	1.11.1	**"Certificate of Substantial Performance"** means a certificate issued by the Contract Administrator indicating that Substantial Performance of the Work has been achieved.
1.12	**Certificate of Total Performance**	1.12.1	**"*Certificate of Total Performance*"** means a certificate issued by the *Contract Administrator* indicating that *Total Performance* of the *Work* has been achieved.
1.13	**Change**	1.13.1	**"*Change*"** has the meaning as set out in GC 7.1.1.
1.14	**Change Order**	1.14.1	**"Change *Order*"** has the meaning set out in GC 9.3.1.

1.15	**Concealed or Unknown Conditions**	1.15.1	**"Concealed *or Unknown Conditions*"** has the meaning set out in GC 11.1.1.
1.16	**Construction Laws**	1.16.1	**"*Construction Laws*"** has the meaning set out in GC 20.3.1.
1.17	**Construction Schedule**	1.17.1	**"*Construction Schedule*"** has the meaning set out in GC 4.6.3.
1.18	**Contemplated Change Order**	1.18.1	**"*Contemplated Change Order*"** has the meaning set out in GC 7.2.1.
1.19	**Contingency or Contingency Allowance**	1.19.1	**"Contingency"** or **"*Contingency Allowance*"** means an allowance to cover the costs of possible *Work*, such as *Concealed or Unknown Conditions*, or *Changes*, that is not identified at the *Tender Closing Date* but which may, pursuant to provisions of the *Contract Documents*, become part of the *Work*.
1.20	**Contract**	1.20.1	**"*Contract*"** means this contract as set out and described in the *Contract Documents*.
1.21	**Contract Administrator**	1.21.1	**"Contract Administrator"** means the person appointed by the *Owner* and identified by the *Owner* in writing to the *Contractor*. The *Contract Administrator* may be an officer of the *Owner*, a direct employee of the *Owner*, an officer or employee of the consultant who designed the *Work* for the *Owner*, or an independent consultant.
1.22	**Contract Documents**	1.22.1	**"*Contract Documents*"** has the meaning set out in Article 2.1 of the Agreement.
1.23	**Contract Drawing**	1.23.1	**"*Contract Drawing*"** means a drawing included in Schedule 2 to the Agreement, entitled the "List of *Contract Drawings*".
1.24	**Contract Price**	1.24.1	**"*Contract Price*"** has the meaning set out in Article 3.1 of the Agreement.
1.25	**Contract Time**	1.25.1	**"*Contract Time*"** means the period of time for the completion of the *Work* as provided by the *Contract Documents*.
1.26	**Contractor**	1.26.1	**"*Contractor*"** means the person, firm or corporation identified as such in the Agreement, and includes the *Contractor's* authorized representative as designated to the *Owner* in writing.
1.27	**Contractor Permits**	1.27.1	**"*Contractor Permits*"** has the meaning set out in GC 20.2.1.
1.28	**Day**	1.28.1	**"*Day*"** means working day as generally recognized by the construction industry in the area of the *Place of the Work*, and for clarification does not include Saturdays, Sundays and other holidays which the construction industry in the area of the *Place of the Work* recognizes as a non-working day.
1.29	**Default Costs**	1.29.1	**"*Default Costs*"** has the meaning as set out in GC 15.3.1.

1.30	**Dispute**	1.30.1	**"*Dispute*"** means any difference between the *Owner* and the *Contractor*, of any claim, or any dispute, relating to or arising out of the *Work*, or the interpretation of the *Contract Documents*, or any failure by the *Owner* and the *Contractor* to agree where the *Contract Documents* call for agreement.
1.31	**Dispute Notice**	1.31.1	**"Dispute *Notice*"** has the meaning set out in GC 17.3.1.
1.32	**Drawings**	1.32.1	**"*Drawings*"** means, collectively, the *Contract Drawings*, the Standard Detail Drawings and the Supplementary Standard Detail Drawings.
1.33	**Extra Work**	1.33.1	**"*Extra Work*"** has the meaning as set out in GC 7.1.3.
1.34	**Field Memo**	1.34.1	**"*Field Memo*"** means a written communication from the *Contract Administrator* to the *Contractor* regarding the *Contract*.
1.35	**Force Account**	1.35.1	**"*Force Account*"** means the method of calculating payment the *Contractor* shall receive for *Work* performed as set out in GC 10.
1.36	**GC**	1.36.1	**"*GC*"** means the section in the General Conditions, made up of paragraphs and subparagraphs with the same beginning paragraph numbers.
1.37	**Overheads**	1.37.1	***"Overheads"*** means those costs the *Contractor* incurs for facilities, staff, support personnel, utilities, consumables and other fixed costs which are not directly expended for the *Contract. Overheads* do not include the fixed portion of equipment costs, whether used on the *Contract* or not.
1.38	**GST**	1.38.1	**"*GST*"** means the federal Goods and Services Tax.
1.39	**Hazardous Materials**	1.39.1	**"*Hazardous Materials*"** means any material or substance which is a "hazardous product", "contaminant", "toxic substance", "deleterious substance", "special waste", "dangerous good" or "reportable substance" that is identified or described in or defined by any applicable statute, regulation or law.
1.40	**Lower Threshold Percentage**	1.40.1	***"Lower Threshold Percentage"*** means 100% minus the Variance Threshold Percentage.
1.41	**Lower Adjustment Limit Value**	1.41.1	***"Lower Adjustment Limit Value"*** means the *Lower Threshold Percentage* multiplied by the total value (unit price times the estimated quantity as shown on the *Schedule of Quantities and Prices*) of the *Deleted Items*.
1.42	**Maintenance Allowance**	1.42.1	**"*Maintenance Allowance*"** has the meaning set out in GC 15.3.1.
1.43	**Maintenance Period**	1.43.1	**"*Maintenance Period*"** has the meaning set out in GC 25.

1.44	**Milestone Date**	1.44.1	**"*Milestone Date*"** means any date specified in the *Contract Documents* for completion of the *Work*, or portion of the *Work*, including the dates of *Substantial Performance* and *Total Performance*.
1.45	**Notice of Award**	1.45.1	**"*Notice of Award*"** has the meaning set out in paragraph 5.1 of the Form of Tender.
1.46	**Notice to Proceed**	1.46.1	**"*Notice to Proceed*"** has the meaning set out in paragraph 5.1.2 of the Form of Tender.
1.47	**Optional Work**	1.47.1	**"*Optional Work*"** means *Work* which may be described in the *Schedule of Quantities and Prices* that will be undertaken and included in the *Work* at the election of the *Owner*.
1.48	**Other Contractor**	1.48.1	**"*Other Contractor*"** means a person, firm or corporation employed by or having a separate contract directly or indirectly with the *Owner* for *Other Work*.
1.49	**Other Work**	1.49.1	**"*Other Work*"** means work not included in the *Work* under this *Contract* that is related to or a part of the project of which the *Work* is a part.
1.50	**Owner**	1.50.1	**"*Owner*"** means the person, firm or corporation identified as such in the Instructions to Tenderers, the Agreement, and other *Contract Documents*, and includes any authorized representative of the *Owner*.
1.51	**Owner Permits**	1.51.1	**"*Owner Permits*"** has the meaning set out in GC 20.2.2.
1.52	**Payment Certificate**	1.52.1	**"Payment *Certificate*"** has the meaning set out in GC 18.1.1.
1.53	**Place of the Work**	1.53.1	**"*Place of the Work*"** means the designated site or location where the *Work* products are to be finally or permanently constructed or installed.
1.54	**Preliminary Construction Schedule**	1.54.1	**"*Preliminary Construction Schedule*"** means the schedule attached as Appendix 2 to the Form of Tender referred to in paragraph 5.3.2 of the Instructions to Tenderers.
1.55	**Quality Assurance**	1.55.1	***"Quality Assurance"*** means the process by which the *Owner* evaluates if the *Work* is being constructed in accordance with the *Contract Documents*.
1.56	**Quality Control**	1.56.1	***"Quality Control"*** means the process by which the *Contractor* checks specific materials, products and workmanship to ensure strict conformance with the *Contract Documents*.
1.57	**Quotation**	1.57.1	**"*Quotation*"** has the meaning as set out in GC 9.2.3.
1.58	**Referee**	1.58.1	**"*Referee*"** means a person appointed in the manner set out in GC 17.5.2 to perform the review of a *Dispute* pursuant to GC 17, and perform the other functions as described in the *Contract Documents*.

1.59	**Schedule of Quantities and Prices**	1.59.1	**"*Schedule of Quantities and Prices*"** refers to Appendix 1 to the Form of Tender.
1.60	**Settlement Meeting**	1.60.1	**"*Settlement Meeting*"** has the meaning set out in GC 17.6.1.
1.61	**Shop Drawings**	1.61.1	**"*Shop Drawings*"** means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data that, as specified in the *Contract Documents* or as required by good construction practice, are to be provided by the *Contractor* to the *Contract Administrator* to illustrate details of a portion of the *Work*.
1.62	**Site**	1.62.1	**"*Site*"** has the same meaning as "*Place of the Work*".
1.63	**Site Inspector**	1.63.1	**"*Site Inspector*"** means the person appointed by the *Contract Administrator* as set out in GC 3.4.6.
1.64	**Small Tool**	1.64.1	**"*Small Tool*"** means a small tool or equipment item with a replacement value of no more than $750.00 per tool or item.
1.65	**Subcontractor**	1.65.1	**"*Subcontractor*"** means a person, firm or corporation having a direct contract with the *Contractor* to perform a part or parts of the *Work*.
1.66	**Substantial Performance**	1.66.1	***"Substantial Performance"*** means the stage of completion when: all *Work,* as certified by the *Contract Administrator,* is capable of completion or correction at a cost of not more than: (a) 3% of the first $500,000 of the *Contract Price*; (b) 2% of the next $500,000 of the *Contract Price*; and (c) 1% of the balance of the *Contract Price*; and the *Work,* or a substantial part of it, is ready for use or is being used for the purpose intended.
1.67	**Superintendent**	1.67.1	***"Superintendent"*** means the *Contractor's* senior representative at the *Place of the Work* as set out in GC 4.8.1
1.68	**Supplementary**	1.68.1	***"Supplementary"*** means clauses, specifications or drawings insert by referenced, by reference by owner in a contract document replace or expand the provisions of the MMCD
1.69	**Taxes**	1.69.1	**"*Taxes*"** has the meaning set out in GC 19.1.1.
1.70	**Tender Closing Date and Tender Closing Time**	1.70.1	**"*Tender Closing Date*" and "*Tender Closing Time*"** has the meaning set out in paragraph 3.1 of the Instructions to Tenderers.
1.71	**Tender Price**	1.71.1	**"*Tender Price*"** has the meaning set out in paragraph 2.3 of the Form of Tender.

1.72	**Tender Quantity**	1.72.1	**"*Tender Quantity*"** has the meaning set out in GC 9.4.1.
1.73	**Total Performance**	1.73.1	**"*Total Performance*"** means when all *Work*, including all deficiencies but excluding any correction of completed *Work* that appears during the *Maintenance Period* or other on-going warranty or guarantee obligations as provided by the *Contract Documents*, has been performed as required by the *Contract Documents*, as certified by the *Contract Administrator*.
1.74	**Upper Adjustment Limit Value**	1.74.1	***"Upper Adjustment Limit Value"*** means the *Upper Threshold Percentage* multiplied by the total value (unit price times the estimated quantity as shown on the *Schedule of Quantities and Prices*) of the *Deleted Items*.
1.75	**Upper Threshold Percentage**	1.75.1	**"Upper Threshold Percentage"** means 100% plus the Variance Threshold Percentage.
1.76	**Variance Threshold Percentage**	1.76.1	***"Variance Threshold Percentage"*** means a variance of 15% between the quantity of a unit price item actually constructed or provided by the time of *Total Performance* and the quantity shown on the tendered *Schedule of Quantities and Prices* for that item.
1.77	**Work**	1.77.1	**"*Work*"** means and includes anything and everything required to be done for the fulfilment and completion of this *Contract*.
1.78	**Workers Compensation Act**	1.78.1	***"Workers Compensation Act"*** means the *Workers Compensation Act*, R.S.B.C. 1996, c. 492 as the same may be amended from time to time.

2.0 DOCUMENTS

2.1	**Execution**	2.1.1	The *Owner* shall deliver the *Contract Documents*, in a form ready for signing, to the *Contractor* within 15 *Days* after the issuance of the *Notice of Award*.
		2.1.2	The *Contractor* shall sign the *Contract Documents* and return them to the *Contract Administrator* within 5 *Days* after receiving them and the *Contract Administrator* shall forward them to the *Owner* for signing.
2.2	**Interpretation**	2.2.1	The intent of the *Contract Documents* is that the *Contractor* shall provide all materials, equipment and labour necessary for the complete performance of the *Work* as described in the *Contract Documents*. It is not intended, however, that the *Contractor* shall supply materials, equipment or labour not consistent with, covered by, or properly inferable from the *Contract Documents*.
		2.2.2	The *Contract Documents* are complementary, and what is required by any one document shall be as binding as if required by all documents.

2.2.3 Words and abbreviations which have well-known technical or trade meanings are used in the *Contract Documents* in accordance with such recognized meanings.

2.2.4 If there is any inconsistency or conflict between the provisions of the *Contract Documents* then:

(1) the *Contract Documents* shall govern and take precedence in the following order with the Agreement taking precedence over all other *Contract Documents*:
   (a) Agreement
   (b) Addenda
   (c) Supplementary General Conditions
   (d) General Conditions
   (e) Supplementary Specifications
   (f) Specifications
   (g) Drawings listed in Schedule 2 to the Agreement
   (h) Supplementary Detail Drawings
   (i) Standard Detail Drawings
   (10) Executed Form of Tender
   (11) Instructions to Tenderers
   (12) All other Contract Documents;

(2) Drawings at a larger scale shall govern over Drawings at a smaller scale. (For clarification, a "larger scale" Drawing means a representation that is closer to actual size than a "smaller scale" drawing);

(3) figured dimensions on a Drawing shall govern over scaled measurements on the same Drawing; and

(4) documents of later date shall always govern a similar type of document of an earlier date.

2.3 Instructions to Tenderers, General Conditions, Specifications, Standard Detail Drawings

2.3.1 The Instructions to Tenderers - Part II, the General Conditions, Specifications and Standard Detail Drawings are as contained in the "Master Municipal Construction Documents - General Conditions, Specifications and Standard Detail Drawings". The applicable edition of this publication is as set out in Schedule 1 to the Agreement or, if no edition has been specified then the applicable edition shall be the most recent edition as of the date of this *Contract*.

2.4 Copies of Contract Documents

2.4.1 The *Owner* shall provide the *Contractor* without charge with as many copies of the *Contract Documents* or portions as are reasonably necessary for the performance of the *Work*, except that the *Contractor* shall at the *Contractor's* cost obtain the "Master Municipal Construction Documents - General Conditions, Specifications and Standard Detail Drawings" containing the General Conditions, Specifications and Standard Detail Drawings.

2.4.2 The *Contractor* shall at all times keep and maintain one copy of a complete set of the current *Contract Documents* and shop drawings, including all revised or supplementary drawings, Specifications or other design details that have been issued by the *Contract Administrator*, at the *Place of the Work*, in good order and available for review by the *Contract Administrator* and his representatives.

3.0 CONTRACT ADMINISTRATOR

3.1 Appointment

3.1.1 The *Owner* shall appoint a "*Contract Administrator*" and shall give written notice of the appointment to the *Contractor* not later than the issuance of the *Notice of Award*.

3.1.2 If for any reason the *Contract Administrator's* appointment is discontinued then the *Owner* shall immediately, in consultation with the *Contractor*, appoint a replacement.

3.2 Authority

3.2.1 The *Contract Administrator* shall have authority to act on behalf of the *Owner* only to the extent expressly provided in the *Contract Documents*.

3.2.2 Nothing contained in the *Contract Documents* shall create any contractual relationship between the *Contract Administrator* and the *Contractor*, *Subcontractors*, suppliers, or their agents, employees or other persons performing any of the *Work*.

3.3 *Contract* Administration

3.3.1 The *Contract Administrator* shall provide administration of the *Contract* as described in the *Contract Documents* during all of the *Work*, until *Total Performance*.

3.3.2 During the progress of the *Work* the *Contract Administrator* shall furnish to the *Contractor* additional instructions ("*Additional Instructions*") in the form of specifications, drawings, samples, models or other written instructions, to supplement the previously issued *Contract Documents* as may be necessary for the performance of the *Work*.

3.3.3 The *Contract Administrator* shall make reasonable efforts to respond promptly to the *Contractor's* requests for *Additional Instructions* and, if it becomes apparent that a number of *Additional Instructions* will be required, the *Contract Administrator* shall cooperate with the *Contractor* to establish a schedule for the issuance of such *Additional Instructions*.

3.3.4 The *Contract Administrator* shall review and take appropriate action upon the *Contractor's* submittal such as *Shop Drawings*, product data, and samples, in accordance with the requirements of the *Contract Documents*.

3.3.5 Unless otherwise specified in the *Contract Documents*, the *Contract Administrator* shall set out or cause to be set out survey monuments or control points at the *Place of the Work*, sufficient to enable the *Contractor* to determine the required lines and grades, and to set out the *Work*. The *Contractor* shall protect and preserve such monuments and control points for so long as they are required for the *Work* and if any of them must be replaced because they are disturbed or destroyed by the *Contractor*, then the *Contractor* shall pay the costs of such replacement.

3.3.6 The *Contract Administrator* shall prepare *Change Orders* and *Field Memos* in accordance with the requirements of GC 9.3.4. The *Contract Administrator* shall, if requested by the *Contractor*, confirm in writing all instructions and directions given by the *Contract Administrator*.

3.3.7 The *Owner's* and the *Contractor's* communication to each other with respect to the *Contract* shall be through the *Contract Administrator*.

3.3.8 The *Contract Administrator* shall conduct inspections to determine the dates of *Substantial Performance* and *Total Performance*.

3.3.9 The *Contract Administrator* shall on behalf of the *Owner* receive and review documents such as written warranties, guarantees and manuals to be provided by the *Contractor*.

3.4 Inspection and *Site Inspector*

3.4.1 The *Contract Administrator* shall visit the *Place of the Work* at intervals appropriate to the progress of construction to remain familiar with the progress and quality of the *Work* and to determine if the *Work* is proceeding in general conformance with the *Contract Documents*.

3.4.2 The *Owner* and the *Contract Administrator* and their authorized representatives shall at all reasonable times during the performance of the *Work* have access to the *Work*, including any parts of the *Work* that are in progress at locations other than where the *Work* is being installed.

3.4.3 The *Contract Administrator* shall in a timely manner carry out any inspections of the *Work* that the *Contract Documents* require the *Contract Administrator* to conduct.

3.4.4 The *Contract Administrator* has the authority to reject *Work* that, in the *Contract Administrator's* opinion, does not conform to the requirements of the *Contract Documents*.

3.4.5 If at any time and for any reason the *Contract Administrator* determines that inspection or testing of the *Work*, or portion of the *Work*, is required that was not called for in the *Contract Documents*, then the *Contract Administrator* may direct the *Contractor* to perform, or have performed, that inspection or testing, as provided in GC 4.12.6.

3.4.6 The *Contract Administrator* may by written notice to the *Contractor* appoint a "*Site Inspector(s)*" to assist the *Contract Administrator* in the administration of the *Contract* and in reviewing the progress and quality of the *Work*. A *Site Inspector* may exercise the authority of the *Contract Administrator*, as set out in the *Contract Documents*, to inspect *Work*, to reject *Work*, to order special inspections and to make other orders at the *Place of the Work*.

3.4.7 The *Contract Administrator's* authority to inspect the *Work*, reject the *Work*, order testing or otherwise review the *Work* shall be for the benefit of the *Owner* and such authority shall not give rise to any duty or responsibility on the *Contract Administrator* or the *Owner* to the *Contractor*, *Subcontractors*, or their agents, employees or other persons performing any of the *Work*, to inspect or review the *Work*.

3.4.8 The *Contract Administrator's* authority as set out in the *Contract Documents* will not relieve the *Contractor* of the responsibility for the *Work* and safety as provided by GC 4.1 and GC 4.2, and the *Contract Administrator* shall not be responsible for or have control of or charge of the matters set out in the above mentioned GC's. The *Contract Administrator* will not be responsible for or have control or charge over the acts or omissions of the *Contractor*, *Subcontractors*, or their agents, employees or other persons performing any of the *Work*.

3.5 Progress Payments

3.5.1 The *Contract Administrator* shall conduct inspections of the *Work* and reviews of supporting documentation as required to determine the amounts owing to the *Contractor* under the *Contract* and shall issue *Payment Certificates*.

3.6 *Contract* Interpretation and Decisions

3.6.1 The *Contract Administrator* will be, in the first instance, the interpreter of the *Contract Documents* and the judge of the performance of both parties to the *Contract*. Interpretations and decisions of the *Contract Administrator* shall be consistent with the *Contract Documents* and in making decisions the *Contract Administrator* will not show partiality to either the *Owner* or the *Contractor*.

3.6.2 Either the *Owner* or the *Contractor* may at any time, by written request in sufficient detail and accompanied by sufficient supporting documentation to reasonably describe the matter, refer any question, including claims relating to the performance of the *Work* or the interpretation of the *Contract Documents*, to the *Contract Administrator* for an initial decision and the *Contract Administrator* shall render a written decision within a reasonable time, with copies to both the *Owner* and the *Contractor*.

3.6.3 If a party does not agree with an interpretation or decision of the *Contract Administrator* then resolution of the matter shall be dealt with in accordance with the provisions of GC 17.

4.0 CONTRACTOR

4.1 Control of the *Work*

4.1.1 The *Contractor* shall have complete control of the *Work* and shall effectively direct and supervise the *Work* so as to ensure conformance with the *Contract Documents*. Subject to the *Owner's* rights as specifically set out in the *Contract Documents* to give directions regarding the *Work*, the *Contractor* shall be solely responsible for construction means, methods, techniques, sequences and procedures and for coordinating the various parts of the *Work* under the *Contract*.

4.1.2 The *Contractor* shall maintain the *Work* in a tidy condition and free from the accumulation of waste, debris and waste products, other than that caused by the *Owner*, *Other Contractors* or their employees.

4.2 Safety

4.2.1 The *Contractor* shall be solely responsible for construction safety at the *Place of the Work* as and to the extent required by applicable construction safety legislation, regulations and codes, including the *Workers Compensation Act* and applicable regulations, and by good construction practice.

4.3 Protection of *Work*, Property and the Public

4.3.1 In performing the *Work*, the *Contractor* shall protect the *Work* and the *Owner's* property and other person's property from damage. The *Contractor* shall at the *Contractor's* own expense make good any such damage which arises as the result of the *Contractor's* operations except for damage which, in the performance of the *Work*, the *Contractor* could not reasonably avoid.

4.3.2 If the *Contractor* contributed along with the *Owner*, the *Contract Administrator* or others to causing damage then the *Contractor* shall be responsible to the extent of the *Contractor's* contribution.

4.3.3 The *Contractor* shall at the *Contractor's* own cost, as part of the *Work*, provide all necessary safety devices and supervision at the *Place of the Work* so as to protect the public, including pedestrians and cyclists

4.3.4 Before commencing any *Work* at the *Place of the Work* the *Contractor* shall*:*

(1) expose and determine conclusively the location in the field all underground utilities and structures indicated on the *Contract Documents* as being at the *Place of the Work;*

(2) consult with all utility corporations that provide electricity, communication, gas or other utility services in the area of the *Place of the Work,* to similarly expose and conclusively determine the location of all underground utilities for which they have records; and

(3) similarly expose and conclusively determine the location of any other utilities or underground structures that are reasonably apparent in an inspection of the *Place of the Work.*

4.3.5 The *Contractor* shall pay the costs to repair any underground utility or structure that the *Contractor* damages in the performance of the *Work* which the *Contractor* was required to locate under GC 4.3.4.

4.3.6 If in the performance of the *Work* the *Contractor* causes damage to an underground utility or structure:

(1) which was unknown or unforeseen to the *Contractor* at the time of the damage, and

(2) that under GC 4.3.4 the *Contractor* was not required to locate, then such event may be considered a *Concealed or Unknown Condition* and the provisions of GC 11, shall apply.

4.4 Temporary Structures and Facilities

4.4.1 The *Contractor* shall have the sole responsibility for the design, erection, operation, maintenance and removal of temporary structural and other temporary facilities and the design and execution of construction methods required in their use. The *Contractor* shall engage registered Professional Engineers skilled and knowledgeable in the appropriate disciplines to perform these functions where required by law or by the *Contract Documents* and in all cases where such temporary facilities and their method of construction are of such a nature that professional engineering skill and knowledge is required to produce safe and satisfactory results.

4.4.2 Notwithstanding the provisions of GC 4.1.1 and 4.4.1, or provisions to the contrary elsewhere in the *Contract Documents*, where such *Contract Documents* include designs for temporary structural and other temporary facilities or specify a method of construction in whole or in part, such facilities and methods shall be considered to be part of the design of the *Work* and the *Contractor* shall not be held responsible for that part of the design or the specified method of construction. The *Contractor* shall, however, be responsible for the execution of such design or specified method of construction in the same manner that the *Contractor* is responsible for the execution of the *Work*.

4.5 Errors, Inconsistencies or Omissions in the *Contract Documents*

4.5.1 The *Contractor* shall, as a competent contractor, reasonably experienced in the *Work*, review the *Contract Documents* and promptly report to the *Contract Administrator* any discovered error, inconsistency or omission. In making such review the *Contractor* does not assume any responsibility or liability to the *Owner* or the *Contract Administrator* to discover all errors, inconsistencies or omissions.

4.5.2 If the *Contractor* does discover any error, inconsistency or omission in the *Contract Documents* the *Contractor* shall not proceed with affected *Work* without receiving directions or clarifications from the *Contract Administrator*. If the *Contractor* proceeds with *Work* in the face of an error, inconsistency or omission that the *Contractor* discovered, or that a competent contractor, reasonably experienced in the *Work*, would have discovered, without additional instructions from the *Contract Administrator*, then the *Contractor* shall at the *Contractor's* cost remove or replace any incorrectly constructed *Work*.

4.5.3 If the *Contractor* determines that *Additional Instructions* are required for the performance of the *Work* the *Contractor* shall give the *Contract Administrator* timely notice of such requirement, and if it becomes apparent that a number of *Additional Instructions* will be required, the *Contractor* shall cooperate with the *Contract Administrator* to establish a schedule for the issuance of such *Additional Instructions* as provided by GC 3.3.3.

4.6 Construction Schedule

4.6.1 The *Contractor* shall, within the time set out in the Form of Tender, prepare and submit to the *Contract Administrator* a construction schedule (the "*Baseline Construction Schedule*") indicating the planned start and completion dates of the major activities of the *Work*. The *Baseline Construction Schedule* shall indicate completion of the *Work* in compliance with the *Milestone Dates*. The Contractor shall ensure that the *Baseline Construction Schedule* is in more detail than the *Preliminary Construction Schedule* so as to enable the *Contract Administrator* to compare actual construction progress during the performance of the Work with the *Baseline Construction Schedule* as adjusted pursuant to GC 4.6.2.

4.6.2 The Contractor shall update the Baseline Construction Schedule monthly to produce an adjusted Baseline Schedule (the "Adjusted Baseline Schedule") that reflects any adjustments to the Milestone Dates or the Contract Time as provided by the Contract Documents, including without limitation if the Contract Administrator issues a Change Order or other Contract Document(s) which adjusts any Milestone Date(s). Each Adjusted Baseline Schedule will replace the previous Baseline Construction Schedule.

4.6.3 In addition to the requirements of GC 4.6.2, the *Contractor* shall, as required by the *Contract Administrator,* mark up the *Baseline Construction Schedule* or *Adjusted Baseline Schedule*, as applicable, to show the actual progress of the *Work* to date, as well as the Contractor's plans for completion of the *Work*. *("the Construction Schedule").*

4.6.4 If the *Contractor* submits a *Construction Schedule* indicating that one or more *Milestone Date(s)* will not be met, submission of such *Construction Schedule* will not relieve the *Contractor* of its obligation to meet the *Milestone Dates*.

4.6.5 If the *Contractor* fails or refuses to produce an *Adjusted Baseline Schedule*, or to update the *Construction Schedule* as required by this GC, then such failure or refusal shall be deemed to be a default and the provisions of GC 15 shall apply.

4.6.6 The time for the performance of the *Work* shall commence on the date specified in the *Notice to Proceed*, or if not so specified, on the date the *Notice to Proceed* is issued. Subject to a contrary provision in the *Contract Documents*, the *Owner* shall issue the *Notice to Proceed* within 10 days of receipt of the documentation required from the *Contractor* under paragraph 5.1.1 of the Form of Tender. Failure by the *Owner* to issue the *Notice to Proceed* within the 10 days shall entitle the *Contractor* to a claim for delay under GC 13.1.1.

		4.6.7	The Contractor shall perform the Work in compliance with the Baseline Construction Schedule or the Adjusted Baseline Schedule, as applicable.
4.7	**Superintendent**	4.7.1	The *Contractor* shall employ a competent senior representative at the *Place of the Work* (the "*Superintendent*") who shall have the responsibility to ensure that the *Work* is performed in compliance with the *Contract Documents*. Unless otherwise permitted in writing by the *Owner*, the *Superintendent* shall be the person who experience was submitted in Appendix 3 of the *Tender.* The *Contractor* shall also employ necessary assistants for the *Superintendent* and the *Superintendent* and assistants shall be in attendance at the *Place of the Work* while *Work* is being performed.
		4.7.2	The *Superintendent* shall represent the *Contractor* at the *Place of the Work* and instructions given to the *Superintendent* by the *Contract Administrator* shall be held to have been given to the *Contractor*.
		4.7.3	If the competence or performance of the *Superintendent* is not satisfactory to the *Contract Administrator*, then on written request from the *Owner*, the *Contractor* shall provide a satisfactory replacement. The *Contractor* shall not change the *Superintendent* without the consent of the *Owner*, such consent not to be unreasonably withheld.
4.8	**Workers**	4.8.1	The *Contractor* shall maintain good order and discipline among the *Contractor's* employees and the *Subcontractors* engaged in the *Work*. The *Contractor* shall not employ, or permit *Subcontractors* to employ, workers who are not skilled in the assigned task. The *Contractor* shall employ sufficient workers to perform the *Work* in compliance with the *Construction Schedule*.
4.9	**Materials**	4.9.1	Materials provided shall be new unless otherwise specified in the *Contract Documents*. Products that are not specified shall be of a quality best suited to their purpose and use, as approved by the *Contract Administrator*.
		4.9.2	The *Contractor* shall at the *Contractor's* own cost, as part of the *Work*, return to the *Owner's* place of storage any materials supplied by the *Owner* which are surplus to the performance of the *Work.*
4.10	***Contractor* to Provide Labour, Materials and Equipment**	4.10.1	Except as specifically stipulated otherwise in the *Contract Documents*, the *Contractor* shall provide and pay for labour, equipment and materials including all supervision, products, tools, construction machinery, water, heat, light, power, transportation and other facilities and services necessary for the performance of the *Work* in accordance with the *Contract Documents*.

4.11 Subcontractors

4.11.1 The *Contractor* shall preserve and protect the rights of the *Owner* with respect to any *Work* performed under subcontract and incorporate the terms and conditions of the *Contract Documents* into all subcontract agreements.

4.11.2 The *Contractor* shall employ only the *Subcontractors* listed in Appendix 5 of the Form of Tender, or others as approved in writing by the Owner, and shall not change or employ additional *Subcontractors* without the approval of the *Owner*, which approval shall not be unreasonably withheld.

4.11.3 The *Owner*, through the *Contract Administrator*, may, at any time during the performance of the *Work*, object to the use of a *Subcontractor* and direct the *Contractor* in writing to employ a different *Subcontractor* satisfactory to the *Contract Administrator*. The *Contractor* shall comply with such direction which shall be considered a *Change* and the *Contract Price* and the *Contract Time* shall be adjusted by any difference in cost and additional time reasonably incurred or suffered by the *Contractor* as a result of employing the different *Subcontractor*.

4.11.4 The *Contractor* shall in no event be required to employ a *Subcontractor* to which the *Contractor* reasonably objects.

4.11.5 The *Contract Administrator* may, upon reasonable request and at the *Contract Administrator's* discretion, provide to a *Subcontractor* information as to the percentage or quantity of the *Subcontractor's* work which has been certified for payment.

4.11.6 Nothing contained in the *Contract Documents* shall create a contractual relationship between a *Subcontractor* and the *Owner*.

4.12 Tests and Inspections

4.12.1 The tests and inspections required by the *Contract Documents* are for the *Owner's* benefit as part of the *Owner's Quality Assurance* program. Acceptable test and inspection results will not relieve the *Contractor* of its obligations under the *Contract* to correct defects or deficiencies in the *Work*.

4.12.2 The *Owner* may reject *Work* completed prior to a failed *Quality Assurance* test if there are not subsequent satisfactory tests indicating that the *Work* is satisfactory.

4.12.3 All *Quality Control* test results must be made available to the *Contract Administrator* within one *Day* of their availability.

4.12.4 The *Contractor* shall as part of the *Work* perform, or cause to be performed, all tests, inspections and approvals of the *Work* as required by the *Contract Documents*, and if a test, inspection or approval requires a representative sample of materials or workmanship the *Contractor* shall at the *Contractor's* own cost supply the labour and materials necessary to provide the sample.

4.12.5 If any portion of the *Work* is designated for special tests, inspections or approvals (either as a requirement in the *Contract Documents*, or by the *Contract Administrator's* instructions, or by the laws or regulations applicable at the *Place of the Work*), then:

(1) if the *Contract Administrator* is to perform or arrange for the test, inspection or approval, the *Contractor* shall give the *Contract Administrator* timely notice requesting such test, inspection or approval; and

(2) if other authorities are to perform the test, inspection or approval, the *Contractor* shall arrange for such test, inspection or approval and shall give the *Contract Administrator* timely notice of the date and time for such test, inspection or approval.

4.12.6 The *Contractor* will comply with any orders or directions given by the *Contract Administrator* pursuant to GC 3.4.5 for inspection or testing that was not called for in the *Contract Documents*, and have such inspection or testing undertaken.

(1) If the *Contract Administrator* orders that such inspection or testing, that was not called for in the *Contract Documents*, be carried out in advance of the *Work* then the order shall be treated as a *Change*.

(2) If the *Contract Administrator* orders that such inspection or testing, that was not called for in the *Contract Documents*, be carried out on *Work* that is completed then the following applies: if the inspection or testing determines that the *Work* is not in accordance with the requirements of the *Contract Documents*, then the *Contractor* shall correct such *Work* and pay the costs of the inspection and testing and all costs of the correction and the restoration; if the inspection or testing determines that the *Work* is in accordance with the requirements of the *Contract Documents*, then the *Owner* shall pay all costs of the inspection and testing and the restoration.

4.12.7 If the *Contractor* disagrees with the *Contract Administrator's* determination of the *Work* not meeting the Specifications based on the results of inspection or testing required in the *Contract Documents* or ordered by the *Contract Administrator,* the *Contractor* may elect to carry out such further inspection or testing which the *Contract Administrator* agrees is acceptable for the purpose of determining whether the *Work* complies with the requirements of the *Contract Documents*.

(1) If such further inspection or testing determines that the *Work* is not in accordance with the requirements of the *Contract Documents,* then the *Contractor* shall correct such *Work* and pay the costs of the inspection and testing including all costs of the correction and subsequent inspection and testing.

(2) If such further inspection or testing determines that the *Work* is in accordance with the requirements of the *Contract Documents*, then the *Owner* shall pay all costs of the inspection and testing.

4.12.8 If the *Contractor* covers or permits to be covered *Work* that has been designated for tests, inspections or approvals, before such tests, inspections or approvals are made, given or completed, the *Contract Administrator* may direct the *Contractor* to uncover such *Work*, in order that the inspections or tests may be satisfactorily completed, and make good such *Work* at the *Contractor's* own expense, and the *Contractor* shall comply with such direction.

4.12.9 The *Contractor* shall promptly provide the *Contract Administrator* with 2 copies of all certificates, inspection and testing reports required by the *Contract Documents* or ordered by the *Contract Administrator*.

4.12.10 The *Contractor* shall not undertake any *Work* outside the working hours, as specified in the *Contract Documents* (if so specified), which under the *Contract Documents* requires tests, inspection, or approval by the *Contact Administrator* unless the *Contractor* obtains the *Contract Administrator's* prior approval. The *Contractor* shall reimburse the *Owner* for any additional costs incurred to provide tests, inspections or approvals outside such specified working hours.

4.13 Rejected *Work*

4.13.1 If for any reason, including poor workmanship, defective products or materials, and damage to completed *Work*, the *Contract Administrator* rejects *Work* because it fails to conform to the *Contract Documents*, then the *Contractor* shall at the *Contractor's* expense promptly remove such *Work* from the *Place of the Work* and replace or re-execute it in accordance with the requirements of the *Contract Documents*. Such remedial work shall include any re-testing reasonably required to establish that the completed *Work* complies with the *Contract Documents*. This provision applies to all materials, products and portions of the *Work* whether or not incorporated into the *Work* as a whole.

4.13.2 The *Contractor* shall promptly make good, at the *Contractor's* expense, *Other Contractors'* work destroyed or damaged by such removals or replacements.

4.13.3 If in the opinion of the *Contract Administrator* it is not expedient to correct such defective work or work not performed in accordance with the *Contract Documents*, then the *Contract Administrator* may direct that such work be left and the *Owner* may deduct from the monies otherwise due to the *Contractor* the difference in value to the *Owner*, considering the *Owner's* intended use of the *Work*, between the work as performed and that called for by the *Contract Documents*. The amount of such deduction will be determined in the first instance by the *Contract Administrator*. If such amount as determined by the *Contract Administrator* is not acceptable to either party then the provisions of GC 17 shall apply.

4.14 Final Cleanup

4.14.1 Upon attaining *Substantial Performance,* the *Contractor* shall remove all surplus products, tools, construction machinery and equipment relating to the *Work* that is not required for the performance of the remaining *Work*. The *Contractor* shall also remove waste, debris and waste products other than that caused by the *Owner* or *Other Contractors*, and leave the *Place of the Work* clean and suitable for occupancy by the *Owner* unless otherwise specified in the *Contract Documents* or directed by the *Contract Administrator*.

4.14.2 If the *Contractor* fails or refuses to remove all such products, materials, equipment and waste within a reasonable time after achieving *Substantial Performance* then, on written notice from the *Contract Administrator* to the *Contractor* specifying a reasonable time to remedy such failure or refusal, the *Owner* may do or cause to be done the removal and all reasonable resulting costs incurred by the *Owner* may be deducted from any amounts owing by the *Owner* to the *Contractor*.

4.15 Independent *Contractor*

4.15.1 The *Contractor* shall be, and in all respects be deemed to be, an independent contractor and nothing in this *Contract* shall be construed to mean that the *Contractor* is an employee, agent or other representative of the *Owner*.

4.16 Notice of Disruption

4.16.1 If in the performance of the *Work* the *Contractor* intends to interrupt any utility, service, traffic, or property access, then, without limiting any other provision of the *Contract Documents*, the *Contractor* shall give timely written notice to the *Contract Administrator*, and to any affected residence and place of business.

5.0 SHOP DRAWINGS

5.1 Preparation of *Shop Drawings*

5.1.1 The *Contractor* shall arrange for the preparation of all required *Shop Drawings* and submission of them to the *Contract Administrator*.

5.1.2 Unless specifically required by the *Contract Documents*, it is intended that the *Drawings* provided by the *Owner* are sufficiently complete to permit the *Contractor* to proceed with the *Work*, and that *Shop Drawings* are required to show details such as fabrication methods, connections or other details that are not customarily included in Drawings provided by an owner for work similar to the *Work*.

5.1.3 The *Contract Administrator* may require that a *Shop Drawing* be stamped by a registered Professional Engineer with appropriate skill and knowledge indicating that the *Shop Drawing* has been prepared in compliance with applicable codes and design standards and good engineering practice.

5.1.4 If the *Contract Administrator* requires the review and stamping by a Professional Engineer of *Shop Drawings* that are of a type which, according to usual construction practice, are not so reviewed and stamped, then the cost of such review and stamping shall be paid by the *Owner*.

5.2 Submission of *Shop Drawings*

5.2.1 The *Contractor* shall submit *Shop Drawings* to the *Contract Administrator* in a timely way and in an orderly sequence so as to permit the *Contract Administrator* a reasonable opportunity to review the *Shop Drawings* without causing a delay to the *Work* or to the work of *Other Contractors*. The *Contract Administrator* and the *Contractor* shall cooperate to establish a schedule for the submission and review of *Shop Drawings*. The *Contractor* and the *Contract Administrator* shall agree on the number of copies of each *Shop Drawing* to be submitted.

5.2.2 Prior to submission to the *Contract Administrator* the *Contractor* shall review all *Shop Drawings*, and shall indicate such review by dating and stamping them. By this review the *Contractor* represents that the *Contractor* has determined and verified all field measurements, field construction criteria, materials, catalogue numbers and similar data and that the *Contractor* has checked and coordinated each *Shop Drawing* with the requirements of the *Work* and of the *Contract Documents*.

5.2.3 At the time of submission, the *Contractor* shall specifically draw the attention of the *Contract Administrator* in writing to any deviations in the *Shop Drawings* from the requirements of the *Contract Documents*.

5.2.4 Unless otherwise specified in other provisions of the *Contract Documents* the *Shop Drawings* may be drawn by hand, in CAD format, or other format at the selection of the *Contractor*.

5.3 Review by Contract Administrator

5.3.1 The *Contract Administrator* will review *Shop Drawings* submitted by the *Contractor* and return them in accordance with an agreed-to schedule, if any, or otherwise with reasonable promptness so as not to cause delay to the *Work*.

5.3.2 The *Contractor* shall make any changes in *Shop Drawings* which the *Contract Administrator* may require consistent with the *Contract Documents* and resubmit unless otherwise directed by the *Contract Administrator*. When resubmitting, the *Contractor* shall notify the *Contract Administrator* in writing of any revisions other than those requested by the *Contract Administrator*.

5.3.3 When a submitted *Shop Drawing* is acceptable to the *Contract Administrator* as provided by this GC then the *Contract Administrator* shall date and mark the *Shop Drawing* as "Reviewed" and return it to the *Contractor*. The *Contract Administrator* shall date and mark the number of copies submitted.

5.3.4 The *Contractor* may proceed with the *Work* shown on any *Shop Drawing* which the *Contract Administrator* has marked "Reviewed". In no event shall the *Contractor* proceed with the performance of *Work* utilizing *Shop Drawings* which have not been marked "Reviewed" by the *Contract Administrator* as provided by this GC.

5.4 Purpose of Contract Administrator`s Review

5.4.1 The *Contractor* is responsible for any errors or omissions in the *Shop Drawings* and the *Contract Administrator's* review shall not relieve the *Contractor* of that responsibility. The *Contract Administrator's* review of the *Shop Drawings* will normally be to see if they are in general conformance with the *Contract Documents* but the *Contract Administrator* may, as the *Contract Administrator* may decide, review a *Shop Drawing* in greater or lesser detail.

5.4.2 The *Contract Administrator's* authority to review the *Shop Drawings* shall be for the benefit of the *Owner* and such authority shall not give rise to any duty or responsibility on the *Contract Administrator* or the *Owner* to the *Contractor*, *Subcontractors*, or their agents, employees or other persons performing any of the *Work*.

5.4.3 The *Contract Administrator's* review shall not relieve the *Contractor* of responsibility for errors or omissions in the *Shop Drawings* or of responsibility for meeting all requirements of the *Contract Documents* unless a deviation on the *Shop Drawings* has been approved in writing by the *Contract Administrator*.

6.0 OTHER CONTRACTORS

6.1 Owner May Award to Other Contractors

6.1.1 The *Owner* reserves the right to let separate contracts with *Other Contractors*, or to undertake work using the *Owner's* own forces to do *Other Work*.

6.2 Coordination and Connection

6.2.1 The *Contractor* shall, in accordance with usual construction practice, coordinate the *Work* with the *Other Work* and connect to *Other Work* as specified or shown in the *Contract Documents*. If such coordination and connection causes the *Contractor* to incur costs or delays that were not reasonably anticipated at the *Tender Closing Time and Date* then such coordination and connection shall be considered to be a *Concealed or Unknown Condition* and the provisions of GC 11 shall apply.

6.3 Deficiencies in *Other Work*

6.3.1 If the *Contractor* discovers any deficiencies in any *Other Work* which might affect the *Work*, the *Contractor* shall immediately report such deficiencies to the *Contract Administrator* and then confirm such report in writing.

6.3.2 The *Contractor* shall not be entitled to additional payment or an extension in the *Contract Time* on account of such deficiencies in *Other Work* for costs or delays incurred as a result of the *Contractor* failing to observe and report in a timely way such deficiencies which the *Contractor* reasonably should have observed and reported.

7.0 CHANGES

7.1 Changes

7.1.1 A "*Change*" is
(1) an addition to the *Work* that is both
(a) of a type and character similar to the *Work* as defined in the *Contract Documents*; and
(b) is located generally within the territorial limits of the *Work*; or
(2) deletion of the *Work* indicated in the *Contract Documents*; or
(3) an alteration of the *Work* indicated in the *Contract Documents*, within the general scope of the *Work* as described in the *Contract Documents*.

7.1.2 The *Owner* may without invalidating the *Contract* make a *Change* to the *Work*. If the *Owner* makes a *Change* to the *Work* then the *Contract Administrator* shall issue a *Change Order*.

7.1.3 Additional work that the *Owner* may wish performed that does not satisfy the requirements of subparagraphs 7.1.1(1)(1) and 7.1.1(2)(2) of GC 7.1.1 is extra *Work* ("*Extra Work*") and not a *Change*. Pursuant to GC 8, *Extra Work* may be declined by the *Contractor* or may, upon agreement between the parties, be undertaken as *Extra Work*.

7.1.4 A variation between the actual quantity and the estimated *Tender Quantity* for that item set out in the Schedule of Quantities and Unit Prices of not more than plus or minus the percentage set out in GC 9.4.1 shall not be a *Change* and the tendered unit prices shall apply. If the variation is greater than such percentage then the provisions of GC 9.4 shall apply.

7.2 Contemplated Change Order

7.2.1 The *Contract Administrator* may at any time give the *Contractor* a written request (a "*Contemplated Change Order*") to provide a *Quotation* for a specified *Change* that the *Owner* is considering.

7.2.2 If the *Contract Administrator* gives the *Contractor* a *Contemplated Change Order* then the *Contractor* shall, as part of the *Work*, respond as promptly as possible with a *Quotation*. The *Quotation* shall comply with the requirements of GC 9.2.3.

7.3 Written Authorization

7.3.1 The *Contract Administrator* may at any time, by way of a *Change Order* or *Field Memo*, direct the *Contractor* to proceed with a *Change* and the *Contractor* shall comply with such direction.

7.3.2 The *Contractor* shall not proceed with any work that the *Contractor* intends or expects to be treated as a *Change* without first either:

(1) receiving a written *Change Order* or *Field Memo* approving the work as a *Change*; or

(2) if the *Contract Administrator* fails or refuses to issue a *Change Order* or *Field Memo* requested by the *Contractor* approving the *Change*, serving 3 *Days* written notice as provided by GC 17.3.2.

7.3.3 If for any reason the *Contractor* proceeds with work that the *Contractor* intends to claim as a *Change* before a written *Change Order* or *Field Memo* is issued, then the *Contractor* shall maintain daily records, and submit them before the end of the next *Day* to the *Contract Administrator* for certification, as provided by GC 10.3.1. Notwithstanding any other provision of the *Contract Documents*, no payment shall be owing to the *Contractor* on account of any claimed *Change* if the *Contractor* fails to maintain and submit such records. However, the mere maintenance and submission of such daily records shall not create an entitlement for the *Contractor* to receive payment for the claimed *Change*, and the *Contractor's* right to receive payment shall be as otherwise provided by the *Contract Documents*.

7.3.4 The *Contractor* shall not be entitled to rely on any oral representation (except in an emergency, in which event the provisions of GC 7.3.5 shall apply), site meeting discussion, site meeting Minutes or other communication as approval that any *Work* is a *Change*. The *Contractor* shall strictly comply with the requirements of this GC.

7.3.5 In an emergency, when it is impractical to delay the *Work* until the written authorization is issued, the *Contract Administrator* may issue an oral direction which the *Contractor* shall follow. In such event the *Contract Administrator* shall issue a confirming *Change Order* or *Field Memo* at the first opportunity.

7.4 Optional Work

7.4.1 *Optional Work* will only be included in the *Work* if the *Contract Administrator* so directs by *Change Order*, and in such event the *Contractor* shall perform the *Optional Work* as part of the *Work*.

8.0 EXTRA WORK

8.1 Invitation to Perform *Extra Work*

8.1.1 The *Owner* may invite the *Contractor* to perform *Extra Work*, as defined in GC 7.1.3, as part of this *Contract* by issuing a *Contemplated Change Order* or a *Field Memo* for the *Extra Work*.

8.1.2 The *Contractor* is under no obligation to accept an invitation to perform *Extra Work* and the *Owner* is under no obligation to offer work that might be undertaken by the *Contractor* as *Extra Work*.

8.1.3 If the *Owner* issues a *Contemplated Change Order* for *Extra Work* the *Contractor* shall promptly either decline the opportunity to perform the *Extra Work*, or respond with a *Quotation*.

8.1.4 Any *Quotation* which the *Contractor* provides in response to an invitation to perform *Extra Work* shall be in accordance with GC 9.2.3.

8.1.5 The *Owner* is under no obligation to accept the *Contractor's Quotation* for *Extra Work* and may elect to have the *Extra Work* performed by others.

8.2 Written Authorization

8.2.1 In no event shall the *Contractor* proceed with any work that the *Contractor* intends or expects to be treated as *Extra Work* without first receiving a written *Change Order* or a *Field Memo* approving the work as *Extra Work*.

8.2.2 If for any reason the *Contractor* proceeds with work that the *Contractor* expects to be treated as *Extra Work* before the method of payment and adjustment of time have been agreed upon, then the *Contractor* shall maintain and submit daily records as provided by GC 7.3.3.

9.0 VALUATION OF CHANGES AND EXTRA WORK

9.1 Agreement on Adjustments to *Contract Price and Time*

9.1.1 The *Owner* and the *Contractor* shall make all reasonable efforts to reach agreements promptly on adjustments to the *Contract Price*, or the method of valuation, and any adjustments to the *Contract Time*, on account of any *Change* or *Extra Work* prior to the *Contractor* commencing the *Change* or *Extra Work*.

9.2 Valuation Method

9.2.1 Adjustments to the *Contract Price* on account of *Changes* shall be valued as follows:

(1) by any amount or method agreed to by the *Contract Administrator* and the *Contractor* including new unit price(s) or a lump sum; or

(2) if the *Contract Administrator* has directed the *Contractor* to proceed with a *Change* before the parties have reached agreement on price, or method of valuation, the *Contractor* shall proceed with the *Change* and if such agreement is not promptly reached, then the method of valuation shall be by *Force Account*.

9.2.2 If with the approval of the *Contract Administrator* the *Contractor* proceeds with *Extra Work* before the parties have reached agreement on price, or method of valuation, and if such agreement is not promptly reached, then the method of valuation shall be by *Force Account*.

9.2.3 Any written price quotation (a "*Quotation*") submitted by the *Contractor* for a *Change*, a *Contemplated Change Order*, *Field Memo*, or for *Extra Work* shall, unless expressly stated otherwise in the *Quotation*, be interpreted to represent the total adjustment to the *Contract Price* (excluding *GST*) and *Contract Time* owing on account of the *Work* contemplated by the *Quotation* and for certainty:

(1) shall be interpreted to include compensation on account of all related costs, including but not limited to all direct, indirect, "impact", head office, overhead, and all other costs, and all markups and profits, even if the *Quotation* does not specifically mention such items; and

(2) shall be interpreted to have considered all effects on the *Contract Time*, and if there is no mention in the *Quotation* of a required extension to the *Contract Time* then the *Quotation* shall be interpreted to mean that the *Contractor* will complete the work covered by the *Quotation* without any adjustment to the *Contract Time*.

9.2.4 Once a *Quotation* is accepted by the *Contract Administrator*, or other agreement reached between the *Contract Administrator* and the *Contractor* regarding adjustments to the *Contract Price* or *Contract Time* on account of a *Change* or *Extra Work*, the *Contractor* shall not be entitled to claim or receive additional payment, or an adjustment to the *Contract Time*, on account of the *Change* or *Extra Work* unless at the time of the agreement the *Contractor* expressly reserved in writing the right to claim for additional payment or *Contract Time* adjustment.

9.3 Change Order / Field Memo

9.3.1 When a *Change* or *Extra Work* is approved, the *Contract Administrator* shall issue a written approval (a "*Change Order*"), setting out a description of the *Work* covered by the *Change* or *Extra Work*, the price or method of valuation for the *Work*, the change in the *Contract Price* and adjustment, if any, to the *Contract Time*.

9.3.2 The value of *Work* performed in the *Change* or *Extra Work* shall be included for payment with the certificates for payment.

9.3.3 If the *Contract Administrator* has directed that a *Change* or *Extra Work* should proceed before full agreement is reached between the parties on price, or the method of valuation for the *Work*, the change in the *Contract Price* or the adjustment, if any, in the *Contract Time*, then the *Contract Administrator* shall give such direction by issuing a *Field Memo*.

9.3.4 The *Contract Administrator* shall in a timely way issue any *Change Order* or *Field Memo* as required, and provide a copy to the *Contractor*, so that the *Contractor* is able to proceed with a *Change* directed or approved by the *Contract Administrator* or *Extra Work* agreed to by the *Contractor* and the *Contract Administrator* with the required written approval without delay.

9.4 Quantity Variations

9.4.1 If for any reason, including an addition or deletion under GC 7.1.1.1) or GC 7.1.1.2) respectively, the actual quantity of a unit price item varies by more than plus or minus the *Variance Threshold Percentage* from the estimated quantity for that unit price item as listed in the *Schedule of Quantities and Prices* (the "*Tender Quantity*") or as otherwise agreed to pursuant to these *Contract Documents*, then either the *Owner* or the *Contractor* may by written notice request the other party to agree to a revised unit price, considering the change in quantities. A party shall make a request for a revised unit price as soon as reasonably possible after the party concerned becomes aware of the quantity variation.

9.4.2 For *Optional Work*, as provided by GC 7.4.1:

(1) if there is a shortfall in the estimated quantity such shortfall shall not be included in any of the calculations called for under GC 9.4, regardless of whether or not the *Contract Administrator* directs the *Optional Work* be undertaken;

(2) if there is an overrun in the estimated quantity GC 9.4.3 b) shall apply to the overrun.

For reference see Instructions to Tenderers, paragraph 17 regarding prices for *Optional Work*.

9.4.3 A revised unit price shall be applicable and calculated as follows:

(1) in the case of a shortfall of more than the *Variance Threshold Percentage*

(a) the revised unit price shall apply to all of the actual amount of that item constructed or provided; and

(b) the revised unit price shall be determined so that the *Contractor's* total compensation for that item will be equal to: the actual quantity constructed or provided multiplied by the tender unit price; plus, an amount equal to the overhead and profit, if any, the *Contractor* would have received for the quantity in excess of the actual quantity up to the *Tender Quantity* as reduced by the *Variance Threshold Percentage*; and

(2) in the case of an overrun of more than the *Variance Threshold Percentage* of the *Tender Quantity* for that item:

(a) the original unit price shall apply to the *Tender Quantity* for that item plus the *Variance Threshold Percentage* and the revised unit price shall apply only to the quantity in excess of the *Variance Threshold Percentage*; and

(b) a revised unit price, applicable to the quantity in excess of *Tender Quantity* plus the *Variance Threshold Percentage* for that item, shall be determined so that the *Contractor* receives an amount or revised unit prices as agreed by the parties, or failing agreement the actual costs of the excess plus mark-ups as provided by GC 10.1

9.4.4 If either party requests revision of a unit price, or if the *Contractor* is entitled to compensation pursuant to GC 9.4.6, the *Contractor* shall make available to the *Contract Administrator* all documentation reasonably required by the *Contract Administrator* to evaluate the revision or request. Both parties shall make reasonable efforts to agree promptly to an equitable revision to the unit price or to an agreed amount of compensation prior to proceeding with the affected *Work*. Any revision of a unit price shall be a *Change*.

9.4.5 If agreement cannot be reached promptly on a revision to a unit price or compensation pursuant to GC 9.4.6, the *Contractor* shall proceed with the *Work* and the request for a unit price revision or for compensation shall be referred to the *Contract Administrator* pursuant to GC 3.6.1. If either party disagrees with the *Contract Administrator's* decision then the provisions of GC 17 shall apply. Notwithstanding such a *Dispute* the *Contract Administrator* shall include the affected *Work* on the regular certificates for payment on the basis of the original unit prices, and an adjustment payment, if required, shall be made after the final determination of the *Dispute*.

9.4.6 If the *Contractor* incorporates any *Approved Equals* into the *Work*, or if the *Contract Administrator* gives approval for the incorporation of any such substitutional materials after the award of the *Contract*, then for the purposes of GC 9.4.1 the "actual quantity" for the tender item will be the sum of the actual quantity, if any, of the materials as specified in the Tender Form for that tender item plus the actual quantity of the Alternative Materials or substitutional materials that are incorporated into the *Work*.

9.5 Adjustments of *Contract Time*

9.5.1 The *Contract Time* shall be adjusted on account of a *Change* or *Extra Work* by an amount:

(1) as set out in a *Quotation* and accepted by the *Contract Administrator*; or

(2) if the *Contractor* has proceeded with the *Change* in accordance with the *Contract Documents* without agreement on any time adjustments, as the *Contract Administrator* may decide, pursuant to GC 3.6.1, in consultation with the *Contractor*; or

(3) as determined pursuant to GC 17 if the amount is disputed.

9.5.2 In the event of a quantity variation as provided by GC 9.4.1 and regardless of whether the unit price(s) has been adjusted, either party may request an adjustment to *Contract Time* including *Milestone Dates* if any. If agreement cannot be reached then the matter shall be resolved pursuant to GC 17.

9.5.3 If the *Contract Administrator* authorizes *Optional Work* pursuant to GC 7.4.1 then the related *Change Order* shall include adjustments to the *Contract Time* as agreed by the parties. If agreement cannot be reached then the matter shall be resolved pursuant to GC 17.

10.0 FORCE ACCOUNT

10.1 Force Account Costs

10.1.1 Payment for *Force Account Work* shall be calculated as follows:

(1) labour at the actual cost to the *Contractor*, including all amounts paid for labour and all related taxes, assessments payable as required by any statutory scheme such as Workers Compensation, unemployment insurance, holiday pay, insurance, and all employee benefits. A mark-up of 3% on the foregoing shall be allowed for all *Small Tools*. A mark-up of 10% on the total of the foregoing shall be allowed for *Overhead*. A further mark-up of 10% on the total of the foregoing including the mark-up for *Overhead* shall be allowed for profit.

(2) major equipment:

(a) *Contractor* Owned or Bare Rented - at the non-operated hourly rates as set out in the *Approved Equipment Rental Rate Guide* based on actual hours, in minimum increments of 0.5 hours, plus a 10% markup to cover all overhead costs and profit. If equipment is not listed in the *Approved Equipment Rental Rate Guide* then at a rate determined by the *Contract Administrator* based on local equipment rental rates; or

(b) Non-*Contractor* Owned and Operated - at the lower of the all-found rate in the *Approved Equipment Rental Rate Guide* for operated equipment, or the actual rental costs incurred by the *Contractor,* as evidenced by invoice, plus a 10% markup to cover all overhead costs and profit;

(c) No separate rental for *Small Tools*;

(3) materials incorporated into the *Work* or required for the performance of the *Work* and not re-usable, shall be at the *Contractor's* actual cost, as evidenced by invoice, including all transportation, freight and haulage costs plus a mark-up of 10% on such actual cost to cover all overhead, handling, and profit;

(4) *Force Account Work* performed by a subcontractor shall be paid for in the lesser of:

(i) the amount as provided by subparagraphs 10.1.1(1)(2) and (3) of this GC, plus a mark-up of 5%, or

(ii) the actual amount the *Contractor* pays the subcontractor including a markup of 10% on such actual cost to cover all Overheads and profit.

10.2 Prior Written Approval

10.2.1 The *Contractor* shall not do any *Work* to be paid by *Force Account* without the prior written direction of the *Contract Administrator* (except in any emergency, in which event the provisions of GC 7.3.5 shall apply).

10.3 Submit Accurate Records

10.3.1 The *Contractor* shall, for each *Day*, keep an accurate, complete and up-to-date record, in a form satisfactory to the *Contract Administrator*, showing, on a shift-by-shift basis, all *Contractor* and *Subcontractor* labour, equipment and materials to be paid by *Force Account*. The *Contractor* shall submit such *Force Account* reports to the *Contract Administrator* before the end of the next *Day* for certification by the *Contract Administrator*.

10.3.2 The *Owner* shall not be liable to pay for any *Work* based on *Force Account* for which the daily *Force Account* reports were not prepared and submitted as set out in GC 10.3.1.

11.0 CONCEALED OR UNKNOWN CONDITIONS

11.1 Definition

11.1.1 A "*Concealed or Unknown Condition*" is a surface or subsurface physical condition encountered by the *Contractor* in the performance of the *Work* that:

(1) occurs at the *Place of the Work*; and
(2) materially affects the cost of, or the time required for, the performance of the *Work*
(3) differs materially from conditions disclosed in the *Contract Documents*, or apparent in an examination of the *Place of the Work* (including "test pits" or other examinations, if any, that the *Owner* may have made available) or that were reasonably inferable from such sources.
(4) May be subject to cultural or archaeological process by third parties

11.2 Concealed or Unknown Condition a Change or Extra Work

11.2.1 Subject to the other provisions of this GC a *Concealed or Unknown Condition* shall be taken into consideration under the *Contract* as follows:

(1) the impact, if any, of Concealed or Unknown Conditions on the Contract Price and/or the Contract Time shall be a Change, and
(2) the work required to remove, treat, accommodate or otherwise allow for the *Concealed or Unknown Condition* shall be either a *Change* or *Extra Work*, as provided by GC 7 and 8,

and the *Contract Price* and/or the *Contract Time* shall, as the circumstances may require, be equitably adjusted accordingly.

11.3 Notice and Records

11.3.1 If either party wishes to claim that the *Contract Time* or *Contract Price* should be adjusted on account of *Concealed or Unknown Conditions* then such party shall give the other party and the *Contract Administrator* written notice of such claim, immediately after that party first becomes aware of the *Concealed or Unknown Conditions*. No adjustment to the *Contract Time* or *Contract Price* shall be owing for any *Work* completed prior to the delivery of such written notice.

11.3.2 If either party gives notice of *Concealed or Unknown Conditions* pursuant to GC 11.3.1 then as part of the *Work* the *Contractor* shall keep records of all actual costs relating to *Concealed or Unknown Conditions* in accordance with the requirements of GC 10.3.1.

11.3.3 When either party has given such notice of claim to the other, the *Contract Administrator* shall promptly investigate such conditions and the provisions of GC 3.6 shall apply.

12.0 HAZARDOUS MATERIALS

12.1 Risk of Hazardous Materials

12.1.1 Unless otherwise specified in the *Contract Documents* the *Contractor* shall assume that the *Owner* has elected not to conduct tests or investigations for *Hazardous Materials* at the *Place of the Work*.

12.1.2 Subject to the provisions of this GC the *Owner* bears the risk that the *Contractor* will encounter *Hazardous Materials* at the *Place of the Work*.

12.1.3 The *Contractor* has no obligation or duty to conduct tests or investigations for *Hazardous Materials* at the *Place of the Work* unless the *Contract Administrator* gives written directions regarding *Hazardous Materials* that are discovered or suspected at the *Place of the Work* as provided by GC 12.3.

12.2 Discovery of Hazardous Materials

12.2.1 If in the performance of the *Work* the *Contractor* encounters any materials at the *Place of the Work* that the *Contractor* knows or suspects may be *Hazardous Materials* then the *Contractor* shall immediately:

(1) stop the *Work*, or portion of the *Work*, and take such steps as required so that such materials are contained and not disturbed; and

(2) give written notice to the *Contract Administrator* and all other parties as required by law.

12.2.2 If the *Contract Administrator* observes any materials at the *Place of the Work* that the *Contract Administrator* knows or suspects may be *Hazardous Materials* then the *Contract Administrator* shall immediately give written notice to the *Contractor* and the *Contractor* shall immediately stop the *Work* or portion of the *Work* as required by GC 12.2.1(1).

12.3 Directions For Hazardous Materials

12.3.1 If materials are encountered that are or are suspected to be *Hazardous Materials* and written notice is given either by the *Contractor* pursuant to GC 12.2.1, or by the *Contract Administrator* pursuant to GC 12.2.2, then the *Contract Administrator* shall after consulting with the *Contractor* give the *Contractor* written directions specifying what, if any, measures are to be taken on account of such materials so as to reasonably permit the *Contractor* to proceed with the *Work*. The *Contractor* shall strictly comply with any such directions.

12.3.2 The *Work* shall be performed in full compliance with all laws applicable to any *Hazardous Materials* encountered at the *Place of the Work*.

12.4 Contract Adjustment For Hazardous Materials

12.4.1 Any adjustment that the *Contractor* is required by this GC to make to the performance of the *Work* on account of suspected or confirmed *Hazardous Materials* encountered by the *Contractor* at the *Place of the Work* shall be considered a *Concealed or Unknown Condition* and the provisions of GC 11 shall apply.

12.4.2 Unless specifically stated otherwise in the *Contract Documents*, the remediation, treatment or removal of any *Hazardous Materials* shall be *Extra Work.*

12.5 Indemnify for Hazardous Materials

12.5.1 Provided that the *Contractor* strictly complies with the requirements of this GC then the *Owner* shall indemnify the *Contractor* from any costs, expenses and damages the *Contractor* is required by law to pay to any third party (excluding subcontractors) as a direct result of encountering any *Hazardous Materials* in the performance of the *Work* at the *Place of the Work*.

12.5.2 If the *Contractor* fails to notice any materials that a competent contractor reasonably experienced in the *Work* would have noticed were *Hazardous Materials*, or fails to comply with a direction given by the *Contract Administrator* pursuant to GC 12.3.1, then the *Contractor* shall:

(1) pay all reasonable additional costs the *Owner* is required by law to incur to deal with any *Hazardous Materials* that have been disturbed or permitted to escape as a direct result of such failure; and

(2) indemnify the *Owner* from any and all costs, expenses and damages that the *Owner* is required by law to pay to any third party as a direct result of such failure.

12.5.3 The *Contractor* shall not bring to the *Place of the Work* any *Hazardous Materials* and the *Contractor* shall indemnify the *Owner* from any costs, expenses and damages the *Owner* is required by law to pay as a result of the *Contractor* bringing any *Hazardous Materials* to the *Place of the Work*. Nothing in this GC shall be interpreted to prohibit or prevent the *Contractor* from bringing to the *Place of the Work* any *Hazardous Material* such as fuel oil, or other materials that the *Contractor* is specifically, or by necessary and reasonable implication, permitted or required to bring onto the *Place of the Work* in order to perform the *Work* as required by the *Contract Documents*.

13.0 DELAYS

13.1 Delay by Owner or Contract Administrator

13.1.1 If the *Contractor* is delayed in the performance of the *Work* by an act or omission of the *Contract Administrator*, the *Owner*, or its employees or agents, contrary to the provisions of the *Contract Documents*, then, on written notice as required by GC 13.5, the *Contractor* shall be entitled to:

(1) an extension of the *Contract Time*; and

(2) reimbursement by the *Owner* for directly related out of pocket additional costs reasonably and necessarily incurred by the *Contractor* as a result of such delay, plus payment of a markup of 10% on such costs shall be allowed for overhead, plus a further markup of 10% on the total of the foregoing shall be allowed for profit. No payment shall be owed for lost opportunity.

13.2 Delay by Contractor

13.2.1 If the *Contractor* is delayed in the performance of the *Work* by its own acts or omissions, or those of its employees, agents or subcontractors, then the *Contractor* will not be entitled to any time extension or reimbursement as a result of such delay.

13.3 Unavoidable Delay

13.3.1 If the *Contractor* is delayed in the performance of the *Work* by any cause that is beyond the reasonable control of the *Contractor*, *Owner* or *Contract Administrator*, including *Abnormal Weather*, labour disputes, strikes, lock-outs (including lock-outs decreed or recommended for its members by a recognized contractors' association, of which the *Contractor* is a member or to which the *Contractor* is otherwise bound), fire, or unusual delay by common carriers, then, on written notice as required by GC 13.6, the *Contractor* shall be entitled to an extension of the *Contract Time*, but shall not be entitled to reimbursement of any costs. For certainty "common carrier" in this GC does not include an entity offering services to the public over wires or satellite systems.

13.4 Unforeseeable Market Conditions

13.4.1 If the cost of materials required for the *Work* increases as a direct result of natural disaster affecting the source or supply of such materials that results in an increase in cost of the performance of the *Work* of more than 1% of the *Contract Price*, then the parties will agree to an equitable adjustment to the *Contract Price*.

13.5 Delays for Additional Instructions

13.5.1 If *Additional Instructions* are required and no schedule for the issuance of the *Additional Instructions* in question has been made under GC 3.3.3 then the *Contractor* shall not be entitled to claim any extension of the *Contract Time*, or payment of any delay costs because of a failure by the *Contract Administrator* to furnish instructions until 5 *Days* after written demand from the *Contractor* to the *Contract Administrator* for such *Additional Instructions* has been made and then not unless such claim is reasonable. In such event for the purposes of the calculation of any adjustment of the *Contract Time* or any adjustment to the *Contract Price*, any delay shall be considered not to have commenced until the end of the 5 *Days*, or other reasonable period, as referred to above.

13.6 Notice of Delay

13.6.1 Regardless of the cause of a delay the *Contractor* shall give written notice of the delay to the *Contract Administrator* immediately after the commencement of delay, or after the date when the delay reasonably should have been recognized, provided however that in the case of a continuing cause of delay only one notice of claim shall be necessary.

13.6.2 If the *Contractor* gives written notice of delay as provided by GC 13.5.1 then as part of the *Work* the *Contractor* shall keep records of all actual costs relating to the delay in accordance with the requirements of GC 10.3.1.

13.6.3 If the *Contractor* gives such notice of claim to the *Contract Administrator*, the *Contract Administrator* shall promptly investigate such conditions and the provisions of GC 13.7 shall apply.

13.6.4 In no event shall the *Contractor* be entitled to any extension of the *Contract Time*, or increase in the *Contract Price* on account of any delay costs:

(1) for any delay that occurs more than 5 *Days* prior to the written notice referred to in GC 13.6.1;
(2) for any delay for which the *Contractor* has not kept and submitted the records in accordance with GC 10.3.1;
(3) for any delay caused by any matter or condition that the *Contractor*, in proceeding with the *Work*, has covered or made inaccessible for investigation by the *Contract Administrator*.

13.7 Contractor to Mitigate

13.7.1 In the event of any delay the *Contractor* shall take all reasonable measures to minimize the effects and costs of the delay and this obligation shall be taken into account in the determination of the *Contractor's* entitlement to an extension of the *Contract Time* and reimbursement of delay costs.

13.8 Direction to Stop or Delay

13.8.1 The *Contract Administrator* shall not, except by written notice to the *Contractor*, stop or delay the *Work* pending instructions or proposed changes in the *Work*.

13.8.2 During any such stoppage or delay the *Contractor* shall be responsible to protect the *Work* and, provided the *Contractor* prepares and submits records of the delay as specified in GC 10.3.1, the *Contractor* shall be entitled to an extension of the *Contract Time* and payment of reasonably incurred delay costs as set out in GC 13.1.1.

13.9 Liquidated Damages for Late Completion

13.9.1 If the *Contractor* fails to meet the *Milestone Date* for *Substantial Performance* as set out in the *Form of Tender*, paragraph 2.2 as may be adjusted pursuant to the provisions of the *Contract Documents*, then the *Owner* may deduct from any monies owing to the *Contractor* for the *Work*:

(1) as a genuine pre-estimate of the *Owner's* increased costs for the *Contract Administrator* and the *Owner's* own staff caused by such delay an amount of $1000.00 per day or pro rata portion for each Day that actual *Substantial Performance* is achieved after the *Substantial Performance Milestone Date*; plus

(2) all direct out-of-pocket costs, such as costs for safety, security, or equipment rental, reasonably incurred by the *Owner* as a direct result of such delay.

If the monies owing to the *Contractor* are less than the total amount owing by the *Contractor* to the *Owner* under 13.9.1(1) and (2) than any shortfall shall immediately, upon written notice from the *Owner*, and upon *Substantial Performance*, be due and owing by the *Contractor* to the *Owner*.

13.10 Changes and Extra Work not Delays

13.10.1 Extensions to the *Contract Time* that are required because of a Change or *Extra Work* shall be calculated pursuant to GC 7, 8 and 9. Such time extensions shall not be considered delays and the provisions of this GC 13 shall not apply.

14.0 ACCELERATION

14.1 Acceleration to Recover *Contractor*-Caused Delays

14.1.1 If the *Contract Administrator* determines that, because of the *Contractor's* own acts or omissions, the progress of the *Work* is behind the *Construction Schedule*, or will not meet the date for *Substantial Performance* (as may be adjusted pursuant to the *Contract Documents*) then the *Contractor* shall, upon written notice from the *Contract Administrator*, at the *Contractor's* own cost take all reasonable measures to accelerate the *Work* so as to conform to the *Construction Schedule* and meet the date for *Substantial Performance*.

14.2 *Owner* Directed Acceleration

14.2.1 If the *Contract Administrator* determines that, because of reasons other than the *Contractor's* own acts or omissions, the progress of the *Work* is behind the *Construction Schedule*, or will not meet the date for *Substantial Performance* (as may be adjusted pursuant to the *Contract Documents*), or if the *Owner* desires to accelerate the *Work* to achieve early completion of the *Work*, then on written notice from the *Contract Administrator* the *Contractor* shall accelerate the *Work* as may be directed by the *Contract Administrator*, at the *Owner's* cost, such acceleration to be a *Change* to which the provisions of GC 7 shall apply.

14.3 Notice of Acceleration

14.3.1 If the *Contract Administrator* has not directed the *Contractor* to accelerate the *Work* at the *Owner's* cost, the *Contractor* shall not be entitled to claim any payment on account of acceleration costs unless the *Contractor* has given prior written notice to the *Contract Administrator* setting out that the *Contractor* intends to claim such costs and the reasons for such claim, provided however that the giving of such notice shall not, by itself, entitle the *Contractor* to payment of such costs.

14.4 *Owner's* Costs of Acceleration

14.4.1 If the *Contractor* accelerates the performance of the *Work* because of a direction given pursuant to GC 14.1.1, or for the *Contractor's* own benefit, then the *Owner* may claim all reasonable additional costs incurred as a result of such acceleration, including additional costs of the *Contract Administrator*, staff costs or other costs.

15.0 OWNER'S RIGHTS ON CONTRACTOR'S DEFAULT

15.1 Bankruptcy

15.1.1 If the *Contractor* should be adjudged bankrupt, or make a general assignment for the benefit of creditors because of the *Contractor's* insolvency or if a receiver is appointed because of the *Contractor's* insolvency, the *Owner* may, without prejudice to any other of the *Owner's* rights or remedies, by giving the *Contractor* or receiver or trustee in bankruptcy written notice, terminate the Contract.

15.2 Notice of Default

15.2.1 If the *Contractor* should neglect to prosecute the *Work* properly or otherwise fails to comply with the requirements of the *Contract* to a substantial degree the *Owner* may notify the *Contractor* in writing that the *Contractor* is in default of the *Contractor's* contractual obligations and instruct the *Contractor* to correct the default in the 5 *Days* immediately following the receipt of such notice.

15.2.2 If the correction of the default cannot be completed in the 5 *Days* specified, the *Contractor* shall be in compliance with the *Owner's* instructions if the *Contractor*:

(1) immediately takes all reasonable steps to begin to correct the default, and
(2) provides the *Contract Administrator* with a schedule reasonably acceptable to the *Contract Administrator* for such correction, and
(3) completes the correction in accordance with such schedule.

15.2.3 If the *Contractor* fails to correct the default in the time specified or subsequently agreed upon, the *Owner* may, without prejudice to any other right or remedy:

(1) correct such default and deduct from any payment then or thereafter due the *Contractor* the *Owner's* direct costs of such correction (including the *Owner's* reasonable staff and administration costs) as certified by the *Contract Administrator*; and/or
(2) deduct any portion of the outstanding *Work* from the *Contract*; or
(3) terminate the *Contract*.

15.3 Termination

15.3.1 If the *Owner* terminates the *Contract* pursuant to this GC the *Owner* shall, while taking all reasonable measures to minimize costs and delays:

(1) be entitled to take possession of the materials, machinery and equipment located at the *Place of the Work* or elsewhere and intended for incorporation in or prosecution of the *Work*, and to utilize the materials, machinery and equipment, subject to the rights of third parties, and complete the *Work* by whatever method the *Owner* may consider expedient, and

(2) be entitled to withhold any payments owing to the *Contractor*, and

(3) upon *Total Performance* of the *Work*, be entitled to deduct and retain from any amounts withheld from the *Contractor*:

(a) the total of any additional costs (the "*Default Costs*") in excess of the *Contract Price* the *Owner* incurred to achieve *Total Performance* because of the *Contractor's* default, including the costs of other contractors, any administrative costs, the cost of the *Owner's* own forces and the cost to the *Owner* of the *Contract Administrator*, all as certified by the *Contract Administrator*; plus

(b) a reasonable allowance (the "*Maintenance Allowance*") as determined by the *Contract Administrator* to cover the cost of corrections to the *Work* performed by the *Contractor* that may be required under GC 25;

and pay the balance, if any, subject to builders lien holdback requirements, to the *Contractor*. If the total of the *Default Costs* and the *Maintenance Allowance* exceed the total of the payments the *Owner* has withheld then such excess shall be immediately due and owing by the *Contractor* to the *Owner*, and

(4) On expiry of the *Maintenance Period*, deduct from the *Maintenance Allowance* the cost of any corrections to the *Contractor's Work* under GC 25 and pay the balance, if any, to the *Contractor*. If the total of the costs of such corrections exceed the *Maintenance Allowance* then such excess shall be immediately due and owing by the *Contractor* to the *Owner*.

15.3.2 If for any reason this *Contract* is terminated the *Contractor's* obligations described in the *Contract Documents* as to quality, correction and warranty shall continue in force after such termination with respect to the *Work* performed by the *Contractor* up to the time of termination.

16.0 CONTRACTOR'S RIGHTS ON OWNER'S DEFAULT

16.1 Bankruptcy

16.1.1 If the *Owner* should be adjudged bankrupt or makes a general assignment for the benefit of creditors because of the *Owner's* insolvency or if a receiver is appointed because of the *Owner's* insolvency, the *Contractor* may, without prejudice to any other right or remedy the *Contractor* may have, by giving the *Owner* or receiver or trustee in bankruptcy written notice, terminate the *Contract*.

16.2 *Work* Stoppage

16.2.1 If the *Work* should be stopped or otherwise delayed for a period of 30 calendar days or more under an order of a court or other authority having jurisdiction and provided that such order was not issued as the result of an act or fault of the *Contractor* or of anyone directly or indirectly employed or engaged by the *Contractor*, the *Contractor* may, without prejudice to any other right or remedy the *Contractor* may have, by giving the *Owner* written notice, terminate the *Contract*.

16.2.2 The *Owner* may, at its discretion, stop all of the *Work* in which event the provisions of GC 13 (Delays) shall apply, but if such stoppage continues for 30 calendar days or more then the *Contractor* may, without prejudice to any other right or remedy the *Contractor* may have, by giving the *Owner* written notice, terminate the *Contract*.

16.3 Notice of Default

16.3.1 If:

(1) the *Contract Administrator* fails to issue a certificate in accordance with the provisions of GC 18.1.1; or

(2) the *Owner* fails to pay the *Contractor* when due the amounts certified by the *Contract Administrator* or awarded by arbitration or court; or

(3) the *Owner* fails to provide the *Contract Documents* as required by GC 2.1.1;

then the *Contractor* may give written notice to the *Contract Administrator*, with a copy to the *Owner*, that the *Owner* is in default and demand that the *Owner* correct the default within 5 *Days*, and if the *Owner* fails to make the correction then, without prejudice to any other right or remedy the *Contractor* may have, the *Contractor* may stop the *Work* or terminate the *Contract*.

16.4 Termination

16.4.1 If the *Contractor* terminates the *Contract* under the conditions set out above, the *Owner* shall pay the *Contractor*:

(1) for all *Work* performed; plus

(2) a reasonable amount for profit as determined by the *Contract Administrator* on account of the remaining *Work*; plus

(3) reimbursement of expenditures, such as for products, materials, services, subcontractors and equipment, which the *Contractor* made on account of the remaining *Work*, plus any additional costs incurred because of the termination, as determined by the *Contract Administrator*.

17.0 DISPUTES

17.1 *Dispute* Resolution

17.1.1 Any *Dispute* shall be resolved in accordance with the *Dispute* resolution process set out in this GC. The steps in the process, as described in this GC, must be followed in the order set out below unless both parties agree otherwise in writing:

(1) request/obtain initial decision from *Contract Administrator*;
(2) deliver Dispute Notice;
(3) appoint and obtain decision of *Referee*;
(4) demand Settlement Meeting;
(5) if both parties agree, proceed to arbitration; otherwise proceed to litigation.

17.1.2 Attached for ease of reference as a Schedule is a schematic diagram of the *Disputes* entitled "Resolution Process". If there are any inconsistencies between the diagram and the wording of this GC then the wording of this GC prevails.

17.2 Initial Decision

17.2.1 Neither the *Owner* nor the *Contractor* shall be entitled to pursue any *Dispute* without first requesting the *Contract Administrator's* initial decision pursuant to the provisions of GC 3.6.2.

17.2.2 The *Contractor* shall not delay the *Work* or any portion of the *Work* on account of any *Dispute*, or any proceeding taken under this GC.

17.2.3 In the event of a *Dispute* the *Contract Administrator* shall give such instructions as in his opinion are necessary to achieve the proper performance of the *Work* and to prevent delays. The parties shall immediately comply with such instructions. Such compliance shall be without prejudice to either party's rights under the *Contract*.

17.2.4 If it is subsequently determined that such instructions were at variance with the *Contract Documents*, or constituted a change in the scope of the *Work*, then such compliance shall be considered a *Change* and the provisions of GC 7 shall apply. If the *Contractor* intends to make a claim that such compliance is a *Change* then the *Contractor* shall prepare and submit cost records as described in GC 10.3.1 and GC 10.3.2 applies if the *Contractor* fails to meet this requirement.

17.3 Dispute Notice

17.3.1 A party shall not be entitled to pursue a *Dispute* but shall be conclusively deemed to have accepted the decision of the *Contract Administrator* rendered under GC 3.6.2 with respect to any *Dispute* unless, within 10 *Days* after receipt of the *Contract Administrator's* decision, the disputing party gives a written notice of dispute (the "*Dispute Notice*") to the other party and to the *Contract Administrator*.

17.3.2 If the *Contractor* or the *Owner* is of the opinion that the *Contract Administrator* has failed or refused within a reasonable time:

(1) to render a decision as required by GC 3.6.2, or

(2) to give any other direction or instruction as required by the *Contract Documents*,

then that party may give the *Contract Administrator* 3 *Days* written notice to remedy the alleged failure or refusal. If at the end of the 3 *Days* the party is not satisfied with the *Contract Administrator's* action then the party may give a *Dispute Notice*, declaring the failure or refusal to be a *Dispute*, and the provisions of this GC shall apply.

17.3.3 The *Dispute Notice* shall contain particulars of the *Dispute* as reasonably available to the disputing party, including any claimed adjustments to the *Contract Time* or *Contract Price*, and the provisions of the *Contract Documents* on which the claiming party relies.

17.3.4 A *Dispute Notice* shall be given by separate written notice and mention of a dispute in minutes of meetings or similar documents, even if received by the other party and the *Contract Administrator*, shall not qualify as a *Dispute Notice*.

17.4 Negotiation

17.4.1 The parties shall make all reasonable efforts to resolve the *Dispute* by amicable negotiations and shall provide frank, candid and timely disclosure of all relevant facts, information and documents to facilitate negotiations.

17.4.2 For the purpose of negotiating the *Dispute* each of the parties shall consider appointing new representatives, where possible, who have not been directly involved in the *Work*, although neither party shall be obligated to do so.

17.5 Referee

17.5.1 Before proceeding further with the *Dispute*, including demanding a *Settlement Meeting*, or requesting arbitration, or commencing litigation, a dissatisfied party shall obtain a decision on the *Dispute* from a *Referee*, appointed as set out below. The *Referee's* review may be omitted only with the written approval of both parties.

17.5.2 If the *Dispute* is not completely resolved by agreement between the parties within 5 *Days* of the delivery of the *Dispute Notice* then either party may initiate the appointment of a *Referee* as follows:

(1) a party shall submit in writing the names of three acceptable candidates for *Referee* to the other party. The *Referee* may be any person who the parties agree will be a *Referee*; or

(2) if the parties have not agreed upon a *Referee* within 3 *Days* of the submission of names by one party to the other as provided by GC 17.5.2.1), then either party may request in writing the Master Municipal Construction Documents Association to appoint the *Referee*. The Association will have the authority to appoint a *Referee* without further consultation with the parties and the parties shall accept the Association's appointment. If for any reason the Association fails to appoint a *Referee* within 5 *Days* of the written request then such failure shall be deemed to be an agreement between the parties to omit a review of that *Dispute* by a *Referee* and a party may at the end of the 5 *Days* request a *Settlement Meeting* and proceed with the remaining steps in the *Dispute* resolution process as described in this GC.

17.5.3 If a *Referee* is selected for appointment as provided by this GC then the parties shall enter into an agreement with the *Referee* by signing a letter in the form as set out in Schedule 17.5.3 "Letter Agreement with Referee". A failure or refusal by either party to sign a copy of the above letter to appoint a *Referee* selected by the other party in accordance with the provisions of the *Contract Documents* shall be considered a default under this *Contract* and the provisions of GC 15.2.1, or GC 16.3.1, as the case may be, shall apply, except that the time period to sign the letter and remedy the default shall be 1 Day.

17.5.4 Upon receipt of a letter of appointment, in the form described in GC 17.5.3, and a copy of the *Dispute Notice*, the *Referee* shall have the authority to review the *Dispute*.

17.5.5 The fees, disbursements and other costs of the *Referee*, in the amounts as agreed between the parties and the *Referee* as set out in the letter of appointment, shall be shared equally by the *Owner* and the *Contractor*. The *Referee* shall submit all invoices directly to the *Contract Administrator*. The *Owner* shall pay the *Referee* all amounts properly owing to the *Referee* as set out in such invoices, and deduct 50% of such amounts from any amounts owing by the *Owner* to the *Contractor*.

17.5.6 The *Referee* shall conduct a review of the *Dispute* in the manner the *Referee* decides is most suitable, including a review of the *Contract Documents*, the *Contract Administrator's* initial decision, the *Dispute Notice*, the other party's reply, if any, an inspection of the *Place of the Work*, and discussions with any persons. The parties shall comply with all reasonable requests from the *Referee* for additional information and documents which the *Referee* considers necessary for the review. Any information given to the *Referee* by a party shall be given to the other party.

17.5.7 The *Referee* may, with the written approval of the parties, retain others to assist with the review.

17.5.8 The *Referee* shall render a brief and impartial decision in writing on the *Dispute*, with copies to both parties within 15 *Days* of the *Referee's* appointment or such longer period as agreed to in writing by both parties. A value to the parties of the review is in having the *Referee* give a timely decision. The decision shall include consideration of the amount, if any, of an adjustment to the *Contract Time* and *Contract Price* that should be made arising out of the matters relating to the *Dispute*.

17.5.9 After a lapse of 10 *Days* from the time when the *Referee* delivers the *Referee's* written decision on the *Dispute* to both parties then, as the final duty regarding the *Dispute*, the *Referee* shall promptly ask each party whether the *Dispute* has been settled, and then provide a written report to each party summarizing the *Referee's* understanding of the status of the *Dispute*.

17.5.10 If both parties have given *Dispute Notices* relating to the same matters (claim and counterclaim) then the *Referee* shall consider both *Dispute Notices* at the same time and the *Referee's* decision shall be with respect to both *Dispute Notices*.

17.5.11 Once a *Referee* has been appointed to review a *Dispute* then, subject to the timely availability of that *Referee*, and unless both parties agree to choose a different *Referee,* that *Referee* shall be the *Referee* to review all other *Disputes* that may arise under the *Contract*.

17.5.12 A decision of a *Referee* is not binding on the parties, and a *Referee's* review shall be sought only for the purpose of assisting the parties to reach agreements with respect to the *Dispute*.

17.5.13 A *Referee* who has rendered a decision on a *Dispute* may not be retained by only one of the parties to participate in any mediation or settlement proceedings with respect to that *Dispute* conducted pursuant to GC 17.6.1. A *Referee* may not be called by either party to give evidence with respect to the *Dispute* in any subsequent arbitration or litigation proceeding to resolve the *Dispute*, nor shall either party refer to or enter into evidence the decision of the *Referee* in such proceeding.

17.5.14 The parties will agree to release and save harmless the *Referee* from any liability arising from a review undertaken by the *Referee*.

17.6 Settlement Meeting

17.6.1 If the *Dispute* is not completely resolved by agreement between the parties within 10 *Days* of the receipt of the *Referee's* decision then either party may give the other party written demand for a settlement meeting (the "*Settlement Meeting*"). A *Settlement Meeting* will be a meeting of a senior representative(s) of the parties who will meet to attempt to resolve the *Dispute*. If possible, the representatives will be persons who have not previously been directly involved with the matter in *Dispute*. With the agreement of both parties the *Settlement Meeting* may be in the form of mediation conducted with the assistance of an independent mediator, acceptable to both parties.

17.6.2 The parties' representatives shall convene the *Settlement Meeting* within 30 calendar days of such written demand for a *Settlement Meeting*.

17.6.3 A dissatisfied party shall not make a request for arbitration or commence litigation without first making a written demand for a *Settlement Meeting*.

17.7 Arbitration or Litigation

17.7.1 If within 7 calendar days of the commencement of the *Settlement Meeting* the matter is not settled by agreement, or if either party fails or refuses to participate in the *Settlement Meeting* within the time limit set out in GC 17.6.2, then either party may request the other party to agree to submit the *Dispute* to binding arbitration, or may without further notice commence litigation.

17.8 Strict Compliance with Time Limits

17.8.1 The parties agree that timely resolution of any *Dispute* is mutually beneficial and, in order to achieve timely resolution, the time limits, as set out in this GC, shall be strictly enforced.

18.0 PAYMENT

18.1 Preparation of Payment Certificate

18.1.1 Within 5 *Days* after the end of a calendar month the *Contract Administrator* shall prepare and issue a certificate (the "*Payment Certificate*") for the period ending the last calendar day of the month.

18.1.2 The *Payment Certificate* shall set out as of the end of last *Day* of the preceding month:

(1) the total value of the *Work* completed and the materials and products incorporated into the *Work*;
(2) the total quantity, or the percent complete for each pay item;
(3) all holdback amounts if any;
(4) the total amount owing by the *Owner* to the *Contractor*;
(5) any liquidated damages or other deductions;
(6) set offs permitted by the *Contract Documents;* and
(7) the amounts paid or owing to a *Referee(s)* if any.

18.1.3 The *Contract Administrator* shall not finalize a *Payment Certificate* without consulting with the *Contractor's Superintendent* for the purpose of reaching agreements on the amounts to be included in a *Payment Certificate*. The period referred to in GC 18.1.1 for the issuance of the *Payment Certificate* may be extended by any time that the *Contractor* takes to provide the consultation to the *Contract Administrator*, or to provide any supporting documentation the *Contract Administrator* requires to finalize the *Payment Certificate*.

18.1.4 If the *Contract Administrator* does not agree with the *Contractor's Superintendent* regarding any aspect of the *Payment Certificate* then the *Contract Administrator* shall without delay:

(1) prior to issuing the *Payment Certificate*, fully advise the *Contractor's Superintendent* of the reasons for the disagreement; and then
(2) issue the *Payment Certificate* to the *Owner*, with a copy to the *Contractor*, in the amounts the *Contract Administrator* determines are correct.

18.2 Supporting Documentation

18.2.1 The *Contractor* shall provide to the *Contract Administrator* all documentation as required by the *Contract Documents* in support of the completed *Work*, materials and products covered by the *Payment Certificate* including inspection reports, invoices, weigh tickets and daily *Force Account* records.

18.2.2 If requested in writing by the *Contract Administrator* the *Contractor* shall as a precondition to the issuance of the *Payment Certificate* provide a sworn declaration in a form set out in Schedule 18.2.2 to these GC's or such other form as the *Contractor* may request and the *Contract Administrator* may accept, that as of the date set out in the sworn declaration all amounts which have been incurred directly by the C*ontractor* relating to the *Work* that are due and owing to third parties have been paid.

18.3 Materials and Products not Incorporated in *Work*

18.3.1 Except for materials or products which are identified in the *Contract Documents* as being "Supply Only" or are authorized under GC 10.1, payments shall not be made for materials or products purchased by the *Contractor* but not incorporated into the *Work* at the *Place of the Work.*

18.4 Holdbacks

18.4.1 Builders Lien Holdback: The *Owner* shall:

(1) hold back 10%, or other percentage as required by the *Builders Lien Act*, of any amounts due to the *Contractor* as a builders lien holdback; and

(2) if the *Place of the Work* is a highway then, notwithstanding that a lien cannot be registered against the *Place of the Work,* hold back the percentage that would have been required if the *Builders Lien Act* did apply of any amounts due to the *Contractor* as a builders lien holdback, on the same conditions as though such hold back was a requirement of the *Builders Lien Act,* including making payment from such hold back directly to subcontractors.

18.4.2 Defects and Deficiencies: In addition to other holdbacks as provided by the *Contract Documents*, when considering *Substantial Performance*, the *Owner* may hold back from payments otherwise due to the *Contractor* 200% of a reasonable estimate, as determined by the *Contract Administrator*, on account of deficient or defective *Work* already paid for. This holdback may be held, without interest, until such deficiency or defect is remedied. The items of defect or deficiency and the amounts of related holdback shall be listed separately on the *Payment Certificate*.

18.4.3 Incomplete Work: If after *Substantial Performance* is achieved the *Contractor* is unable to complete any of the *Work* because of climatic or other conditions beyond the *Contractor's* reasonable control then the *Owner* may hold back from payments otherwise due to the *Contractor* the amount as estimated by the *Contract Administrator* in consultation with the *Contractor* by which the cost to have others complete the *Work* exceeds the estimated *Contract Price* for such *Work*.

18.4.4 Filed Builders Liens: The *Owner* may, in addition to other holdbacks as provided by the *Contract Documents*, hold back an amount equal to any lien which has been filed with respect to the *Work*, plus 15% as security for costs. The *Owner* may, at its option, after 5 *Days* written notice to the *Contractor*, pay such amount into court to discharge the lien. If the lien is discharged without payment of the holdback into court, then the *Owner* shall pay such holdback to the *Contractor*, without interest.

18.4.5 The *Contractor* shall assist the *Owner* as the *Contract Administrator* may reasonably request to establish a holdback account pursuant to the *Builders Lien Act*, if required to be established under the *Builders Lien Act*, at a savings institution acceptable to the *Owner*, including preparing and completing any and all documents and forms as the savings institution may require. Any notice issued by the *Contractor* upon the *Owner's* failure to pay into the holdback account the amount the *Owner* is required to retain under the *Builders Lien Act* shall be given in writing to the *Contract Administrator*.

18.5 Payment

18.5.1 The net amount shown for payment on a *Payment Certificate* shall be due and payable to the *Contractor* on or before the 15th *Day* after the issuance of the *Payment Certificate*.

18.5.2 The payment by the *Owner* of any monthly or other payment shall not bind the *Owner* with respect to any subsequent payment or the final progress payment, but shall be taken as approximate only, and shall not mean, or be construed to mean, that the *Owner* has accepted *Work* that is not in accordance with the requirements of the *Contract Documents*, or that the *Contractor* is in any manner released from its obligation to comply with the *Contract Documents*.

18.5.3 If for any reason the *Owner* disputes the net amount shown for payment on a *Payment Certificate* the *Owner* shall, within the time specified in this GC:

(1) pay to the *Contractor* any amount not disputed and also deliver to the *Contractor* and the *Contract Administrator* written reasons for any deductions;

(2) pay the balance into an interest-bearing trust account.

The dispute by the *Owner* of the correct amount owing shall be a *Dispute* and the written reasons for any deduction shall constitute a *Dispute Notice*. The trust account monies shall not be removed except by written agreement of the *Owner* and the *Contractor*, or final resolution of the *Dispute*. The provisions of GC 17 shall apply to the resolution of the *Dispute*. The *Owner* will, on request from the *Contractor*, provide the *Contractor* with written confirmation from the financial institution holding the trust account of the amount and terms of the monies paid into trust.

18.6 Substantial Performance

18.6.1 The *Contract Administrator* will, no later than 10 *Days* after the receipt of a written application from the *Contractor* for a *Certificate of Substantial Performance* make an inspection and assessment of the *Work* to verify the validity of the application, and either:
(1) issue the Certificate of Substantial Performance, or
(2) if the *Contract Administrator* decides that *Substantial Performance* has not been achieved, consult with the *Contractor* and advise the *Contractor* of the *Work* required to achieve *Substantial Performance*.

18.6.2 The *Contractor* may, after performing the required *Work*, re-apply for the *Certificate of Substantial Performance*, and the provisions of GC 18.6.1 shall apply to the re-application.

18.6.3 An application for *Substantial Performance* shall be accompanied by:
(1) a sworn declaration in a form in accordance with GC 18.2.2; and
(2) documentation satisfactory to the *Contract Administrator* showing compliance with Worksafe BC requirements.

18.6.4 The Contract Administrator shall include the date of Substantial Performance in the Certificate of Substantial Performance. Immediately following the issuance of the Certificate of Substantial Performance the Contractor, in consultation with the Contract Administrator, will establish a reasonable date for the Total Performance.

18.6.5 The *Owner* shall pay any builders lien holdback as required by the *Builders Lien Act*, or on such other date as required by law, but the *Owner* may hold back the amounts for any deficiencies or filed builders liens as provided in GC 18.4.2, GC 18.4.3, and 18.4.4.

18.6.6 The *Contract Administrator* shall be the payment certifier responsible for payment certification for the *Contractor* under the *Builders Lien Act*. The *Contractor* shall be the person responsible for payment certification for all subcontractors, including the *Subcontractors*, as required under the *Builders Lien Act*.

18.7 Total Performance

18.7.1 The *Contractor* shall ensure that all *Work* is protected until the *Total Performance* of the *Work* and be responsible for the correction of defects in it regardless of whether or not they were apparent when the certificate of *Substantial Performance* was issued.

18.7.2 *Total Performance* shall not be attained until the *Contractor* has removed all products, materials, equipment and waste as referred to in GC 4.14.1.

18.7.3 Upon achieving *Total Performance*, the *Contractor* may apply for a *Certificate of Total Performance* and the procedure and requirements for the issuance of the Certificate shall be as set out in GC 18.6 including the provision by the *Contractor* of the sworn declaration and Worksafe BC compliance documentation.

18.8 Contingency

18.8.1 Any *Contingency* is an allowance which is for the sole benefit of the *Owner*. While the *Owner* shall, as required by the *Contract Documents*, pay the *Contractor* for all *Work* performed the *Owner* has no obligation to pay any *Contingency* to the *Contractor*.

18.9 Waiver of Claims

18.9.1 The *Contractor's* application for the *Certificate of Substantial Performance* shall constitute a waiver and release by the *Contractor* of any and all claims arising out of or relating to the *Contract* to the date of *Substantial Performance*. This waiver shall include without limitation those that might arise from the negligence or breach of contract by the *Owner*, the *Contract Administrator*, and their respective employees, agents, officers and consultants, but does not include claims made by the *Contractor* in writing prior to such application in accordance with the provisions of the *Contract Documents* and delivered to the *Contract Administrator* prior to date of *Substantial Performance* and still unsettled.

18.9.2 The *Contractor's* application for the *Certificate of Total Performance* shall constitute a waiver and release by the *Contractor* of any and all claims arising out of or relating to the *Contract* that have arisen between the date of *Substantial Performance* and the date of *Total Performance*. This waiver shall include those that might arise from the negligence or breach of contract by the *Owner*, the *Contract Administrator*, and their respective employees, agents, officers and consultants, but does not include claims made by the *Contractor* in writing prior to such application in accordance with the provisions of the *Contract Documents* and delivered to the *Contract Administrator* and still unsettled.

18.9.3 The issuance of the *Certificate of Substantial Performance* shall constitute a waiver and release by the *Owner* of all claims for set-off amounts, back charges, cost sharing for *Referees* fees, or other such amounts that are known or reasonably should be known to the *Owner* at the time of the issuance of such Certificate and that the *Owner* might claim relating to the *Contract*, except for claims made by the *Owner* in writing in accordance with the provisions of the *Contract Documents* and delivered to the *Contract Administrator* prior to the issuance of the *Certificate of Substantial Performance* and still unsettled. For certainty, nothing in this GC 18.9.3 shall be interpreted or construed to mean that the *Owner* in any way waives any warranty rights or in any way releases the *Contractor* from the *Contractor's* obligation to perform the *Work* in accordance with the *Contract Documents* and this GC 18.9.3 shall not be construed as any limitation on the *Owner's* rights to claim damages from the *Contractor* arising from any failure by the *Contractor* to perform the *Work* as required by the *Contract Documents.*

18.9.4 The provisions of GC 18.9.3 apply in the same way to the issuance of the *Certificate of Total Performance* such that claims by the *Owner* that have arisen between the date of *Substantial Performance* and the date of *Total Performance* are waived, except for claims made in writing and delivered as set out in GC 18.9.3.

19.0 TAXES, DUTIES AND GST

19.1 Taxes

19.1.1 The *Contract Price* and all unit prices, lump sum prices, and all other prices and *Quotations* shall include all taxes, including sales taxes, customs duties and excise taxes, except for *GST* (collectively the "*Taxes*") payable with respect to the performance of the *Work*. The *Contractor* shall be responsible to pay all *Taxes*.

19.1.2 Any increase or decrease in costs to the *Contractor* due to changes in *Taxes* after the *Tender Closing Date and Time* that was not reasonably foreseeable as of the *Tender Closing Date and Time* shall increase or decrease the *Contract Price* accordingly.

19.2 Price Adjustment

19.2.1 If an exemption, rebate or recovery of any *Taxes* is available with respect to the *Contract*, both the *Owner* and the *Contractor* shall reasonably cooperate so as to obtain such exemption, rebate or recovery regardless of which party may benefit.

19.3 GST

19.3.1 *GST,* where applicable to a price, shall be shown as a separate line item.

20.0 LAWS, NOTICES, PERMITS AND FEES

20.1 Laws

20.1.1 The *Contractor* shall perform the *Work* and give any required notices in full compliance with all applicable laws, ordinances, rules, regulations, codes and orders of the municipal and other authorities having jurisdiction which are in or come into force during the performance of the *Work*.

20.2 Permits

20.2.1 The *Contractor* shall obtain all permits, licenses, approvals and certificates which, as of the *Tender Closing Date and Time*, are generally required for the performance of the *Work* (collectively the "*Contractor Permits*"). *Contractor Permits* shall include all municipal construction permits and approvals. The *Contractor* shall pay all *Contractor* Permit fees.

20.2.2 The *Owner* shall obtain those permits, clearances and approvals that are required for the completed project itself, including any permanent easements or other permanent property rights, land use approvals (such as zoning) or environmental approvals (such as Federal Department of Fisheries and Oceans) (collectively the "*Owner Permits*"). The *Owner* shall obtain all *Owner Permits* in a timely manner so as not to delay the progress of the *Work*.

20.3 Construction Laws

20.3.1 The *Contractor* shall not be responsible for verifying that the *Contract Documents* are in compliance with the applicable laws, bylaws, rules, regulations and codes (collectively the "*Construction Laws*") relating to the *Work*.

20.3.2 If the *Contract Documents* must be changed because they are at variance with any *Construction Law*, whether such *Construction Law* came into force before or after this *Contract* was entered into, then the change in the *Contract Documents* shall be a *Change* to which the provisions of GC 7 apply.

20.3.3 If the *Contractor* becomes aware that the *Contract Documents* are at variance with any of the *Construction Laws* the *Contractor* shall immediately notify the *Contract Administrator* in writing, seeking instructions as to required changes. If the *Contractor* fails to notify the *Contract Administrator* as required by this GC and performs *Work* that the *Contractor* knows or reasonably should know is contrary to a *Construction Law* or order of an authority having jurisdiction, then the *Contractor* shall at the *Contractor's* own cost remove the non-conforming *Work* and bear all resulting costs, expenses and damages.

20.4 Environmental Laws

20.4.1 The *Contractor* shall have due regard for the protection of the environment in the performance of the *Work* and shall not place any materials, or dispose of any materials, or perform any *Work* in a manner contrary to applicable Federal or Provincial or municipal environmental laws and regulations, either at the *Place of the Work*, or at any other place or property.

21.0 WORKERS COMPENSATION REGULATIONS

21.1 Evidence of Compliance

21.1.1 The *Contractor* shall provide evidence, satisfactory to the *Contract Administrator*, of compliance with the requirements of the *Workers Compensation Act* including payments due thereunder at the following times:

(1) prior to commencing the *Work*;
(2) as a condition of receiving a Certificate of Substantial Performance; and
(3) as a condition of receiving a *Certificate of Total Performance*.

21.1.2 At any time during the performance of the *Work*, upon request of the *Contract Administrator*, the *Contractor* shall provide such evidence of compliance with *Workers Compensation Act* by the *Contractor* and his *Subcontractors*.

21.2 Contractor is "Prime Contractor"

21.2.1 Commencing on the effective date of the *Notice to Proceed* and until such time as the *Contractor* has achieved *Substantial Performance*, as part of the *Work* the *Contractor* shall be the "prime contractor" as defined in the *Workers Compensation Act* and accordingly shall comply with all resulting requirements and obligations including coordination of the health and safety activities of all employers at the *Place of the Work*, and complying with the obligations of a prime contractor for a multi-employer workplace as prescribed by the applicable regulations. For certainty, except for that period during which the *Contractor* is the "prime contractor" pursuant to this Section 21.2.1, the *Owner* or appointed third party shall be the "prime contractor" responsible for safety at the *Place of Work*.

21.3 Compliance with Workers Compensation Requirements

21.3.1 If at any time the performance of the *Work* is stopped because the *Contractor* unreasonably fails or refuses to comply with a regulation or order issued pursuant to the *Workers Compensation Act*, then such failure or refusal shall be considered a default under this *Contract* and the provisions of GC 15.2.1 shall apply.

21.3.2 The *Contractor* shall indemnify the *Owner* for any costs, fines, expenses and penalties that the *Owner* is required to pay on account of the *Contractor* performing the *Work* in breach of any *Workers Compensation Act* order or regulation.

22.0 INDEMNIFICATION

22.1 *Contractor* to Indemnify

22.1.1 The *Contractor* shall indemnify and hold harmless the *Owner* and the *Contract Administrator*, their agents and employees from and against claims, demands, losses, costs, damages, actions, suits or proceedings by third parties that arise out of, or are attributable to, any act or omission or alleged act or omission of the *Contractor*, the *Contractor's* agents, employees or *Subcontractors* or suppliers in performance of the *Contract*.

22.2 *Owner* to Indemnify

22.2.1 The *Owner* shall indemnify and hold harmless the *Contractor*, his agents and employees from and against claims, demands, losses, costs, damages, actions, suits, or proceedings arising out of the *Contractor's* performance of the *Contract* which are attributable to a lack of or defect in title to the *Place of the Work*.

22.2.2 If the *Owner* performs work at the *Place of the Work* at the same time as the *Contractor* is performing the *Work*, then the *Owner* shall indemnify and hold harmless the *Contractor*, and the *Contractor's* agents and employees from and against claims, demands, losses, costs, damages, actions, suits or proceedings by third parties that arise out of, or are attributable to, any act or omission or alleged act or omission of the *Owner*, the *Owner's* agents, or employees in the performance of that work.

22.3 Priority

22.3.1 Notwithstanding GC 2.2.4, in the event of conflict between the provisions of this GC and Article 5 of the Agreement, or GC 23, the provisions of this GC shall govern.

23.0 DAMAGES AND MUTUAL RESPONSIBILITY

23.1 Reimbursement for Wrongful Act or Neglect

23.1.1 If either party to this *Contract* should suffer damage in any manner because of any wrongful act or neglect of the other party or of a third party for whom the other party is responsible in law, then, provided the notice provisions of this GC are complied with, the injured party shall be reimbursed by the other party for such damage. If the damage is as a result of a wrongful act or neglect of a third party then the reimbursing party shall be subrogated to the other party's rights against the third party in respect of such wrongful act or neglect.

23.1.2 No claim for reimbursement under this GC shall be made unless written notice, including a brief description of the nature and basis of the claim, is given by the injured party to the other party within a reasonable time after the claiming party knew, or reasonably should have known, of the damage. If such written notice is given before *Total Performance* is achieved, and is disputed by the other party, then the provisions of GC 17 shall apply.

23.2 Damages to Other *Contractor*

23.2.1 If in the performance of the *Work* the *Contractor* causes damages to an *Other Contractor*, the *Contractor* shall use best reasonable efforts to reach a settlement with the *Other Contractor*. If an *Other Contractor* commences litigation or arbitration proceedings against the *Owner* on account of damage that the *Other Contractor* alleges was caused by the *Contractor*, then the *Owner* shall so notify the *Contractor* in writing. On written demand from the *Owner* the *Contractor* shall, at the *Contractor's* own expense, reasonably cooperate with the *Owner* in the defence of the *Other Contractor's* claim, or assume the entire defence of the *Owner*. If a final order or judgement is given in such litigation or proceeding against the *Owner* the *Contractor* shall pay or satisfy it and pay all defence costs reasonably incurred by the *Owner*.

23.3 *Contractor* Right of Appeal in *Owner's* Name

23.3.1 If the *Contractor* is required by this GC to pay or satisfy a final order, judgement or award against the *Owner* then the *Contractor*, upon undertaking to indemnify the *Owner* against any and all liability for costs, shall have the right to exercise the *Owner's* appeal rights with respect to such final order or judgement, in the name of the *Owner*, to any and all courts of competent jurisdiction.

24.0 INSURANCE

24.1 Required Insurance

24.1.1 *Contractor* will at the *Contractor's* expense, carry with an insurance company or companies and under policies of insurance acceptable to and approved by Owner the following insurance with limits not less than shown in the respective items:

(1) Automotive Liability Insurance (Owned and Non-Owned Units)
Limits: Bodily Injury and Property Damage – inclusive each accident $3,000,000
The *Contractor* shall, at the *Contractor's* expense, throughout the term of the *Contract*, maintain such insurance as required under the Insurance (Motor Vehicle) Act of British Columbia. The *Contractor* shall provide the *Owner* with a Certificate of Insurance, I.C.B.C. form No. APV 47, for owned or leased vehicles as evidence of third-party motor vehicle insurance coverage.

(2) Commercial General Bodily Injury and Property Damage Liability Insurance
Limits: Bodily Injury and Property Damage - inclusive $5,000,000
The insurance shall include *Contractor's* Contingent Liability, and Contractual Liability of sufficient scope to include the liability assumed by the *Contractor* under the terms of this *Contract*, and Completed Operations Liability. The policy shall include the *Owner* and the *Contract Administrator* as additional insured with a cross liability clause. Any property damage deductible shall be for the account of the *Contractor* and shall not exceed $10,000.00 for any one occurrence.

(3) Course of Construction Builders' Risk Insurance
Coverage on an "All Risks" basis in the amount of not less than the amount of the *Contract Price*; subject to a deductible provision for the *Contractor's* account not exceeding $10,000.00 each loss. Coverage to include the *Owner* as an additional insured.

(4) Insurance on *Contractor* supplied Equipment
Equipment rented or owned by the *Contractor* to its full insurable value.

(5) Boiler and Machinery Insurance – If Applicable.
Boiler and machinery Insurance in the joint names of the *Contractor* and the *Owner.* The policy shall include as insureds all *Subcontractors.* The coverage shall be maintained continuously from the commencement of use or operation of the boiler and machinery objects insured by the policy and until ten calendar days after *Substantial Performance.*

24.1.2 The above insurance policies listed in this GC shall have the right of subrogation waived as against the *Owner* and its respective employees, servants and agents.

24.1.3 Prior to commencement of any *Work*, the *Contractor* shall provide the *Owner* with satisfactory evidence that the insurance required to be provided by *Contractor* under this GC is in full force and effect.

24.1.4 The *Owner* makes no representation or warranty with respect to the extent or adequacy of the insurance protection afforded by the policies above. It shall be the full responsibility of the *Contractor* to determine their own additional insurance coverages, that are necessary and advisable for its own protection or to fulfil its obligations under this *Contract*. Any such additional insurance shall be provided and maintained by the *Contractor* at the *Contractor's* own expense.

24.1.5 All policies referred to in this GC shall provide that thirty (30) days notice of cancellation will be given in writing to the Named Insured and the *Owner*, otherwise the policies to remain in full force and effect until the *Work* has been completed.

Notwithstanding the foregoing, the Commercial General Bodily Injury and Property Damage Liability Insurance referred to in GC 24.1.1.(2) shall remain in full force and effect from the commencement of the performance of the *Work* for a period of not less than twelve (12) months following *Total Performance*, and with respect to completed operations coverage for a period of not less than 24 months following *Total Performance*.

24.1.6 The *Contractor* is responsible for ensuring that its *Subcontractors* comply with the same insurance requirements as outlined in this GC.

25.0 MAINTENANCE PERIOD

25.1 Correction of Defects

25.1.1 The Contractor shall, at the *Contractor's* own expense, promptly correct defects or deficiencies in the *Work* that appear prior to and during the period of one year from the date of *Certificate of Substantial Performance*, or such longer periods as may be specified in the *Contract Documents* for certain products or *Work* (the "*Maintenance Period*").

25.1.2 During the *Maintenance Period* the *Owner* or the *Owner's* authorized representative shall promptly give the *Contractor* written notice of observed defects and deficiencies.

25.1.3 The *Contractor* shall correct or pay for damage resulting from corrections made to the *Work* pursuant to this GC.

25.2 Commencement of Maintenance Period

25.2.1 The *Maintenance Period* shall not begin to run with respect to any deficiencies remaining at the time of *Substantial Performance*. The *Maintenance Period* for any deficiencies or defects in the *Work* that are made good during the *Maintenance Period*, shall commence from the time when the *Owner* or the *Owner's* authorized representative accepts or reasonably should have accepted such completion, or remedial *Work*.

25.2.2 Subject to GC 26.3.1, all warranties under this *Contract* shall commence from the date of *Substantial Performance* of the *Contract*, regardless of whether any *Subcontractor* achieves *Substantial Performance* of its subcontract prior to *Substantial Performance* of the *Contract* as a whole.

25.3	**Continuing Obligation to Satisfy *Contract Documents***	25.3.1	Neither the issuance of the *Certificate of Substantial Performance* nor the *Certificate of Total Performance* nor the expiry of the *Maintenance Period* shall relieve the *Contractor* of obligation to perform the *Work* in accordance with the *Contract Documents* and to provide materials and workmanship that are not defective or faulty. The rights and obligations as provided by this GC are in addition to other rights set out in other provisions of the *Contract Documents* and none of these other rights or obligations are altered or affected by the expiry of the *Maintenance Period*.
		25.3.2	The *Contractor* shall be responsible for the proper performance of the *Work* only to the extent that the design and specifications permit such performance.

26.0 EARLY USE OF THE WORK

26.1	**Partial Use**	26.1.1	If the *Contractor* performs the *Work* in such a manner that portions of the *Work* may be used by the *Owner* before *Substantial Performance* is achieved then the *Owner* may, on written approval of the *Contract Administrator* and on written notice to the *Contractor*, take over and begin to use such portions even though overall *Substantial Performance* has not been achieved, but such taking and use shall not be deemed an acceptance of such portion or any part of the *Work*.
26.2	**Partial Use a *Change***	26.2.1	If the *Owner* does take over and begin to use a portion of the *Work* before *Substantial Performance* then, unless otherwise specified in the Contract Documents, such use shall be a *Change*.
26.3	**Effect on Maintenance Period**	26.3.1	If the *Owner* does take over and begin to use a portion of the *Work* before *Substantial Performance* is achieved then the *Maintenance Period* shall commence to run from the date of the take over and use with respect to such portions.

END OF General Conditions

L&M Engineering Limited
MMCD Supplemental Conditions, 2024

L&M ENGINEERING LIMITED
MMCD SUPPLEMENTARY CONDITIONS, 2025

The following conditions, which are specific to this project, form part of the Contract and are supplementary to the MMCD General Conditions. These supplemental conditions shall be read in conjunction with this Contract Document. In the event of direct conflict with other components of the contract documents, these Supplemental Conditions shall take precedent.

G.C. 31

Add 3.1.2

The owner designates L&M Engineering Limited as the "Contract Administrator".

G.C. 4.1 Contract Surety

Add 4.17 and replace with the following:

4.17 Contract Surety

The *Contractor* shall, prior to the commencement of the *Work* and as a prerequisite to a Notice to Proceed provide to the *Owner* contact Surety in the form of a 50% Labor and Material Payment and a 50% Performance Bond in the *Contractors* name as Principal.

G.C. 9.4 Quantity Variation

Add 9.4.8

Quantity Variation Threshold shall be +/- 15 %.

Add 9.4.9

Quantity Variation will not be applicable to those works identified as Optional Works.

G.C. 10.1 Force Rate Work

Add 1.1.1 (5)

Force Rates shall not be submitted for management, clerical, foreman or supervisory personnel or equipment already onsite and engaged in coinciding activities or other works while force rate work proceeds.

Add 1.1.1 (6)

Doubling up of Overhead and profit markup on equipment rates already stated as on the Form of Tender as including over head and profit will not be allowed.

G.C. 18.3 Materials and Products not Incorporated in the Work

Add 18.3.2

"Materials and Products not Incorporated in the Work" has the same meaning as the term " Materials Onsite but not Installed" found in L&M Engineering Limited standard documentation.

G.C. 25.0 Maintenance Period

Add 25.2.2

The limitation of the Maintenance Period will not negatively effect or negate those other warranty or maintenance obligations included or put forth by suppliers and vendors for individual products.

L&M Engineering Supplementary Specifications

L&M ENGINEERING LIMITED
SUPPLEMENTARY SPECIFICATIONS, 2025

The specifications for this project are as per the MMCD, Master Municipal Construction Documents publications.

The following Supplemental Specifications supersede the MMCD specifications. These supplemental specifications shall be read in conjunction with every division and section in this Contract Document. In the event of direct conflict these Supplemental Specifications shall take precedence.

Notwithstanding this order of precedence, in the event of a conflict between any of the Contract Documents the more stringent provisions, as determined by the Engineer, shall apply.

1. Equivalent Alternatives.

Designated "Acceptable Manufactures" and "Acceptable Products" may be substituted with equivalent alternatives acceptable to and approved by the engineer.

2. Authorized Person.

Authorized Person refers to the Contract Owner, the Consultant Engineer, the Consulting Engineers representative or the person or agency specifically designated by the Engineer.

3. Material Testing

The Contractor shall be responsible for all quality control material testing as necessary to ensure their supplied products and workmanship meet the requirements of the MMCD specifications. The Contractor must review the MMCD specifications to determine what material testing is required to prove and document proper installation. Additionally, refer to BBA specification.

4. Document Order of relevance.

In the event of conflict between specifications, the following order of relevance will be held.

1. Design Drawings.
2. L&M Supplemental Specifications.
3. MMCD Specifications.

5. Modifications to MMCD, Section 33 11 01, Waterworks.

3.17 General Procedure Flushing, Testing, and Disinfection.

Contractor will prepare and submit for owners approval a Watermain Commissioning Work Procedure containing but not limited to the following components:

3.17.9 A Disinfection plan for the proposed water supply system must be submitted prior to commencement of work. The disinfection and bacteriological testing plan will describe the intended schedule, sample sections, methods, and procedures for all aspects of the testing and disinfection process. This includes the flushing and proper disposal of chlorinated water generated during flushing and disinfection.

6. MEASUREMENT AND PAYMENT, ALL DIVISIONS AND SECTIONS

The MMCD Specifications Measurement and payment descriptions shall be replaced by the specifically prepared Measurement and Payment as provided for in the measurement and of the Supplemental Specifications.

The following Measurement and Payment Descriptions correspond to the provided Schedule of Approximate Quantities and Unit Prices found in Appendix 1 of the form of tender. In the event of discrepancy between the Measurement and Payment Description and Appendix 1, Appendix 1 will be held as correct.

Definitions for Measurement and Payment.

The following is a description of the Payment Types and their standard methods of Measurement:

a. Unit Price Works.

i. Payments are made based on the unit prices lists in the Schedule of Approximate Quantities and Unit Prices.

ii. The Unit Price for supply of materials and installation of materials shall be full compensation for supplying, hauling, placing, installing, cleaning, testing, and placing in service together with all other work subsidiary and incidental thereto for which separate payment is not provided elsewhere.

iii. The method of measurement of the quantities for payment and the basis of payment will be in accordance with the following items of this Measurement and Payment.

iv. No payment will be made for installations beyond the designed limits of works (neat lines) unless approved by the Engineer or otherwise specifically stated within the measurement and payment descriptions.

v. All measurement will be done by the engineer unless otherwise specified.

vi. Where the Schedule of Approximate Quantities and Unit Prices show separate items for supply and installation, the unit prices for supply shall include supplying, delivering, loading, unloading and all allowances for handling, storage, breakage and waste. Payment will be made only for materials actually installed.

b. Optional Works.

i. Items shown in the Schedule of Approximate Quantities and Unit Prices as "Optional Works" will be paid only when actual expenditures are made following receipt of the written authority of the engineer.

ii. Optional works shall be included as part of the Total Contract Price in the calculation of insurance and surety requirements.

iii. All schedules and timelines provided by the contractor will include the performance of the Optional items.

iv. Optional Works Items may be, at the owner's sole discretion, removed from Contract with no penalty to the owner for lost profit, lost opportunity, and without increase to any other contract item. At the agreement of the owner and the contractor, a schedule adjustment may result from the deletion of provisional works.

c. Provisional Sum Works.

i. Items shown in the Schedule of Approximate Quantities and Unit Prices as "Provisional Sums" will be paid only when actual expenditures are made following receipt of the written authority of the engineer.

ii. All provisional sums shall be included as part of the Total Contract Price in the calculation of insurance and surety requirements.

iii. All schedules and timelines provided by the contractor will include the performance of Provisional Sum Works items.

iv. Provisional sums amounts will be replaced by the actual cost of the work. The contractor will not be intitled to payment of remaining any provisional sum not utilized.

d. Lump Sum Works.

i. The total "Lump Sum" tender price provided by the Contractor on the Tender Summary Page is a complete lump sum price for all works illustrated on the design drawings and specified in the Contract Documents.

ii. Items shown in the Schedule of Approximate Quantities and Unit Prices as "Lump Sum" prices will be paid on a lump sum basis, or a percentage thereof.

iii. The lump sum prices for supply and installations of materials shall be full compensation for supplying, hauling, installing, cleaning, testing and placing in service together with all other work subsidiary and incidental thereto for which separate payment is not provided elsewhere.

e. Supply Only Works.

i. Supply only works include full compensation for supply, delivery to the owner and stockpiling of those materials specified in the contract documents. Contractors are not required to perform installation, however the materials remain the responsibility of the contractor until such materials are delivered to the owners care or are otherwise used by the owner. The conditions of warranty and maintenance still apply to Supply Only Works.

f. Definitions of Units.

i. Lineal Meters, (“lm.”, “LM”). Measured in metric meters, always in the horizontal plane unless otherwise specified in the measurement and payment description.

ii. Square Meters, (“m2”, “Sq.m”) Measured or calculated areas in metric meters in the horizontal plane. The area is defined by the top surface of designed area (neat lines) unless otherwise specified in the measurement and payment description.

iii. Cubic Meters, (“m3”,”Cu.m”). Measured or calculated volumes in metric meters. Defined by the limit of designs.

iv. When cubic meters are utilized for installations of a set dimension, the height of the structure multiplied by an area taken at the midpoint of the structure defines the volume unless otherwise specified in the measurement and payment description.

v. Lump Sum, (“ls”, “LS”). All-inclusive payment for all identified works associated with a given item.

vi. Each. (“ea”, “EA”) Payment for all identified works for a singular unit of an item. Measured by

vii. Vertical Meters, (“vm”, “VM”). Measured or calculated in metric meters in the vertical plane from the center point of an installation at design invert to the final design.

CONTRACT SPECIFIC MEASUREMENT AND PAYMENT DESCRIPTIONS:

Section 1 - General Requirements.

1.1 Mobilization and Demobilization

- This item shall consist of any startup costs, moving equipment, materials, offices, and temporary facilities and other items onsite and expenses associated with the project as well as performance of. Only one mobilization at the beginning of the project, one demobilization and clean-up at the end of the project, and, regardless of the project schedule and constraints.

Payment

- Payment will be made at the Contract Lump Sum Price shown in the "Schedule of Quantities and Prices" with 50% of the Lump Sum paid at first progress, 25% of the Lump Sum paid prorated on a monthly basis based on the percentage of the Contract completed and 25% of the Lump Sum paid following Substantial Completion.

Measurement

- As a percentage complete.

1.2 Demolition and Salvage

This item shall include the demolition, salvage, relocations, or removal of existing infrastructure including but not limited to existing curb, gutter, existing PRV stations including all components of the exiting vaults as detailed on the Contract Drawings. The unit price includes all costs associated with the removal, loading, hauling, stockpiling, relocation and reinstallation, disposal of material to an approved off-site location and backfilling of resulting excavations resulting from removal.

The Contractor shall be responsible for all necessary permits and fees for the transportation and disposal of the demolition waste. The district will not receive concrete rubble or other wastes to their gravel pits or other facilities.

Payment

- Lump sum.

Measurement

- As a percentage complete.

1.3 Hydro Vactor Locates

This item shall consist of any and all costs for personnel, equipment, and performance of hydro vactor or similar, safe method excavation as the contractor may deem necessary for safe performance of work and protection of existing installations and underground utilities. Item includes underground locates, disposal of any resulting wastes, backfill of any resulting holes, survey of locations and elevations, reporting and coordinating of locations with engineer.

Payment

- Lump Sum paid prorated on a monthly basis based on the percentage of completed.

Measurement

- As a percentage complete.

Section 2 – Surface Works – Road Repair – Optional Work

2.1 Asphalt Removal and Disposal

This item shall include the removal of asphalt as detailed on the Contract Drawings. The unit price includes all costs associated with the saw cutting, removal, loading hauling and disposal of 100mm asphalt to an approved offsite location. The district will not receive asphalt wastes to their gravel pits or other facilities.

The Contractor shall be responsible for all necessary permits and fees for the transportation and disposal of the asphalt.

Payment

- Unit price per Sq.m installed.

Measurement

- The neat line plan area measured from the contract drawings.

2.2 Asphalt Paving 100mm Thickness

This item shall consist of the supply and installation of Class 1 asphaltic concrete to the limits as shown on the Contract Drawings. The unit price shall be full compensation for all costs associated with the labor, materials, equipment necessary to load, haul, place in uniform layers, shape, grade, roll, and compact asphalt to the elevations shown on the Contract Drawings.

This item includes the submission of an asphalt mix design, asphalt cutting, matching to existing pavements and finished grades within the roadway, along with all other incidental work for which separate payment is not specified elsewhere.

Payment

- Unit price per Sq.m.

Measurement

- The lesser measurement of either the neat line area or plan area defined by the design drawings.

2.3 Concrete Curb and Gutter – Erect Curb

This item shall include supply and installation of concrete curb and gutter as detailed on the Contract Drawings. The unit price includes supply and installation of monolithic concrete curb and gutter, expansion and contraction joints, and joint sealer materials to match to the existing asphalt roadway.

This item also includes all required, formwork, fine grading, loading, hauling, hand forming, carpentry work, trowelling, brushing, trimming, and all incidental work for which separate payment is not specified elsewhere.

Item includes all required materials testing as required including but not limited to mix design air, slump and compressive strength testing and associated reporting.

This item includes installation of native or import fill as curb backing.

Payment

- Unit price per lineal metre.

Measurement

- Lineal measurement of in the horizontal plane.

2.4 Aggregates

a) WGB – Road and Pathway Rehabilitation - 300mm.
b) SGSB = Road Rehabilitation – 500mm.

This item shall consist of the production supply and installation of aggregates. The unit price will include production, supply, delivery, loading, hauling, placing in uniform layers, compacting across the entire installation width, moisture conditioning of materials, final grading and shaping in preparation for the asphalt, and all other incidental work for which separate payment is not specified elsewhere.

The item shall also include the performance of proof rolling of the base at the discretion of the engineer.

Item includes all required materials testing, density testing and associated reporting.

Payment

- a, b: Unit price per Sq.m.

Measurement

- In place area as measured by the engineer. With no payment for materials placed beyond the neat lines of the design.

Section 3 – Water Works

3.1 PRV Station, Supply and Installations

This item shall consist of the supply and installation of a new PRV Station as per the contract. Works will include full compensation for all costs associated with the labor, materials, equipment and appurtenances including but not limited to the following.

- Excavation, temporary stockpiling of excavated materials, moisture conditioning of excavated materials in preparation for backfilling, backfill of excavation, compaction of backfill materials, loading, hauling and offsite disposal of surplus excavation and final grading.
- Control and management of trenchline and excavation groundwater water infiltration.
- Supply, loading, hauling, delivery, offloading and crane installation of a concrete PRV chamber, risers, frame, lid.
- Supply, loading, hauling, delivery, offloading and installation of all fittings, valves, stands, ladders, vent pipes and other all associated and listed internal components of the PRV Chamber.
- Supply, loading, hauling, delivery, offloading and installation of all fittings for proposed tie in watermain and all fittings external to the PRV Station.
- Supply and installation of concrete thrust blocks.
- Production, supply, delivery, loading, hauling, placing, moisture conditioning, compaction of bedding materials.
- Protection of existing infrastructure,
- Grouting and sealing of chamber.
- Flushing, pressure testing, disinfection, insitu and lab bacteriological testing and commissioning of station.
- 1 hr. of introductory training to District Staff on the function and operation of the PRV Station.
- Supply of O&M documents for the station.

Payment

- Lump sum.

Measurement

- As a percentage complete.

3.2 Isolation and Connection to Existing Mains

This item consists of the connection to existing water mains at the locations specified in the Contract Documents.

The unit price shall include locating and confirming existing water main valves, Hydrovactor locating and excavation of the existing water main. Flushing of existing mains, prevention of backflow into existing mains and all other works necessary to accomplish connection to existing potable water system in accordance with AWWA standards for work on potable water systems.

The item also includes preparation and submission of a AWWA compliant watermain isolation plan for approval by the district, coordination and scheduling of district personnel for isolation work, preparation of notification to public for any interruptions of service and assistance to the district in performance of actual isolation. The district will be reasonable for actual isolation.

Payment

- Unit price each tie-in completed.

Measurement

- Physical count.

Section 4 – Miscellaneous

4.1 75mm Thickness Topsoil and Grass Seeding

This item consists of the provision and installation of topsoil and hand seeding within all disturbed areas. All materials shall be supplied in accordance with the Contract Drawings and with the MoTI Section 757 Technical Specifications.

The unit price shall be full compensation for all costs associated with the labour, materials, equipment and appurtenances necessary to haul, place and grade topsoil, uniformly apply hand seed mixture, watering of seeded area and all other incidental work for which separate payment is not specified elsewhere. The hydroseeding application shall be in accordance with the Contract Drawings.

Payment

- Lump sum.

Measurement

- As a percentage complete.

4.2 Sump Pump Storm Discharge Line

This item shall consist of the supply and installation of sewer pipe as indicated on the Contract Drawings. The work also includes the supply of pipe fittings and required installation materials, pipe laying, connection to proposed manhole or main, grouting, jointing as per the Contract Drawings, and all other incidental work for which separate payment is not specified elsewhere.

Payment

- Lump sum.

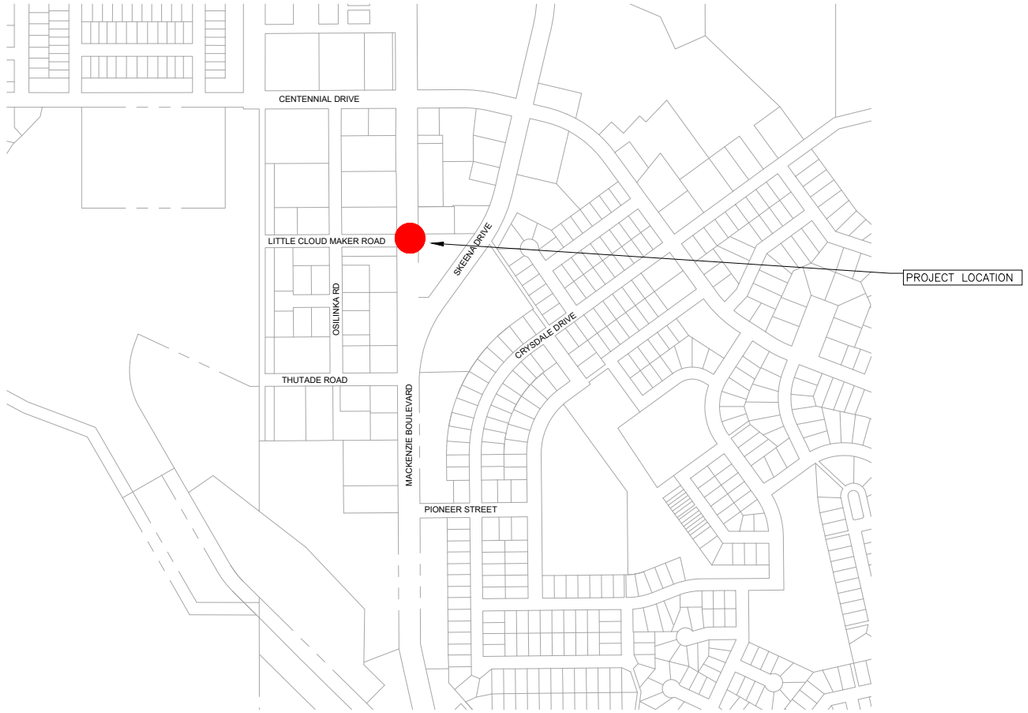
Measurement

- As a percentage complete.

DISTRICT OF MACKENZIE

MACKENZIE BLVD. & LITTLE CLOUDMAKER RD.

P.R.S. #4 REPLACEMENT



DRAWING INDEX

Dwg No.	Rev.	Description
C001	1	CONSTRUCTION NOTES
C002	1	CONSTRUCTION DETAILS
C003	1	OVERALL SITE PLAN
C004	1	P.R.S. #4 MACKENZIE BOULEVARD
C005	1	SECTIONS & DETAILS

ISSUED FOR TENDER

L&M ENGINEERING LIMITED
1210 FOURTH AVENUE
PRINCE GEORGE, B.C.
V2L 3J4
TEL. (250) 562-1977
FAX (250) 562-1967

PROJECT No.:	1044-79
DATE:	05/06/25
PROJECT MANAGER:	LM
DESIGNER:	LM
DRAFTSPERSON(S):	AS

GENERAL CONSTRUCTION NOTES

1. ALL WORKS ARE TO BE CONSTRUCTED IN ACCORDANCE WITH THE 2019 MASTER MUNICIPAL CONSTRUCTION DOCUMENTS (MMCD)
2. THE LOCATION OF EXISTING UTILITIES, AS SHOWN ON THE DESIGN DRAWINGS, ARE APPROXIMATE ONLY AND MAY NOT BE FULLY ACCURATE OR COMPLETE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR A BC ONE CALL AND TO LOCATE ALL EXISTING UNDERGROUND UTILITIES PRIOR TO ANY SITE WORKS.THE CONTRACTOR SHALL EXPOSE ALL TIE-IN LOCATIONS AND POTENTIAL POINTS OF CONFLICT AND CONFIRM DESIGN ELEVATIONS PRIOR TO COMMENCING CONSTRUCTION. IN THE EVENT OF A CONFLICT, THE CONTRACTOR SHALL CONTACT THE ENGINEER IMMEDIATELY FOR DIRECTION. THE CONTRACTOR SHALL ASSUME ALL COSTS AND EXPENSES THAT MAY ARISE FROM DAMAGES AND REPAIR TO SUCH UTILITIES.
3. FOR ANY MATERIAL SUBSTITUTION OR CHANGE TO THE DESIGN, THE CONTRACTOR MUST OBTAIN WRITTEN APPROVAL FROM THE ENGINEER PRIOR TO COMMENCING CONSTRUCTION. FAILURE TO GET WRITTEN APPROVAL FROM THE ENGINEER OF RECORD MAY RESULT IN A BREACH OF CONTRACT AND THE CONTRACTOR MAY HE HELD LIABLE FOR DAMAGES THAT MAY OCCUR.
4. SITE WORK DEMOLITION AND REMOVALS ALL REMOVALS ARE TO BE DISPOSED OF IN AN APPROVED OFF SITE LOCATION. THE CONTRACTOR IS TO PROTECT EXISTING STRUCTURES AND SPECIAL CARE IS TO BE TAKEN TO NOT DAMAGE EXISTING ITEMS OUTSIDE OF THE LIMIT OF REMOVALS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGES THAT MAY OCCUR.
5. ASPHALT AND CONCRETE REMOVALS ALL ASPHALT AND CONCRETE THAT ARE TO BE REMOVED ARE TO BE SAWCUT ALONG THE LIMIT OF REMOVALS AND DISPOSED OF IN AN APPROVED OFF SITE LOCATION. SPECIAL CARE IS TO BE TAKEN TO NOT DAMAGE THE PAVEMENT OUTSIDE OF THE LIMIT OF REMOVALS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGES THAT MAY OCCUR.
6. UNDERGROUND POWER AND COMMUNICATION CABLE DUCTS UTILITY LOCATION AND INSTALLATION SHALL BE AS PER ELECTRICAL ENGINEERING DESIGN DRAWINGS, UTILITY COMPANY SPECIFICATIONS, AND MANUFACTURES INSTRUCTIONS.
7. ALL WORK SHALL BE IN ACCORDANCE WITH CURRENT WORK SAFE B.C. REGULATIONS.

MASTER MUNICIPAL CONSTRUCTION DOCUMENTS 2019

DIVISION 1 - GENERAL REQUIREMENTS

1. PROJECT RECORD DOCUMENTS SHALL CONFORM TO SECTION 01 33 01 OF THE MMCD.
2. REFERENCE SPECIFICATIONS SHALL CONFORM TO SECTION 01 42 00 OF THE MMCD.
3. TRAFFIC CONTROL, VEHICLE ACCESS AND PARKING SHALL CONFORM TO SECTION 01 55 00 OF THE MMCD.
4. ENVIRONMENTAL PROTECTION SHALL CONFORM TO SECTION 01 57 01 OF THE MMCD.
   a. THE CONTRACTOR SHALL BE RESPONSIBLE TO MAINTAIN ACCESS ROADS TO PREVENT ACCUMULATION OF MUD, DIRT, SAND, GRAVEL OR DEBRIS ON CITY ROADS, CITY LANDS OR PROVINCIAL HIGHWAYS.
8. PROJECT IDENTIFICATION SHALL CONFORM TO SECTION 01 58 01 OF THE MMCD.

DIVISION 3 - CONCRETE

1. CONCRETE REINFORCEMENT SHALL CONFORM TO SECTION 03 20 01 OF THE MMCD.
2. CONCRETE WALKS, CURBS AND GUTTERS (MMCD DRAWING C1-C9) SHALL CONFORM TO SECTION 03 30 20 OF THE MMCD.
   a. THE CONTRACTOR SHALL SUBMIT THE CONCRETE MIX DESIGN AND TRIAL MIX TEST RESULTS TO THE ENGINEER FOR REVIEW AT LEAST TWO WEEKS PRIOR TO COMMENCING WORK.
3. CONCRETE CAST-IN-PLACE SHALL CONFORM TO SECTION 03 30 53 OF THE MMCD.
4. PRECAST CONCRETE SHALL CONFORM TO SECTION 03 40 01 OF THE MMCD.

DIVISION 31 - EARTHWORKS

1. AGGREGATE AND GRANULAR MATERIALS SHALL CONFORM TO SECTION 31 05 17 OF THE MMCD.
   a. SECTION 31 05 17 2.3 - PIT RUN GRAVEL REFER TO THE TABLE FOR MATERIAL GRADATION
   b. SECTION 31 05 17 2.8 - SELECT GRANULAR SUBBASE (SGSB) REFER TO THE TABLE FOR MATERIAL GRADATION.
   c. SECTION 31 05 17 2.9 - CRUSHED GRANULAR SUB-BASE REFER TO THE TABLE FOR MATERIAL GRADATION.
   d. SECTION 31 05 17 2.10 - GRANULAR BASE (WGB, IGB) REFER TO THE TABLE FOR MATERIAL GRADATION.
2. EXCAVATING, TRENCHING AND BACKFILLING (MMCD DRAWING G4) SHALL CONFORM TO SECTION 31 23 01 OF THE MMCD.TRENCH BACKFILL FOR ALL UTILITY MAINS OR SERVICES SHALL CONSIST OF TYPE "3" FILL (APPROVED NATIVE MATERIAL), COMPACTED IN 200mm (LOOSE) THICK LIFTS TO 98% STANDARD PROCTOR MAXIMUM DRY DENSITY. THE TOP 300mm OF SUBGRADE IN ALL UTILITY TRENCHES SHALL BE COMPACTED IN 200mm (LOOSE) LIFTS TO 100% STANDARD PROCTOR MAXIMUM DRY DENSITY. CONTRARY TO SECTION 31 23 01 3.4.1 - PIPE INSTALLATION THE PIPE BEDDING AND SURROUND MATERIAL WILL CONFORM TO THE PIPE MANUFACTURERS RECOMMENDATIONS

DIVISION 32 - ROAD AND SITE IMPROVEMENTS

1. GRANULAR SUBBASE SHALL CONFORM TO SECTION 32 11 16.1 OF THE MMCD.
   a. THE LAYER OF GRANULAR SUBBASE MATERIAL SHALL BE PLACED IN LIFTS NOT EXCEEDING 200mm MEASURED IN LOOSE THICKNESS AND COMPACTED TO 100% STANDARD PROCTOR MAXIMUM DRY DENSITY.
2. GRANULAR BASE SHALL CONFORM TO SECTION 32 11 23 OF THE MMCD.
3. THE LAYER OF GRANULAR BASE COURSE MATERIAL SHALL BE COMPACTED TO 100% STANDARD PROCTOR MAXIMUM DRY DENSITY
4. ASPHALT PRIME SHALL CONFORM TO SECTION 32 12 13.2 OF THE MMCD.
5. HOT-MIX ASPHALT CONCRETE PAVING SHALL CONFORM TO SECTION 32 12 16 OF THE MMCD.
   a. THE ASPHALT SURFACE SHALL CONSIST OF A MINIMUM THICKNESS OF 65mm OF MIX 'C' INSTALLED IN ONE LIFT, UNLESS NOTED OTHERWISE. THE CONTRACTOR SHALL SUBMIT THE ASPHALT CONCRETE MIX DESIGN AND TRIAL MIX TEST RESULTS TO THE ENGINEER FOR REVIEW AT LEAST TWO WEEKS PRIOR TO COMMENCING WORK.
13. TOPSOIL AND FINISHED GRADING SHALL CONFORM TO SECTION 32 91 21 OF THE MMCD.
14. SEEDING SHALL CONFORM TO SECTION 32 92 20 OF THE MMCD.
   g. REFER TO THE MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE 2020 STANDARD SPECIFICATION FOR HIGHWAY CONSTRUCTION SECTION 257 - RE-VEGETATION SEEDING WITH A NORTHERN COSTAL SEED MIX.

DIVISION 33 - UTILITIES

1. CTV INSPECTION OF PIPELINES SHALL CONFORM TO SECTION 33 01 30.1 OF THE MMCD.
   a. PERFORM CLOSED CIRCUIT TELEVISION INSPECTIONS (CCTV) OF INSTALLED STORM SEWERS BY CCTV CAMERA AND RECORDING DEVICES IN ACCORDANCE WITH WRC STANDARDS.
   b. PERFORM CLOSED CIRCUIT TELEVISION INSPECTIONS (CCTV) OF INSTALLED SANITARY SEWERS BY CCTV CAMERA AND RECORDING DEVICES IN ACCORDANCE WITH WRC STANDARDS.
2. WATERWORKS SHALL CONFORM TO SECTION 33 11 01 OF THE MMCD.
   a. WATER MAIN SHALL BE POLY VINYL CHLORIDE PRESSURE PIPE (PVC) TO AWWA C900, PRESSURE CLASS 235 (DR 18) TO THE DIMENSIONS SHOWN IN THE DESIGN DRAWINGS. THE WATER MAIN SHALL HAVE 3.0m MINIMUM COVER UNLESS NOTED OTHERWISE.
   b. THRUST BLOCKS (MMCD DRAWING W1) SHALL BE CONSTRUCTED AS PER SECTION 33 11 01 OF THE MMCD.
   c. GATE VALVES (MMCD DRAWING W3) SHALL BE CONSTRUCTED AS PER SECTION 33 11 01 OF THE MMCD.
   d. MECHANICAL RESTRAINTS ALL FITTINGS ARE TO BE INSTALLED WITH DUCTILE IRON JOINT RESTRAINTS (COATED TO AWWA C219 / 210 / 213 / 550) COMPLETE WITH STUD BOLTS / RODS (ASTM A354, GR BC, SACRIFICIAL COATING WITH ZINC TO ASTM B633 OR CADMIUM TO ASTM B766, MIN 19Ø OR GREATER Ø) AND NUTS (ASTM A563, SACRIFICIAL COATING WITH ZINC TO ASTM B633 OR CADMIUM TO ASTM B766). STUD BOLTS AND NUTS ARE TO BE INSTALLED FINGER-TIGHT. RESTRAINT SHALL BE SUITABLE FOR HOST PIPE, FORD BOX UNIFLANGE 1300/C OR EQUAL. PIPE JOINTS TO BE EBAA IRON MEGALUG MECHANICAL JOINT OR APPROVED EQUIVALENT. ALL PIPE JOINTS WITHIN 12m OF ANY VERTICAL PIPE BEND ARE TO BE MECHANICALLY RESTRAINED.
   e. FITTINGS SHALL BE CAST IRON FITTINGS DUCTILE IRON, CEMENT LINED TO AWWA C104 WITH TYTON OR ANSI/ASME B16.1 CLASS 125/150 FLAT FACE FLANGES, MEETING AWWA (C110, C111, C115, C150, C153), CL350. STAR PIPE OR EQUAL.
   f. TESTING PROCEDURE SHALL CONFORM TO SECTION 33 11 01 OF THE MMCD AND THE LATEST VERSION OF THE ANSI/AWWA STANDARD FOR DISINFECTING WATER MAINS. PRIOR TO CONNECTING THE NEW WATER MAIN TO THE EXISTING WATER MAIN SYSTEM, THE WATER MAIN MUST BE PRESSURE TESTED, CHLORINATED, FLUSHED, AND BACTERIOLOGICAL TESTS CONDUCTED. IF THE CONTRACTOR WISHES TO UTILIZE CITY WATER TO PRESSURE TEST, CHLORINATE, AND FLUSH, THE CONTRACTOR MUST INSTALL A TEMPORARY DOUBLE BACK-FLOW PREVENTOR IN ACCORDANCE WITH THE ANSI/AWWA C510 STANDARDS.
   - PRESSURE TESTING OF THE WATER MAIN SHALL BE CONDUCTED IN ACCORDANCE WITH SECTION 33 11 01 OF THE MMCD. HYDROSTATIC AND LEAKAGE TESTING SHALL CONFORM TO ANSI/AWWA C900-07 STANDARDS. APPLY A LEAKAGE TEST PRESSURE OF 1.5 TIMES DESIGN WORKING PRESSURE OR 1035 KPa (150 psi), WHICHEVER IS HIGHER FOR MINIMUM OF 2 HOURS. ALL TESTING SHALL BE WITNESSED BY THE ENGINEER.
   - FLUSHING OF THE WATER MAIN SHALL BE IN ACCORDANCE WITH ANSI/AWWA STANDARD C651-14. FLUSHING SHALL BE CONDUCTED PRIOR TO BOTH THE PRESSURE TESTING AND PRIOR TO THE BACTERIOLOGICAL TESTING. FLUSHING VELOCITIES SHALL BE CONFIRMED WITH THE ENGINEER. THE CONTRACTOR IS TO OBTAIN APPROVAL FROM THE MUNICIPALITY PRIOR TO DISCHARGING AND CHLORINATED WATER INTO THE SANITARY SYSTEM.
   - CHLORINATION OF THE WATER MAIN SHALL BE CONDUCTED IN ACCORDANCE WITH SECTION 33 11 01 OF THE MMCD AND IN ACCORDANCE WITH ANSI/AWWA STANDARD C651-14. AN INITIAL CHLORINE RESIDUAL OF 50ppm IS REQUIRED THROUGHOUT THE ENTIRE WATER MAIN SYSTEM. AFTER 24 HOURS, A CHLORINE RESIDUAL OF 10ppm MUST BE PRESENT IN THE TEST SECTION. USE A TEST POINT INSTALLATION (MMCD DRAWINGS W5) IF REQUIRED.
   - THE CONTRACTOR IS RESPONSIBLE PERFORMING BACTERIOLOGICAL TESTS ON THE WATER MAIN IN ACCORDANCE WITH ANSI/AWWA STANDARD C651-14. BACTERIOLOGICAL TESTS SHALL BE TAKEN DAILY FOR A MINIMUM OF TWO DAYS. THE BACTERIOLOGICAL TESTS SHALL BE PERFORMED BY AN ACCREDITED LABORATORY APPROVED BY THE NORTHERN HEALTH AUTHORITY. ALL TESTING SHALL BE WITNESSED BY THE ENGINEER.

DIVISION 34 - TRANSPORTATION

1. TRAFFIC SIGNALS SHALL CONFORM TO SECTION 34 41 13 OF THE MMCD.
   j. TRAFFIC SIGNS TO CONFORM TO THE MINISTRY OF TRANSPORTATION MANUAL OF STANDARD TRAFFIC SIGNS AND PAVEMENT MARKINGS. ALL SIGNS SHALL BE DIAMOND GRADE.

NO.	DATE (D/M/Y)	REVISION	BY

ISSUED FOR TENDER

L&M ENGINEERING LIMITED

MACKENZIE BRITISH COLUMBIA

CONSULTANTS PROJECT No.:	1044-79
DRAWN: AS	
CHECKED: LM	
ENGINEER:	
DATE: 05/06/25	
SCALES:	
SCALES:	

DISTRICT OF MACKENZIE
MACKENZIE BLVD. &
LITTLE CLOUDMAKER RD.
P.R.S. #4 REPLACEMENT
CONSTRUCTION NOTES

DRAWING No.
C001

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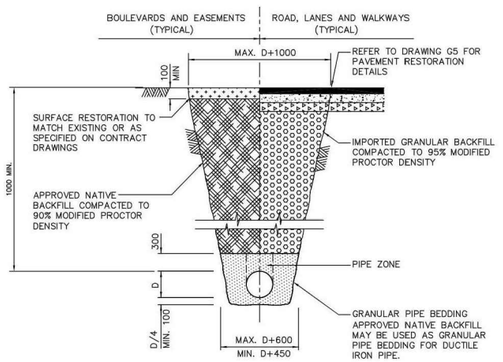
MMCD STANDARD DETAIL DRAWINGS

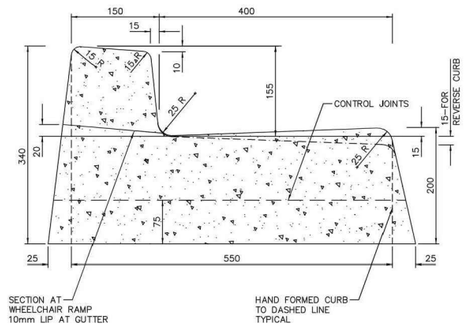


NOTE: 1. TRENCHING TO COMPLY WITH ALL REQUIREMENTS OF WORKSAFE BC.
2. REFER TO CONTRACT DRAWINGS, SECTION 31 23 01 FOR DETAILED SPECIFICATIONS.
3. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

NOT TO SCALE

2019 UTILITY TRENCH — DRAWING NUMBER: **G4**

MMCD STANDARD DETAIL DRAWINGS



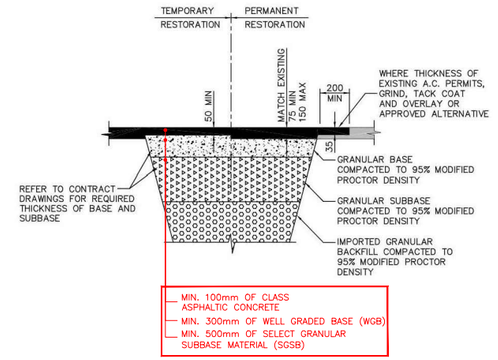
BARRIER CURB WITH GUTTER

NOTE: 1. SECTION SHOWN IS FOR MACHINE EXTRUDED CURBS.
2. REFER TO CONTRACT DRAWINGS, SECTION 03 30 20 FOR DETAILED SPECIFICATIONS.
3. REFER TO DRAWING C1, C2 AND C3 FOR INSTALLATION DETAILS.
4. REFER TO DRAWING C4 FOR DIMENSIONS OF NARROW BASE CURB AND GUTTER.

NOT TO SCALE

2019 CONCRETE BARRIER CURB – WIDE BASE — DRAWING NUMBER: **C5**

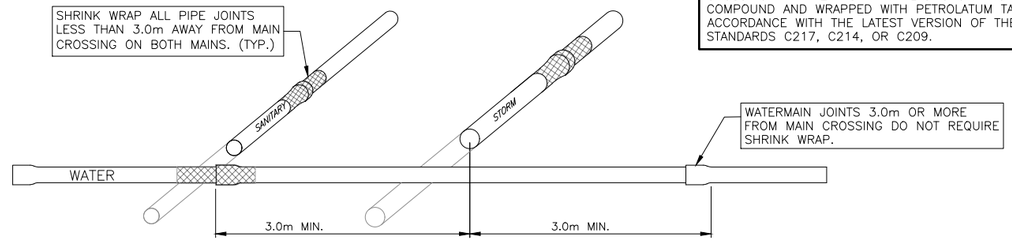
MMCD STANDARD DETAIL DRAWINGS



NOTE: 1. REFER TO CONTRACT DRAWINGS, SECTIONS 31 23 01 AND 32 12 16 FOR DETAILED SPECIFICATIONS.
2. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

NOT TO SCALE

2019 PAVEMENT RESTORATION — DRAWING NUMBER: **G5**



MAIN CROSSING DETAIL
SCALE: N.T.S.

NOTE:

THE NEAREST JOINTS MUST BE 3m OR MORE FROM THE CROSSING. IF THE JOINTS ARE LESS THAN 3m FROM THE CROSSING THEN WRAP ALL JOINTS ON EACH SIDE OF THE CROSSING WITH HEAT SHRINK PLASTIC OR PACKED WITH COMPOUND AND WRAPPED WITH PETROLATUM TAPE IN ACCORDANCE WITH THE LATEST VERSION OF THE AWWA STANDARDS C217, C214, OR C209.

LEGEND

NO.	DATE (D/M/Y)	REVISION	BY

ISSUED FOR TENDER

L&M ENGINEERING LIMITED

MACKENZIE BRITISH COLUMBIA

CONSULTANTS PROJECT No.:	1044-79
DRAWN: AS	
CHECKED: LM	
ENGINEER: LM	
DATE: 05/06/25	
SCALES:	
SCALES:	

DISTRICT OF MACKENZIE
MACKENZIE BLVD. &
LITTLE CLOUDMAKER RD.
P.R.S. #4 REPLACEMENT
CONSTRUCTION NOTES

DRAWING No.
C002

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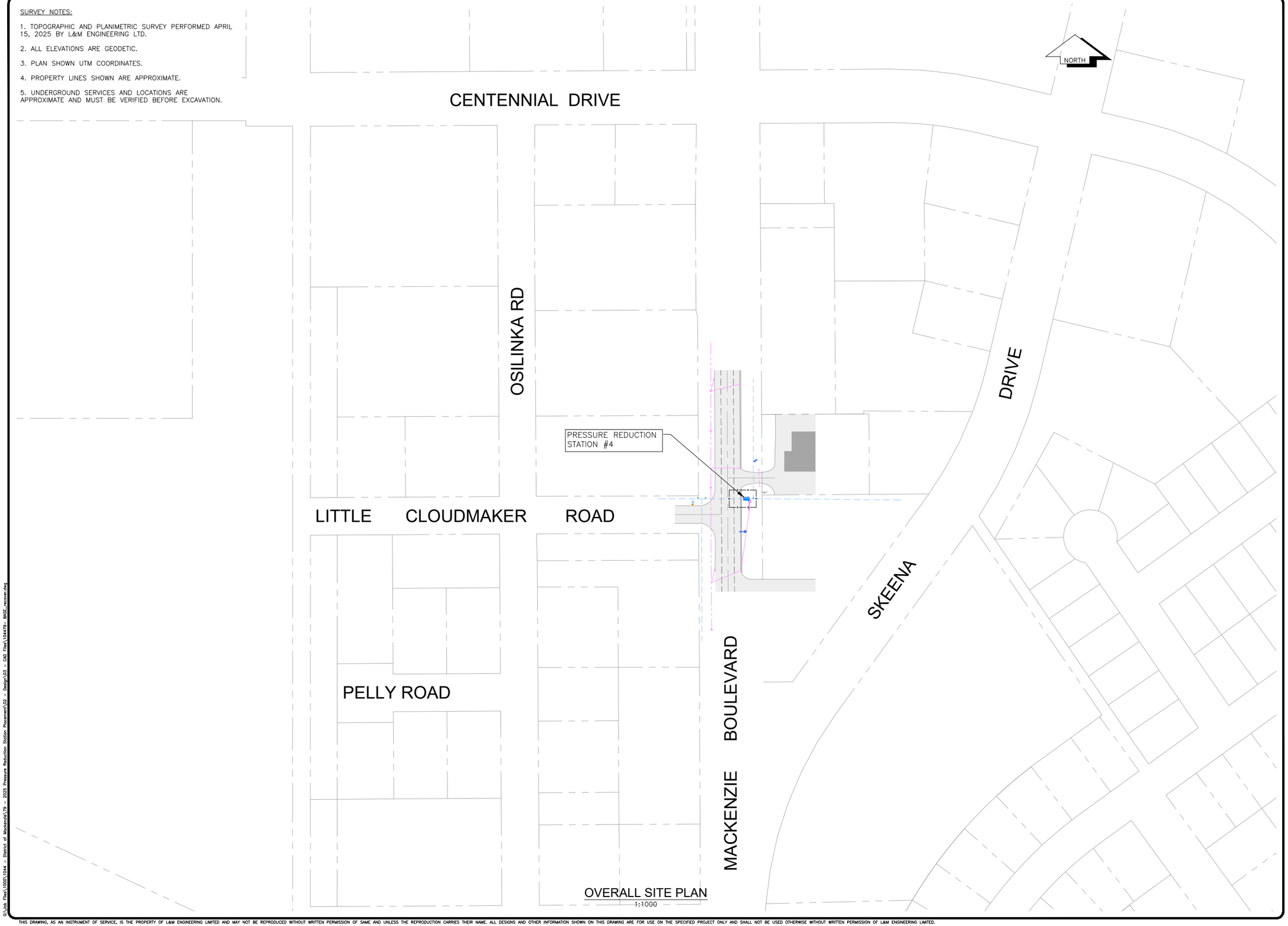
SURVEY NOTES:

1. TOPOGRAPHIC AND PLANIMETRIC SURVEY PERFORMED APRIL 15, 2025 BY L&M ENGINEERING LTD.
2. ALL ELEVATIONS ARE GEODETIC.
3. PLAN SHOWN UTM COORDINATES.
4. PROPERTY LINES SHOWN ARE APPROXIMATE.
5. UNDERGROUND SERVICES AND LOCATIONS ARE APPROXIMATE AND MUST BE VERIFIED BEFORE EXCAVATION.



OVERALL SITE PLAN
1:1000

LEGEND

EXISTING

- EX. LEGAL LINE
- EX. LEGAL R.O.W. & EASEMENT
- EX. SANI/STORM & MANHOLE
- DCB EX. SINGLE & DOUBLE CATCHBASIN c/w CB LEADS
- CS EX. SANI/STORM SERVICE & CURB-STOP
- WV EX. FIRE HYDRANT & VALVE ASSEMBLY
- EX. WATERMAIN & VALVE
- EX. P.R.S.
- EX. ROAD & SIDEWALK
- EX. ROAD SIGN(s)
- EX. GRAVEL ROAD/DRIVEWAY
- EX. FENCE
- OH EX. OVERHEAD LINES
- PP EX. POWER POLE & ANCHOR

PROPOSED

- PR. SANI/STORM & MANHOLE
- PR. FIRE HYDRANT & VALVE ASSEMBLY
- PR. WATERMAIN & VALVE
- OH PR. OVERHEAD LINES
- PP PR. POWER POLE

NO.	DATE (D/M/Y)	REVISION	BY

ISSUED FOR TENDER

L&M ENGINEERING LIMITED

MACKENZIE BRITISH COLUMBIA

CONSULTANTS PROJECT No.:	1044-79
DRAWN:	AS
CHECKED:	LM
ENGINEER:	LM
DATE:	05/06/25
SCALES:	1:1000
SCALES:	

DISTRICT OF MACKENZIE
MACKENZIE BLVD. &
LITTLE CLOUDMAKER RD.
P.R.S. #4 REPLACEMENT
OVERALL SITE PLAN

DRAWING No.
C003

0 30 60 Meters

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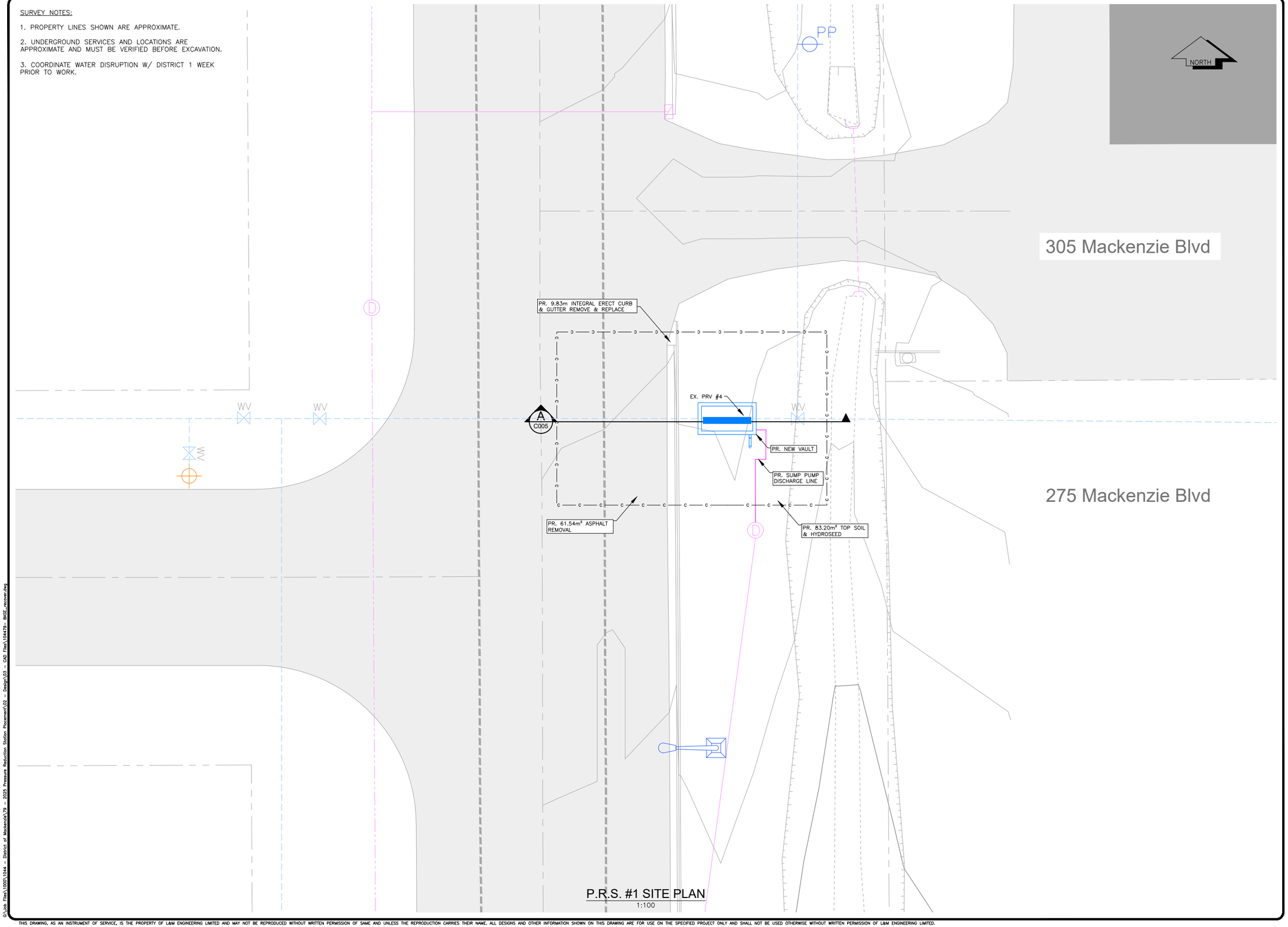
SURVEY NOTES:

1. PROPERTY LINES SHOWN ARE APPROXIMATE.

2. UNDERGROUND SERVICES AND LOCATIONS ARE APPROXIMATE AND MUST BE VERIFIED BEFORE EXCAVATION.

3. COORDINATE WATER DISRUPTION W/ DISTRICT 1 WEEK PRIOR TO WORK.



P.R.S. #1 SITE PLAN
1:100

LEGEND

EXISTING

- EX. LEGAL LINE
- EX. LEGAL R.O.W. & EASEMENT
- EX. SANI/STORM & MANHOLE
- DCB EX. SINGLE & DOUBLE CATCHBASIN c/w CB LEADS
- CS EX. SANI/STORM SERVICE & CURB-STOP
- WV EX. FIRE HYDRANT & VALVE ASSEMBLY
- EX. WATERMAIN & VALVE
- EX. P.R.S.
- EX. ROAD & SIDEWALK
- EX. ROAD SIGN(s)
- EX. GRAVEL ROAD/DRIVEWAY
- EX. FENCE
- OH EX. OVERHEAD LINES
- PP EX. POWER POLE & ANCHOR

PROPOSED

- PR. SANI/STORM & MANHOLE
- PR. FIRE HYDRANT & VALVE ASSEMBLY
- PR. WATERMAIN & VALVE
- OH PR. OVERHEAD LINES
- PP PR. POWER POLE

NO.	DATE (D/M/Y)	REVISION	BY

ISSUED FOR TENDER

L&M ENGINEERING LIMITED

MACKENZIE BRITISH COLUMBIA

CONSULTANTS PROJECT No.:	1044-79
DRAWN:	AS
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ENGINEER:	LM
DATE:	05/06/25
SCALES:	1:100
SCALES:	

DISTRICT OF MACKENZIE
MACKENZIE BLVD. &
LITTLE CLOUDMAKER RD.
P.R.S. #4 REPLACEMENT
SITE PLAN

DRAWING No.
C004

0 3 6 Meters

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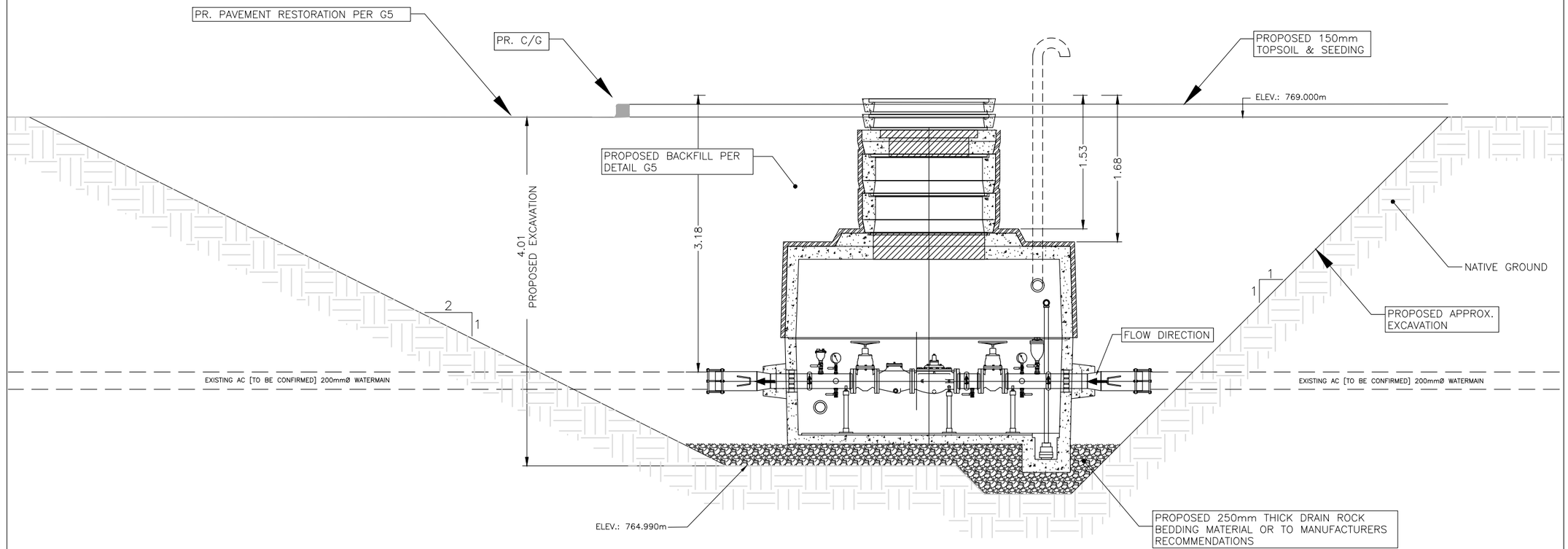

SECTION A C001
1:25

LEGEND

NO.	DATE (D/M/Y)	REVISION	BY

ISSUED FOR TENDER

L&M ENGINEERING LIMITED

MACKENZIE BRITISH COLUMBIA

CONSULTANTS PROJECT No.:	1044-79
DRAWN: AM	
CHECKED: LM	
ENGINEER: LM	
DATE: 05/06/25	
SCALES:	
SCALES:	

DISTRICT OF MACKENZIE
MACKENZIE BLVD &
LITTLE CLOUDMAKER
P.R.S.#4 REPLACEMENT
SECTIONS & DETAILS

DRAWING No.
C005

0 0.75 1.5 Meters

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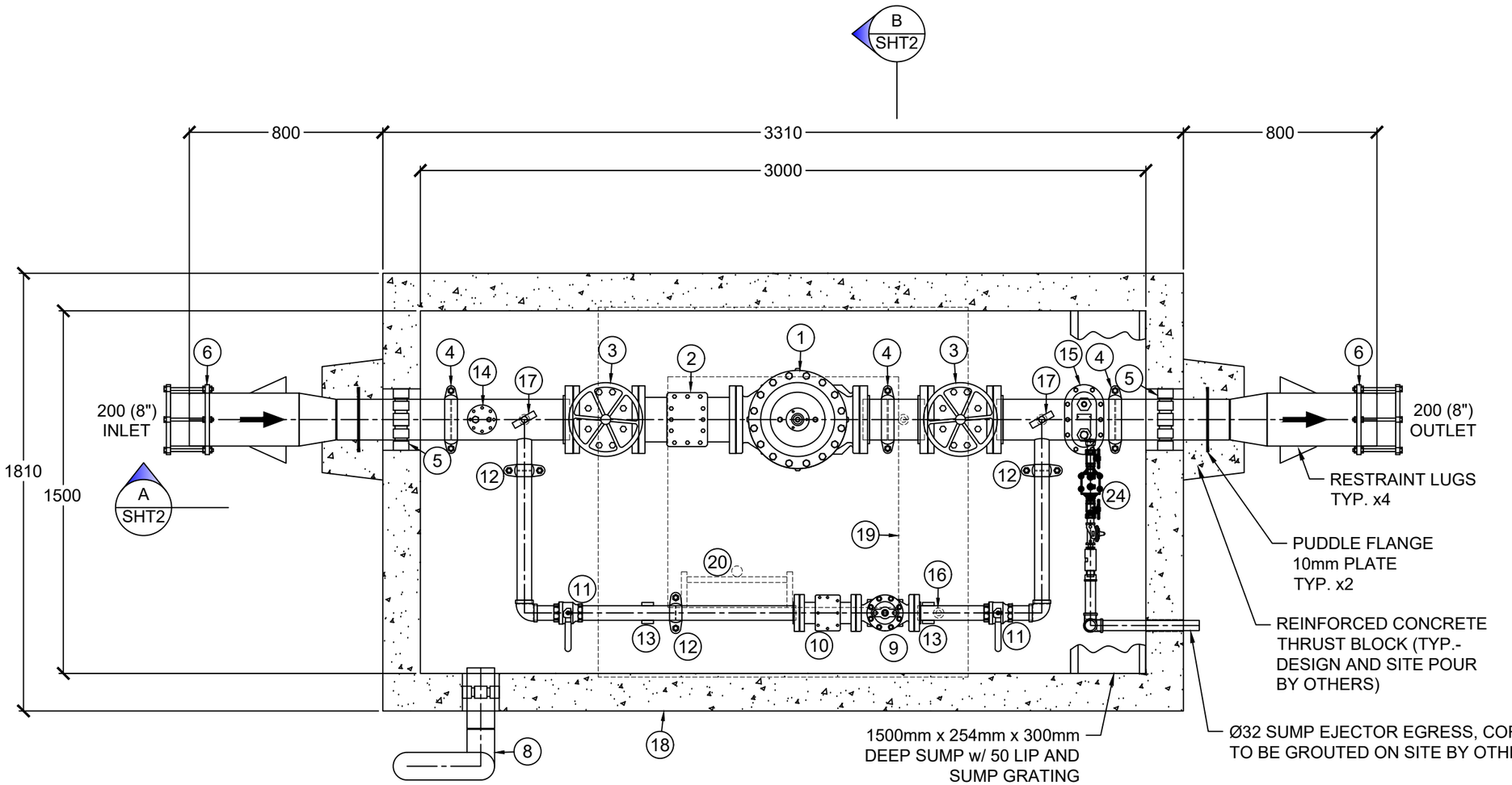


MATERIALS LIST

ITEM	QTY	DESCRIPTION
1	1	150 (6") SINGER 106-PR Pressure Reducing Valve w/ S.S. Braided Hoses, Globe Style Body, #150 Flanges and X107 Position Indicator
2	1	150 (6") CLA-VAL X43H Strainer w/ S.S. Blow Off Valve
3	2	150 (6") MUELLER A2362 NRS Gate Valve w/ Handwheel
4	3	150 (6") VICTAULIC 89 Galv. Grooved Coupling
5	2	150 (6") LINK SEAL Assembly
6	2	200 (8") ROBAR 1506 External Transition Coupling
7	3	150 (6") CWS Adj. Stainless Steel Pipe Support
8	1	100 (4") CWS Sch. 10 304 Stainless Steel Vent Pipe w/ Link Seal Assembly and Bird Screen
9	1	50 (2") SINGER 106-PR Pressure Reducing Valve w/ S.S. Braided Hoses, Globe Style Body, #150 Flanges and X107 Position Indicator
10	1	50 (2") CLA-VAL X43H Strainer w/ S.S. Blow Off Valve
11	2	50 (2") MAS G2E Stainless Steel Ball Valve
12	3	50 (2") VICTAULIC 89 Grooved Coupling
13	2	50 (2") CWS Adj. Stainless Steel Pipe Support
14	1	25 (1") VAL-MATIC 15A.DISV Air Valve w/ S.S. Isolation Ball Valve
15	1	25 (1") VAL-MATIC 201C.2DISV Combination Air Valve w/ S.S. Isolation Ball Valve
16	4	19 (¾") Drain w/ S.S. Isolation Ball Valve
17	2	WINTERS PFQ Pressure Gauge w/ Gauge Tree and S.S. Isolation Ball Valve
18	1	AE #3152 Precast Concrete Chamber c/w White Interior, Black Exterior and Cored Holes
19	1	USF TPS 36"x36" Aluminum Single Door Hatch w/ Pedestrian Loading, Padlock Recess and Insulation - Cast into Custom AE #1.5 Concrete Hatch Collar
20	1	COAST WATER SYSTEMS Aluminum Ladder c/w Safety Post - Shipped Loose Installed By Others
21	3	AE 1.5 Comm Riser - 450mm Tall
22	2	AE 1.5 Comm Riser - 150mm Tall
23	LOT	50 (2") Sprayfoam Insulation
24	1	19 (¾") CWS Sump Ejector w/ DCVA, Float Valve, Fluid Ejector and Foot Valve

FOR INQUIRIES ABOUT THIS PREPACKAGED CHAMBER, PLEASE CALL BRIAN KELENC @ 604-460-3622 OR EMAIL SALES@COASTWATER.CA FOR MORE INFORMATION

CHAMBER (AE 3152)

WEIGHT (APPROX. UNTIL SHIPPING)

TOP: 12,900 LBS / 5,830 KGS

BOTTOM: 11,500 LBS / 5,190 KGS

HATCH COLLAR: 2,100 LBS / 953 KGS

PIPE TRAIN: 2,300 LBS / 1,043 KGS

INSIDE DIMENSIONS:

3000 L x 1500 W x 2000 H

NOTES

- DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED
- ALL ANSI 125#/150# FLANGES
- ALL PIPE AND FITTINGS TO BE SCH. 40 304 STAINLESS STEEL UNLESS OTHERWISE NOTED
- NUTS AND BOLTS TO BE ASTM F593 STAINLESS STEEL w/ EPDM GASKETS

REVISION

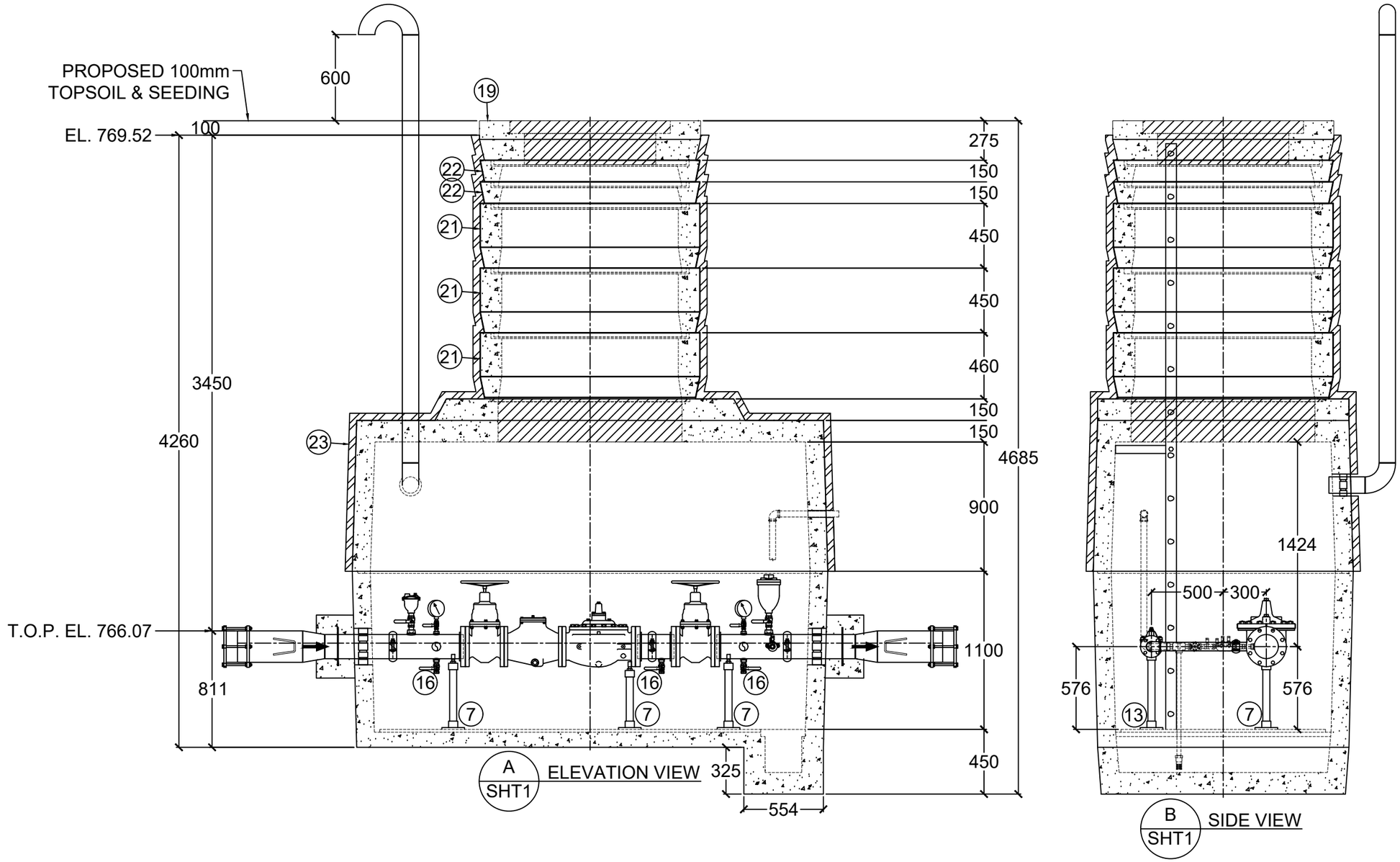
NO.	DESCRIPTION	DATE	BY
A			
B			
C			
D			
E			

COAST WATER SYSTEMS

PROJECT NAME:

DESCRIPTION: 150 (6") PRV w/ 50 (2") PRV BYPASS

DATE: MAY 17, 2024	SCALE: 1:20
QUOTE: --- / OE: ---	SHEET: 1 OF 2
CHECKED BY: BK	DRAWING NO.:
DRAWN BY: SH	REV. -



FOR INQUIRIES ABOUT THIS PREPACKAGED CHAMBER, PLEASE CALL BRIAN KELENC @ 604-460-3622 OR EMAIL SALES@COASTWATER.CA FOR MORE INFORMATION

CHAMBER (AE 3152)

WEIGHT (APPROX. UNTIL SHIPPING)

TOP: 12,900 LBS / 5,830 KGS

BOTTOM: 11,500 LBS / 5,190 KGS

HATCH COLLAR: 2,100 LBS / 953 KGS

PIPE TRAIN: 2,300 LBS / 1,043 KGS

INSIDE DIMENSIONS:

3000 L x 1500 W x 2000 H

NOTES

- DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED
- ALL ANSI 125#/150# FLANGES
- ALL PIPE AND FITTINGS TO BE SCH. 40 304 STAINLESS STEEL UNLESS OTHERWISE NOTED
- NUTS AND BOLTS TO BE ASTM F593 STAINLESS STEEL w/ EPDM GASKETS

REVISION

NO.	DESCRIPTION	DATE	BY
A			
B			
C			
D			
E			

COAST WATER SYSTEMS

PROJECT NAME:	NEW RUPERT OVERLAND WATERMAIN CENTENNIAL DR. PRV STATION #1	
DESCRIPTION:	150 (6") PRV w/ 50 (2") PRV BYPASS	
DATE: MAY 17, 2024	SCALE: 1:30	
QUOTE: --- / OE: ---	SHEET: 2 OF 2	
CHECKED BY: BK	DRAWING NO.: 24-3571-P1	REV. -
DRAWN BY: SH		

APPENDIX B

MMCD SPECIFICATIONS

Select specification, all MMCD specifications apply as may be required. Contractor is reasonable to obtain full MMCD specification

1.0 GENERAL

1.0.1 Section 03 30 20 refers to those portions of the work that are unique to the construction of Portland cement concrete walks, curbs and gutters. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

1.1 Related Work

1.1.1	Cast-in-Place Concrete	Section 03 30 53
1.1.2	Aggregates and Granular Material	Section 31 05 17
1.1.3	Roadway Excavation, Embankment and Compaction	Section 31 24 13
1.1.4	Granular Subbase	Section 32 11 16.1
1.1.5	Granular Base	Section 32 11 23
1.1.6	Unit Paving	Section 32 14 01
1.1.7	Storm Sewers	Section 33 40 01

1.2 References

1.2.1 The abbreviated standard specifications for testing, materials, fabrication and supply, referred to herein, are fully described in Section 01 42 00 - Reference Specifications – Site and Infrastructure.

1.3 Test Panels

1.3.1 If specified in Contract Documents construct test panels to set standard for acceptance of finished surfaces.

1.4 Measurement and Payment

1.4.1 Payment for excavation, embankment fill (subgrade fill) and subgrade preparation will be made under payment items in Section 31 24 13 - Roadway Excavation, Embankment and Compaction.

1.4.2 Payment for granular base and granular subbase under curb and gutter to 300 mm beyond back of curb as shown on Standard Detail Drawings will be made under payment items in Section 32 11 23 - Granular Base and Section 32 11 16.1 - Granular Subbase, respectively.

1.4.3 Payment for machine placed or precast concrete curbs and gutters excluding granular subbase and granular base includes supply and placing of the concrete curbs and gutters and will cover all straight and curve sections and will be made separately for each specified type.

1.4.4 Payment for hand formed curb or curb and gutter will only be made when such hand forming is specifically ordered by Contract Administrator.

1.4.5 Payment for concrete sidewalks, in-fill strips and walkways and all concrete ramps where shown on Contract Drawings includes

supply and placing of the concrete and granular base under the concrete sidewalks, in-fill strips and walkways and will be made separately for each specified thickness and type of finish.

1.4.6 Payment for driveway crossings including granular base as shown on Standard Detail Drawing C7 will be made on a unit basis (each crossing) for each specified thickness

1.4.7 Payment for limestone chips infill strip includes the granular base similar to that required for concrete infill strip together with 75 mm of limestone chip overlay and compaction.

1.4.8 Payment for adjustment of existing catch basins and other utilities covers required for installation of curb and gutter and walks will be made for each item to be adjusted. Relocation, if required, will be paid for as newly installed items.

1.4.9 Payment for perforated drainpipe adjacent to sidewalk or curb and gutter, where shown on Contract Drawings or where directed by Contract Administrator: will be made under payment items in Section 33 40 01 - Storm Sewers.

1.5 Inspection and Testing

1.5.1 Refer to General Conditions, Clause 4.12, Tests and Inspections

2.0 PRODUCTS

2.1 Materials

2.1.1 Borrow material: to Section 31 24 13 - Roadway Excavation, Embankment and Compaction.

2.1.2 Granular subbase: to Section 31 05 17 - Aggregates and Granular Materials.

2.1.3 Granular base: to Section 31 05 17 - Aggregates and Granular Materials.

2.1.4 Non-staining mineral type form release agent: chemically active release agents containing compounds that react with free lime to provide water soluble soap.

2.1.5 Concrete mixes and materials: to Section 03 30 53 - Cast-in-Place Concrete with the following criteria specific to this Section:

(1) Hand-formed and hand-placed concrete:
- (1) Slump: 80 mm.
- (2) Air entrainment: 5 to 8%.
- (3) Maximum aggregate size: 20 mm.
- (4) Minimum cement content: 335 kg/m^3.
- (5) Minimum 28 day compressive strength: 32 MPa.

(2) Extruded concrete:
- (1) Slump: 0 - 25 mm.
- (2) Air entrainment: 6 to 9%.
- (3) Maximum aggregate size: 10 mm.
- (4) Fineness modulus: 2.1 to 2.4.
- (5) Minimum cement content: 335 kg/m^3.
- (6) Minimum 28 day compressive strength: 32 MPa.

2.1.6 Joint filler and Curing Compound: to Section 03 30 53 - Cast-in-Place Concrete.

3.0 EXECUTION

3.1 Subgrade Preparation

3.1.1 Excavate or fill to design subgrade to Section 31 24 13 - Roadway Excavation, Embankment and Compaction.

3.1.2 Compact as specified in Section 31 24 13 - Roadway Excavation, Embankment and Compaction.

3.2 Granular Subbase and Base

3.2.1 Place subbase and minimum of 100 mm granular base material to design grade as shown on Contract Drawings, including Standard Detail Drawings.

3.2.2 Compact subbase and base to minimum 95% Modified Proctor density.

3.2.3 Obtain Contract Administrator's approval of compacted base prior to placing forms or control devices for extruding equipment.

3.3 Formwork

3.3.1 Ensure steel forms of approved design and free from twists and warp.

3.3.2 Ensure wood forms of select dressed lumber, straight and free from defects and thoroughly cleaned.

3.3.3 Use flexible forms for all curves less than 60 m radius.

3.3.4 After obtaining Contract Administrator's approval of compacted base, set forms to line and grade as shown on Contract Drawings, free from waves or irregularities in line or grade.

3.3.5 Set special isolation forms as required around catch basins, manholes, poles or other objects as shown on Contract Drawings or as directed by Contract Administrator.

3.3.6 Forms to be to shape, lines and full dimensions of work being formed.

3.3.7 Adequately brace forms to maintain specified tolerances after concrete is placed.

3.3.8 Treat forms lightly with approved form release agent and remove surplus agent.

3.4 Inspection

3.4.1 Immediately prior to placement of concrete, carefully inspect all formwork to ensure forms are properly set at required horizontal and vertical alignment, sufficiently rigid, clean, surface treated and ready for placement of concrete. Obtain Contract Administrator's approval of formwork and compacted base.

3.5 Concrete Placement

3.5.1 Place concrete to Section 03 30 53 - Cast-in-Place Concrete and the following criteria specific to this Section.

3.5.2 Do not place concrete during rain or on ponded water or frozen base.

3.5.3 Do not place concrete when air temperature appears likely to fall below 5°C within 24 h, unless specified precautions are taken and approved by Contract Administrator.

3.5.4 Schedule concrete placement to ensure sufficient daylight hours available to permit edging and finishing or provide adequate illumination.

3.5.5 Moisten granular base immediately prior to placing concrete.

3.5.6 Place concrete within 1.5 h of batching time

3.5.7 Place concrete in forms, ensuring no segregation of aggregate and consolidate with approved mechanical vibrator or power screed.

3.5.8 Place concrete in continuous operation until entire panel or section completed. Do not place fresh concrete on concrete which has achieved partial set.

3.5.9 Incorporate all castings into concrete at time of placement

3.5.10 Discontinue placement at expansion, construction or isolation joints only.

3.5.11 Remove face forms as soon as practical to permit face finishing. Do not leave face forms in place overnight.

3.6 Extruded Sections

3.6.1 Extruding machine to be fitted with approved template consistent with sections shown on Standard Detail Drawings.

3.6.2 Extruded sections to be true to line, grade and cross-section.

3.6.3 Finished appearance, quality and workmanship to comply with Contract Drawings, this Specification and Standard Detail Drawings.

3.6.4 Where finished product does not conform to specifications, remove defective product and replace.

3.6.5 Defective extruded work replaced with hand placed concrete to be paid at tendered price for extruded product.

3.7 Driveway Crossings and Wheel Chair Ramps

3.7.1 Construct driveway crossings and wheel chair ramps where shown on Contract Drawings or to Standard Detail Drawings.

3.8 Tolerances

3.8.1 Maximum horizontal deviation = 6 mm.

3.8.2 Maximum vertical deviation = 6 mm.

3.8.3 Maximum deflection from horizontal or vertical alignment to be 6 mm in 3 m.

3.9 Expansion Joints

3.9.1 Form transverse expansion joints at both ends of curb returns and at a maximum spacing of 9 m for sidewalks, 9 m for curb and gutter, at each end of driveway crossings and at tangent points on circular work.

3.9.2 Extend through full depth of concrete.

3.9.3 Fill with 13 mm approved expansion joint material

3.9.4 Bond break compound may be used in lieu of expansion joint between sidewalk and back of abutting curb and gutter or where applicable between sidewalk and back of abutting utility strip or sidewalk infill.

3.10 Control Joints

3.10.1 In sidewalks, construct control joints at maximum 3 m intervals.

3.10.2 In curb or curb and gutter construct control joints at maximum 3 m intervals and match with control joints in abutting sidewalk.

3.10.3 Cut to minimum depth of concrete section as shown on Standard Detail Drawings C4 and C5.

3.10.4 Use proper tool to make cut while concrete is still green or sawcut after concrete has hardened.

3.11 Isolation Joints

3.11.1 Form isolation joints around all poles, hydrants, manholes and all structures or fixed objects located within the concrete section by using specified joint filling material.

3.11.2 Form longitudinal isolation joints between sidewalk and abutting curb and gutter, abutting utility strips, abutting structures using 13 mm approved joint filling material

3.11.3 Use 13 mm premoulded hardboard joint material to form isolation joints between sidewalks and abutting walls and structures.

3.12 Finishing

3.12.1 Finish surface of concrete sidewalks and utility strips to smooth surface with magnesium or wood float and brush or broom to provide uniform non-skid surface.

3.12.2 Broom or brush crossways or as otherwise required to match adjacent finish or as directed by Contract Administrator.

3.12.3 Grooves or scoring (dummy joints) used for aesthetic purposes as shown on the Contract Drawings or as directed by Contract Administrator, to be marked with proper tools and set 15 mm deep.

3.12.4 Finish driveway crossings and wheel chair ramps as shown on Standard Detail Drawings.

3.12.5 Round edges with steel edging tool to a width of 50 mm around perimeter of each panel or as shown on Standard Detail Drawings.

3.12.6 Ensure surface of hand-formed curb and gutter is smooth magnesium or wood float finish. Ensure extruded curb and gutter is smooth finished and hand floated as required to correct irregularities.

3.12.7 Under no circumstances is concrete to be overworked by trowelling, dusted with dry cement or finished with a mortar coat.

3.12.8 Ensure finished surface as specified.

3.13 Special Effects

3.13.1 Unit paving: to Section 32 14 01 - Unit Paving.

3.13.2 Exposed aggregate and coloured or stamped concrete as specified on Contract Drawings or in Supplementary Specifications.

3.14 Protection

3.14.1 Protect freshly finished concrete from dust, rain or frost by using tarpaulins or other suitable protective coverings. Keep clear of finished surface.

3.14.2 Place and maintain suitable barriers to protect finished concrete from equipment, vehicles or pedestrian traffic.

3.14.3 Provide personnel as required to prevent vandalism until concrete has set.

3.14.4 Do not run vehicles or construction equipment on concrete for at least 3 days.

3.15 Curing

3.15.1 Apply approved curing compound to all exposed concrete surfaces at rate recommended by manufacturer or alternatively, use moist curing procedures for a minimum of 7 days.

3.15.2 When temperature is below 5°C, maintain all concrete at temperature not less than 10°C for at least 72 h and protect from freezing for at least another 72 h or such time as required to ensure proper curing of concrete. Admixtures are not to be used for prevention of freezing.

3.16 Perforated Drain Pipe

3.16.1 Where shown on Contract Drawings or where directed by Contract Administrator install perforated drain pipe adjacent to sidewalk or curb and gutter: to Section 33 40 01 - Storm Sewers.

3.17 Acceptance

3.17.1 Before acceptance of finished concrete remove all irregular, cracked, vandalized or otherwise defective sections and replace in accordance with specifications.

3.17.2 Minimum area of replacement of defective sidewalk is one panel section.

3.17.3 Single curb crack less than 1.5mm wide shall be repaired with epoxy injection.

3.17.4 Entire curb section, between control joints, shall be replaced when 2 or more cracks less than 1.5mm width are present or when a single crack greater than 1.5mm is present.

3.18 Adjustment of Existing Catchbasins

3.18.1 Adjust existing catch basins to specified alignment and elevation using concrete bricks and mortar or concrete adjusting rings.

3.18.2 Remove all debris from inside catch basin.

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END OF SECTION 03 30 20

1.0 GENERAL

1.0.1 Section 03 40 01 refers to those portions of the precast concrete work that are unique to the construction of pavements, sidewalks, curbs and gutters, manholes and catch basins, and similar works incidental to municipal infrastructure. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

1.0.2 This Specification is **NOT** to be used for any structural facilities such as buildings, bridges, retaining walls, or any similar structure requiring site specific structural engineering design.

1.0.3 Except where specifically stated otherwise, all materials and methods in this Section to conform to requirements of the latest version of CSA-A23.1.

1.1 Related Work

1.1.1 Excavating, Trenching and Backfilling — Section 31 23 01

1.2 References

1.2.1 The abbreviated standard specifications for testing, materials, fabrication and supply, referred to herein, are fully described in. Section 01 42 00 – Reference Specifications – Site and Infrastructure.

1.3 Construction Quality Control

1.3.1 Submit proposed quality control procedures for Contract Administrator's approval.

1.4 Measurement and Payment

1.4.1 Payment for all work performed under this Section will include the supply and placing of concrete precast units and will be incidental to payment for work described in other sections unless specifically listed otherwise in the Schedule of Quantities and Prices and specified hereunder.

1.4.2 Payment for concrete block retaining walls includes all work and incidentals, excavation, drain rock backfill and concrete footing but excludes the sidewalk and its base. Measurement of height of wall for the purpose of calculating area for payment will be taken from the top of concrete footing to bottom of cap above the block.

1.4.3 Payment for concrete lock block wall will be by blocks of different sizes and dimensions and includes subgrade preparation as shown on Contract Drawing. Excavation and backfilling will be paid under appropriate pay items in Section 31 23 01 – Excavating, Trenching and Backfilling.

1.4.4 Payment for precast concrete “no-post” barrier includes supply of barriers and placement at exact locations as shown on Contract Drawing.

1.4.5 Payment for relocation of “no-post” barriers will be made for within or off-site involving use of lifting and/or transportation equipment. Payment will not be made for short distance relocation by pushing with machinery available on site.

1.5 Inspection and Testing

1.5.1 Refer to General Conditions, Clause 4.12, Tests and Inspections.

2.0 PRODUCTS

2.1 Materials

2.1.1 Precast concrete units to be constructed in accordance with CAN/CSA-A23.1 unless stated otherwise.

3.0 EXECUTION

3.1 General

3.1.1 Install precast concrete units, including surface tolerances, finishing and field quality control, in accordance with Contract Drawings.

3.1.2 Protection, storage and handling of precast concrete units to Manufacturer's recommendations.

END OF SECTION 03 40 01

1.0 GENERAL

1.0.1 Section 31 05 17 refers to those portions of the work that are unique to the supply and processing of aggregates. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

1.1 Related Work

1.1.1 Section 31 05 17 includes specifications for aggregates and granular materials referred to in the following sections:

(1)	Shrub and Tree Preservation	Section 31 11 41
(2)	Excavating, Trenching and Backfilling	Section 31 23 01
(3)	Roadway Excavation, Embankment And Compaction	Section 31 24 13
(4)	Granular Subbase	Section 32 11 16.1
(5)	Granular Base	Section 32 11 23
(6)	Portland Cement Concrete Pavement	Section 32 13 13
(7)	Unit Paving	Section 32 14 01
(8)	Waterworks	Section 33 11 01
(9)	Sanitary Sewers	Section 33 30 01
(10)	Sewage Forcemains	Section 33 34 01
(11)	Storm Sewers	Section 33 40 01
(12)	Pipe Culverts	Section 33 42 13

1.1.2 Section 31 05 17 does not include specifications for aggregates to be incorporated into controlled density fill, hot-mix asphalt concrete paving, pavement crack filling, ready-mixed concrete or granular materials for landscaping purposes. These specifications are specified as follows:

(1)	Controlled Density Fill	Section 31 23 23
(2)	Hot-Mix Asphalt Concrete Paving	Section 32 12 16
(3)	Pavement Crack Cleaning and Filling Prior to Overlay	Section 32 01 17.7
(4)	Cast-in-Place Concrete	Section 03 30 53
(5)	Topsoil and Finish Grading	Section 32 91 21
(6)	Seeding	Section 32 92 20
(7)	Hydraulic Seeding	Section 32 92 19
(8)	Sodding	Section 32 92 23
(9)	Planting of Trees, Shrubs and Ground Covers	Section 32 93 01

1.2 References

1.2.1 The abbreviated standard specifications for testing, materials, fabrication and supply, referred to herein, are fully described in Section 01 42 00 – Reference Specifications – Site and Infrastructure.

1.3 Approvals

1.3.1 Inform Contract Administrator of proposed source and provide samples or access for sampling at least 2 weeks prior to commencing production.

1.3.2 If materials from proposed source do not meet specified requirements, locate alternative source or demonstrate that material from source in question can be processed to meet specified requirements.

1.3.3 Should a change of material source be proposed during work, advise Contract Administrator 2 weeks in advance of proposed change to allow sampling and testing.

1.3.4 Acceptance of material does not preclude future rejection if it is subsequently found to lack uniformity, or if it fails to conform to requirements specified.

1.4 Measurement and Payment

1.4.1 Payment for all work performed under in this Section will be included under payment for work requiring aggregates and granular materials in other Sections unless specifically shown otherwise as separate pay items.

1.5 Inspection and Testing

1.5.1 Refer to General Conditions, Clause 4.12, Tests and Inspections.

2.0 PRODUCTS

2.1 Materials - General

2.1.1 Gravel to be composed of inert, durable material, reasonably uniform in quality and free from soft or disintegrated particles. In absence of satisfactory performance records over a five-year period for particular source of material, soundness to be tested according to ASTM C88/C88M or latest revised issue. Maximum weight average losses for course and fine aggregates to be 30% when magnesium sulphate is used after five cycles.

2.1.2 All crushed gravel when tested according to ASTM C136/C136M and ASTM C117, or latest revised issue, to have a generally uniform gradation and conform to following gradation limits and 60% of the material passing each sieve must have one or more fractured faces. Determination of the amount of fractured material shall be in accordance with the Ministry of Transportation and Highways' Specification I-11, Fracture Count for Coarse Aggregate, Method "A", which determines fractured faces by count. The Plasticity Index for crushed gravel to not exceed 6.0.

2.2 Native Material

2.2.1 To be any workable soil free of organic or foreign matter; any material obtained within limits of Contract may be deemed native material for purposes of payment if it is approved by the Contract Administrator.

Native material is not acceptable if it is impracticable to control its water content or compact to specified density.

2.3 Pit Run Gravel

2.3.1 To be well graded granular material, substantially free from clay lumps, organic matter and other extraneous material, screened to remove all stones in excess of maximum diameter specified in material description (300 mm Pit Run Gravel, 200 mm Pit Run Gravel, 100 mm Pit Run Gravel). Material to compact to specified density and conform to following gradations:

Sieve Designation	Percent Passing		
(300 mm dia)			(100)
(200 mm dia)	---		(100)
(100 mm dia)	---		(100)
75 mm	---		100
50 mm	70	-	100
25 mm	50	-	100
4.75 mm	22	-	100
2.36 mm	10	-	85
0.075 mm	2	-	8

2.3.2 Recycled concrete free from contaminated and other extraneous material, conforming to the specified gradations may be used as pit run gravel.

2.4 Pit Run Sand

2.4.1 To be well graded pit run sand, free from organic materials and conform to following gradations:

Sieve Designation	Percent Passing		
12.5 mm			100
4.75 mm	35	-	100
2.36 mm	20	-	70
1.18 mm	13	-	50
0.600 mm	8	-	35
0.300 mm	5	-	25
0.150 mm	2	-	15
0.075 mm	0	-	6

2.5 River Sand

2.5.1 River sand to be free of organic material and conform to the following gradation:

2.5.2

Sieve Designation	Percent Passing
19 mm	100
4.76 mm	80 - 100
0.60 mm	20 - 100
0.42 mm	10 - 100
0.25 mm	0 - 80
0.15 mm	0 - 50
0.074 mm	0 - 4

2.6 Drain Rock

2.6.1 To consist of clean round stone or crushed rock conforming to following gradations:

2.6.2

Sieve Designation	Percent Passing	
	Coarse	Fine (Torpedo Gravel)
25.0 mm	100	
19.0 mm	0 - 100	
9.5 mm	0 - 5	100
4.75 mm	0	50 - 100
2.36 mm		10 - 35
1.18 mm		5 - 15
0.600 mm		0 - 8
0.300 mm		0 - 5
0.150 mm		0 - 2
0.075 mm		0

2.6.3 Drain rock to be used only where specified on Standard Detail Drawings or Contract Drawings. Use of drain rock other than as specified requires approval of Contract Administrator after examination of soils against which drain rock will be placed.

2.7 Granular Pipe Bedding and Surround Material

2.7.1 Crushed or graded gravels: to conform to following gradations:

Sieve Designation		Percent Passing Type 1*	Type 2*	Type 3*
50.0	mm	100	100	100 - 100
38.0	mm	100	100	90 - 100
25.0	mm	100	100	20 - 60
19.0	mm	90 - 100	90 - 100	0 - 15
12.5	mm	65 - 85	70 - 100	
9.5	mm	50 - 75		0 - 5
4.75	mm	25 - 50	40 - 70	
2.36	mm	10 - 35	25 - 52	
1.18	mm	6 - 26	15 - 38	
0.600	mm	3 - 17	6 - 27	
0.300	mm		3 - 20	
0.075	mm	0 - 5	0 - 8	

**Type 1*: *standard gradation*
**Type 2*: *to be used only in dry trench conditions and with Contract Administrator's prior approval*
**Type 3*: *minimum 40% Porosity*

2.7.2 Recycled concrete free from contaminated and other extraneous material, conforming to the Type 1 gradations, may be used as pipe bedding and surround material.

2.7.3 Other permissible materials: only where shown on Contract Drawings or directed by Contract Administrator shall drain rock, pit run sand, river sand or approved native material be used for bedding and pipe surround.

2.8 Select Granular Sub-base

2.8.1 To be well graded granular material, substantially free from lumps and organic matter, screened if required to conform to following gradations:

Sieve Designation	Percent Passing		
75 mm			100
25 mm	50	-	85
0.150 mm	0	-	15
0.075 mm	0	-	8

2.9 Crushed Granular Sub-base

2.9.1 To be 75 mm crushed gravel conforming to following gradations:

Sieve Designation	Percent Passing		
80 mm			
75 mm			100
38 mm	60	-	100
25 mm		-	
19 mm	35	-	80
12.5 mm		-	
9.5 mm	26	-	60
4.75 mm	20	-	40
2.36 mm	15	-	30
1.18 mm	10	-	20
0.6 um	5	-	15
0.3 um	3	-	10
0.18 um		-	
0.15 um		-	
0.075 um	0	-	5

2.10 Granular Base

2.10.1 To be 19 mm crushed gravel conforming to following gradations:

Sieve Designation	Percent Passing		
19 mm			100
12.5 mm	75	-	100
9.5 mm	60	-	90
4.75 mm	40	-	70
2.36 mm	27	-	55
1.18 mm	16	-	42
0.600 mm	8	-	30
0.300 mm	5	-	20
0.075 mm	2	-	8

2.10.2

2.10.3 Where shown on the contract drawings or directed by the Contract Administrator, Type 2_19 mm crushed gravel conforming to following gradations is permissible:

Sieve Designation	Type 2 Percent Passing		
25 mm			100
19 mm	80	-	100
9.5 mm	50	-	85
4.75 mm	35	-	70
2.36 mm	25	-	50
1.18 mm	15	-	35
0.300 mm	5	-	20
0.075 mm	0	-	5

2.11 Recycled Aggregate Material

2.11.1 Aggregates containing recycled material may be utilized if approved by the Contract Administrator. In addition to meeting all other conditions of this specification, recycled material should not reduce the quality of construction achievable with quarried materials. Recycled material shall consist only of aggregates, crushed Portland cement concrete, or asphalt that is free of impurities.

2.11.2 Recycled Concrete and Asphalt (RCA)

2.11.3 To be well graded mixture of aggregates, crushed Portland cement concrete, or asphalt, substantially free from lumps and impurities. The material shall be manufactured to conform to the following gradation.

Sieve Designation		Percent Passing		
25	mm			100
19	mm	80	-	100
9.5	mm	50	-	85
4.75	mm	35	-	70
2.36	mm	25	-	50
1.18	mm	15	-	35
0.300	mm	5	-	20
0.075	mm	0	-	20

2.11.4 California Bearing Ratio of the supplied materials shall be a minimum of 20% and shall be tested at every 5,000 tonnes.

2.11.5 Virgin Materials

2.11.6 All aggregates and granular materials shall consist of entirely virgin materials, except recycled aggregate materials

2.12 Pit Fines, Overburden and Cyclone sand

2.12.1 **Pit Fines**: Fine aggregate which is a by-product of gravel washing and screening, conforming to the following:

Sieve Designation	Percent Passing		
4.76 mm		100	
0.42 mm	80	-	100
0.074 mm	0	-	4

2.12.2 **Cyclone Sand** Inorganic fine sand produced as a by-product of gravel processing and conforming to the following:

Sieve Designation	Percent Passing		
4.76 mm		100	
0.42 mm	80	-	100
0.25 mm	50	-	100
0.15 mm	0	-	70
0.074 mm	0	-	20

2.12.3 **Overburden** Inorganic, silty, native material as a by-product of gravel mining and conforming to the following:

Sieve Designation	Percent Passing		
150 .mm	100		
76.00 mm	85	-	100
4.76 mm	45	-	100
0.42 mm	25	-	100
0.074 mm	20	-	60

2.13 Recycled Asphalt Pavement (RAP)

2.13.1 Recycled Asphalt Pavement (RAP) shall consist of asphalt concrete free from organic matter, contaminated and other extraneous material.

2.13.2 Source of RAP shall be from asphalt removal, surplus generated during plant start-up, transition between mixes, plant clean out, or excess mix produced that could not be placed.

2.13.3 RAP gradation shall not exceed the maximum aggregate size for the specified asphalt mix.

3.0 EXECUTION

3.1 Handling

3.1.1 Handle and transport aggregates to avoid segregation, contamination and degradation

3.1.2 Do not use intermixed or contaminated materials. Remove and dispose rejected materials within 48 h of rejection.

3.1.3 Handling:

3.1.4 Handling and storage of RAP shall be in accordance with National Asphalt Pavement Association (NAPA) – Best Practices for RAP and RAS Management.

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END OF SECTION 31 05 17

1.0 GENERAL

1.0.1 Section 31 23 01 refers to those portions of the work that are unique to excavating, trenching and backfilling of underground utility installations and related structures. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein. This section shall also refer to installation of pipe and conduit installed for telephone and cable television, gas and electrical services.

1.1 Related Work

1.1.1	Environmental Protection	Section 01 57 01
1.1.2	Aggregates and Granular Materials	Section 31 05 17
1.1.3	Rock Removal	Section 31 23 17
1.1.4	Controlled Density Fill	Section 31 23 23
1.1.5	Topsoil and Finish Grading	Section 32 91 21
1.1.6	Waterworks	Section 33 11 01
1.1.7	Sanitary Sewers	Section 33 30 01
1.1.8	Sewage Forcemains	Section 33 34 01
1.1.9	Storm Sewers	Section 33 40 01
1.1.10	Pipe Culverts	Section 33 42 13
1.1.11	Manholes and Catchbasins	Section 33 44 01

1.2 References

1.2.1 The abbreviated standard specifications for testing, materials, fabrication and supply, referred to herein, are fully described in Section 01 42 00 – Reference Specifications – Site and Infrastructure.

1.3 Definitions

1.3.1 Rock Excavation: As defined in Section 31 23 17 - Rock Removal.

1.3.2 Common Excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation including dense tills, hardpan, partially cemented materials, clay or frozen materials which can be ripped and excavated with heavy construction equipment.

1.3.3 Over-excavation: excavation below design elevation of bottom of specified bedding, and including backfilling of resultant excavation with specified material, as authorized by Contract Administrator.

1.3.4 Removals: removal and disposal at an approved location off-site of surface concrete structures and walks, curbs, gutters, manholes, catchbasins, pipes, culverts, endwalls, and any other structures on surface or underground specifically designated on Contract Drawings for removal. Removals to include backfilling of resultant excavation with specified material.

1.3.5 Native Topsoil: to Section 32 91 21 - Topsoil and Finish Grading.

1.4 Protection of Work Property and Public

1.4.1 Comply with General Conditions, Clause 4.3, Protection of Work, Property and the Public.

1.5 Safety Requirements

1.5.1 Comply with General Conditions, Clause 4.2, Safety.

1.5.2 Design and install trench shoring in accordance with the regulations of the WorkSafe BC.

1.6 Blasting

1.6.1 Ensure all blasting operations comply with Section 31 23 17 - Rock Removal.

1.7 Disposal

1.7.1 Dispose of all surplus spoil from excavations on-site and/or off-site as shown on Contract Drawings or as specified in Contract Documents. Suitability of excavated material for use as native bedding or trench backfill will be governed by 2.0 of this Section. Dumping of spoil on private property will be permitted only upon written approval from property owner and provided all necessary permits and approvals have been obtained.

1.8 Limitations of Open Trench

1.8.1 Excavate trenches only as far in advance of pipe laying operation as safety, traffic, and weather conditions permit and, in no case, to exceed 30 m. Before stopping work on last day of work before each weekend or holiday, completely backfill every trench. If circumstances do not permit complete backfilling of all trenches, adequately protect all open trenches or excavations with approved fencing or barricades and, where required, with flashing lights.

1.9 Permits and Approvals

1.9.1 Comply with General Conditions, Clause 20, Laws, Notices, Permits and Fees.

1.10 Measurement and Payment

1.10.1 With the exception of pay items specifically identified hereunder, payment for all other work performed under this Section will be included under payment for work involved in trenchwork as described in other Sections.

1.10.2 Additional payment for trench excavation by hand will only be made in addition to the work items involving trenchwork where excavation by machinery is not practicable and only under prior approval by Contract Administrator.
Payment will be based on before and after excavation cross-section areas at sufficient equal intervals over the length of trench so excavated.

1.10.3 Payment for over-excavation including backfilling will only be made for over-excavation authorized by Contract Administrator.
Payment will be based on before and after excavation cross-section areas at sufficient equal intervals over the length of over-excavation.

1.10.4 Payment for removal and disposal of disused pipes and headwalls encountered during trench excavation to specific disposal site will be

in addition to trenchwork with no deduction of payment from such trenchwork. No payment will be made under this item for removal and disposal carried out as part of the operation for removal and disposal of excavated materials from trenchwork.

1.10.5 All costs incurred as a result of unauthorized excavation beyond neat lines or limits of excavation shown on Contract Drawings or Standard Detail Drawings including remedial backfilling will be to Contractor's cost.

1.10.6 Measurement for excavation of new channels and ditches will be based on before and after excavation cross-section areas at sufficient equal intervals over the entire length of the channels or ditches.

1.10.7 Payment for cleaning and deepening of existing channel or ditch will be made separately for each location or over sections with generally similar cross sections before and after cleaning.

1.10.8 Payment for swales in boulevard or other locations as shown on Contract Drawings includes excavation, grading, addition and removal of native materials as required to form swales to suit local conditions and to provide proper drainage.

1.11 Inspection and Testing

1.11.1 Refer to General Conditions, Clause 4.12, Tests and Inspections.

2.0 PRODUCTS

2.1 General

2.1.1 Unless shown otherwise on Contract Drawings the materials specified in 2.2 of this Section are approved for their respective uses.

2.2 Use of Specified Materials

2.2.1 Backfill for over-excavated trench or structure excavations to be one of the following:

(1) Granular pipe bedding and surround material.

(2) Pit run sand.

(3) Drain rock (only where approved by Contract Administrator).

(4) Recycled concrete and asphalt (RCA).

(5) Controlled density fill.

2.2.2 Pipe bedding and surround: see applicable Sections:

(1) Waterworks	Section 33 11 01
(2) Storm Sewers	Section 33 40 01
(3) Pipe Culverts	Section 33 42 13
(4) Sanitary Sewers	Section 33 30 01

(5) Sewage Forcemains — Section 33 34 01

(6) Roadway Lighting — Section 26 56 01

2.2.3 Trench and excavation backfill to be one of the following:

(1) Approved native material.

(2) Pit run gravel.

(3) Pit run sand.

(4) Controlled density fill.

2.2.4 Surface treatment to be:

(1) Restoration to match existing conditions.

(2) Subgrade, subbase and base for works described in other Sections.

(3) Topsoil, grass, sod or requirements for landscaping works described in other Sections.

2.3 Materials

2.3.1 Refer to Section 31 05 17- Aggregates and Granular Materials for specifications for approved granular materials and approved native material.

2.3.2 Other granular materials: granular materials approved for roadwork (subbase, base,) also acceptable for trench backfill subject to approval of Contract Administrator.

2.3.3 Concrete: to Section 03 30 53 – Cast-In-Place Concrete, to be minimum 20 MPa.

2.3.4 Controlled Density Fill: to Section 31 23 23 – Controlled Density Fill, to be maximum 0.5 MPa.

3.0 EXECUTION

3.1 Site Preparation

3.1.1 Remove all brush, weeds, grasses and accumulated debris to an approved offsite location.

3.1.2 Cut pavement or sidewalk neatly along limits of proposed excavation as shown on Standard Detail Drawing G4 in order that surface may break evenly and cleanly. Cut beyond limits shown only if authorized by Contract Administrator.

3.1.3 Where trench passes through lawn, neatly cut and remove sod before trench excavation. Save sod for replacement upon backfilling trench.

3.1.4 Strip topsoil after area has been cleared and stockpile in locations as shown on Contract Drawings. Stockpile height not to exceed 2 m. Avoid mixing topsoil with subsoil. Dispose of unused topsoil as

specified. Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.

3.2 Stockpiling

3.2.1 Stockpile fill materials in areas designated by Contract Administrator. Stockpile granular materials in manner to prevent segregation.

3.3 Excavation

3.3.1 Connection to existing mains:

(1) Prior to or at commencement of construction, check existing main for line and elevation at point of connection. If found different from Contract Drawings report such difference to Contract Administrator immediately. Comply with General Conditions, Clause 4.5, Errors, Inconsistencies or Omissions in the Contract Documents.

(2) Connections to existing waterworks systems to be made by Municipal crews unless shown otherwise on Contract Drawings. Make all necessary arrangements with Contract Administrator to schedule work to prevent construction delays.

(3) Connections to existing sanitary and storm sewer systems to be made by Contractor unless shown otherwise on Contract Drawings. Notify Contract Administrator minimum 48h in advance of scheduled connection. Make connection in presence of Contract Administrator.

(4) To prevent damage to existing utilities, excavate last 300 mm over utility by hand.

3.3.2 Surface drainage:

(1) Provide suitable temporary ditches or other approved means of handling drainage prior to excavation and during construction to protect construction area and adjacent and other affected properties. Provide siltation controls to protect natural watercourses or existing municipal drainage facilities.

(2) Comply with Section 01 57 01 - Environmental Protection.

3.3.3 Excavation to grade: excavate trenches to allow pipe to be laid to alignment and grades required with allowance for specified pipe bedding.

3.3.4 Excavation below grade: when bottom of excavated trench at subgrade is unstable and in opinion of Contract Administrator, cannot adequately support pipe, install pipe using concrete bedding as shown on Contract Drawings or over-excavate trench to suitable subgrade or as directed by Contract Administrator. Backfill over-excavation with specified materials and compact to minimum 95% Modified Proctor density in compliance with ASTM D1557. Use drain rock backfill only if authorized by Contract Administrator.

3.3.5 Trench width: excavate trench to section and dimensions shown on Standard Detail Drawing G4. If width exceeds maximum allowable, Contractor may be required to demonstrate that specified pipe is still

adequate or provide pipe with approved higher strength class or provide approved higher class of bedding. All additional requirements as a result of excessive trench width to be to Contractor's cost.

3.3.6 Hand excavation: excavate by hand if necessary, to preserve or minimize damage to existing trees, shrubs, buildings and all similar existing features or facilities.

3.3.7 Trench bottom conditions: remove disturbed or softened material from trench bottom before placing bedding material. Maintain trench free from water and soft materials during placement of pipe bedding, pipe installation and trench backfill to ensure proper compaction of granular materials.

3.3.8 Trench drainage:

(1) During pipe laying, jointing, bedding and backfilling, keep trench free of water by pumping or other appropriate means. Provide pumps and dewatering equipment and take precautions to prevent any damage to adjoining buildings, structures, roads or land from prolonged or excessive pumping by installing shoring, sheeting or other supportive measures. Discharge water from excavations in such a manner as not to cause nuisance, injury, loss or damage. Contractor to be responsible for any claims or actions arising from such discharge of water.

(2) Keep bell holes free from water during jointing. Diverting trench water through newly laid system not allowed, unless authorized by Contract Administrator.

3.3.9 Disposal of surplus soil: dispose of surplus excavated soil off-site. Side-casting not allowed in restricted areas where, in opinion of Contract Administrator, side-casting would create interference with flow of traffic. In such case, temporarily store materials or dispose to an approved site. Provisions of Provincial Contaminated Sites Legislation must be met prior to disposal of soil offsite.

3.3.10 Native Backfill: Where native backfill is approved for re-use, and side-casting not allowed, transport approved material to other locations where material is required or temporarily store at approved site. Protect stored material from contamination, segregation and weather.

3.3.11 Rock Excavation: Rock excavation to Section 31 23 17 - Rock Removal.

3.3.12 Maintain roads used for transporting materials and equipment in clean condition. Clean, flush and/or sweep on daily basis and more frequently if directed by Contract Administrator.

3.4 Pipe Installation

3.4.1 Related work: Pipe installation, including bedding, pipe laying, and granular surround to be in accordance with following sections:

(1)	Waterworks	Section 33 11 01
(2)	Storm Sewers	Section 33 40 01
(3)	Pipe Culverts	Section 33 42 13
(4)	Manholes and Catchbasins	Section 33 44 01
(5)	Sanitary Sewers	Section 33 30 01
(6)	Sewage Forcemains	Section 33 34 01

3.4.2 Concrete encasement or protection: where specified or required by Contract Administrator provide concrete encasement of pipe or slab protection as shown on Standard Detail Drawings G6 and G7. Do not place backfill material until concrete has taken its initial set and in no case less than 1 h.

3.4.3 Anchor blocks: where specified or required by Contract Administrator provide anchor blocks as shown on Standard Detail Drawing G8. Ensure all concrete anchor blocks at least 150 mm into undisturbed ground on bottom and sides of trench. Concrete strength as specified on Standard Detail Drawing G8.

3.5 Backfill and Compaction

3.5.1 General: Place backfill carefully in trench to prevent damage to installed pipe.

3.5.2 Shoring: during backfill and compaction of trench, remove shoring in such a manner as to allow proper compaction and to prevent trench walls from collapsing. Remove all bracing and/or shoring from trench.

3.5.3 Backfill Materials:

(1) Boulevards and easements: for trenches in boulevards, easements or other areas not subjected to vehicle loading, and outside of ditch lines, backfill with approved native material except as shown otherwise on Contract Drawings.

(2) Roads, driveways and shoulders: for trenches in paved or gravelled roads, driveways, shoulders or other areas subjected to vehicle loading, backfill with imported granular material or approved native material as specified on Contract Drawings.

(3) Road shoulder is that portion of right-of-way between travelled portion of road, either paved or gravelled, and road ditch. Where no ditch exists, ensure shoulder width minimum of 1.5 m.

(4) Ditches: backfill with imported granular material or approved native material as specified on Contract Drawings.

(5) Contract Administrator may permit native material for all above uses subject to suitability of native material for said use. Native material approved for re-use to be handled, stockpiled and compacted using construction method appropriate for given moisture content and weather conditions.

(6) Controlled Density Fill: Place controlled density fill in accordance with Section 31 23 23 - Controlled Density Fill.

3.5.4 Compaction: place backfill and compact to following Modified Proctor densities in compliance with ASTM D1557. (All following references to density imply compliance with ASTM D1557).

(1) Boulevards and easements to minimum 90%.

(2) Roads, driveways, shoulders, re-shaped ditches and sidewalks to minimum 95%.

(3) Use caution in pipe zone to ensure no damage to pipe.

3.6 Surface Restoration

3.6.1 General:

(1) Restore all disturbed surfaces to condition at least equal to that which existed prior to construction.

(2) Make good any damage to adjacent lands or improvements.

(3) Resolve all reasonable claims arising from Contractor's actions and obtain written releases from land owners following final restoration.

3.6.2 Boulevards and easements:

(1) Restore surface to minimum 100 mm depth.

(2) Restore unimproved surfaces with material equal to that removed at surface.

(3) Restore gardens with approved topsoil or bark mulch to match existing conditions.

(4) Restore lawns with approved topsoil and seed or sod to match existing lawn.

(5) Restore gravel surfaces with matching granular materials.

(6) Complete final restoration immediately upon completion of trench backfilling.

3.6.3 Gravelled roads and driveways:

(1) Restore surface with minimum 75 mm to 100 mm thick lift of 19 mm granular road base material.

(2) Compact to minimum 95% Modified Proctor density.

(3) Complete final restoration immediately upon completion of trench backfilling.

3.6.4 Ditches:

(1) Re-shape ditches to specified lines, grades and sections and restore surface with minimum 300 mm of specified material to ensure stability of ditch slopes and bottom.

(2) Compact to minimum 95% Modified Proctor density.

(3) Complete final restoration immediately upon completion of trench backfilling.

3.6.5 Base preparation for paved surfaces:

(1) Paved surfaces to include all paved roads, driveways, sidewalks and parking areas.

(2) If native material used for backfill provide specified depth of subbase as shown on Contract Drawings.

3.6.6 Temporary pavement patching:

(1) Patch arterial and collector roads same day excavation made.

(2) Patch all other roads within 24 h of closing trench.

(3) Patching material to be hot-mix asphalt on all roads unless specified otherwise, cold-mix may be used only where directed by Contract Administrator.

(4) Place temporary pavement to 50 mm minimum thickness.

(5) Maintain temporary patch to ensure safe and smooth conditions.

3.6.7 Permanent pavement restoration:

(1) Install permanent pavement within 30 days of placement of temporary patch or sooner where directed by Contract Administrator.

(2) Remove broken or cracked pavement as well as any paved areas showing settlement and dispose off-site.

(3) Remove underlying granular road base material as required to permit placement of specified thickness of permanent pavement. Ensure remaining base meets specified thickness. Material and placement of road base to Section 32 11 23 – Granular Base.

(4) Compact base to minimum 95% Modified Proctor density.

(5) Restore pavement as detailed on Standard Detail Drawing G5. If thickness of existing pavement permits, grind 35 mm depth along edge of pavement. Dry if necessary and paint clean, dry edge with asphalt emulsion (tack coat).

(6) Place and compact hot-mix pavement material to minimum thickness as shown on Standard Detail Drawing G5.

(7) Material and placement of hot-mix pavement to Section 32 12 16 - Hot-Mix Asphalt Concrete Paving.

(8) Restore surface to smooth condition and match with grade of adjacent pavement.

(9) Where shown on Contract Drawings place hot-mix overlay over restored trench section and adjacent pavement to Section 32 12 16 - Hot-Mix Asphalt Concrete Paving.

(10) Maintain restored pavements in complete repair during Maintenance Period. Effect repairs within 14 days from receipt of written notice from Contract Administrator or immediately if so directed by Contract Administrator if dangerous situation exists.

END OF SECTION 31 23 01

1.0 GENERAL

1.0.1 Section 31 24 13 refers to those portions of the work that are unique to roadway excavation, embankment construction and compaction. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

1.1 Related Work

1.1.1	Environmental Protection	Section 01 57 01
1.1.2	Aggregates and Granular Materials	Section 31 05 17
1.1.3	Clearing and Grubbing	Section 31 11 01
1.1.4	Shrub and Tree Preservation	Section 31 11 41
1.1.5	Dust Control	Section 31 15 60
1.1.6	Site Grading	Section 31 22 01
1.1.7	Excavating, Trenching and Backfilling	Section 31 23 01
1.1.8	Rock Removal	Section 31 23 17
1.1.9	Geosynthetics	Section 31 32 19
1.1.10	Topsoil and Finish Grading	Section 32 91 21
1.1.11	Pipe Culverts	Section 33 42 13

1.2 References

1.2.1 The abbreviated standard specifications for testing, materials, fabrication and supply, referred to herein, are fully described in Section 01 42 00 – Reference Specifications – Site and Infrastructure.

1.3 Definitions

1.3.1 Excavation classes: only two classes of excavation will be recognized:

(1) Rock excavation: To Section 31 23 17 - Rock Removal - 1.3.

(2) Common Excavation: To Section 31 23 01- Excavating, Trenching and Backfilling - 1.3.

1.3.2 Native Topsoil: To Section 32 91 21 - Topsoil and Finish Grading.

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

1.3.4 Borrow material: material obtained from areas outside limits of work and required for construction of embankments or for other portions of work.

1.3.5 Embankment (subgrade fill): material derived from usable excavation and placed above original ground or stripped surface up to subgrade elevation.

1.3.6 Imported embankment fill: approved granular material, supplied by Contractor and obtained from off-site sources, to be used for embankment fill up to subgrade elevation.

1.3.7 Pavement structure: combination of layers of unbound or stabilized granular subbase, base, and asphalt or concrete surfacing.

1.3.8 Subgrade elevation: elevation immediately below pavement structure.

1.4 Protection of Work Property and Public

1.4.1 Comply with General Conditions, Clause 4.3, Protection of Work Property and the Public.

1.5 Blasting

1.5.1 All blasting operations to comply with Section 31 23 17 - Rock Removal.

1.6 Disposal

1.6.1 Refer to Section 31 23 01 - Excavating, Trenching and Backfilling - 1.7 for re-use and off-site disposal requirements.

1.7 Permits and Approvals

1.7.1 Comply with General Conditions, Clause 20, Laws, Notices, Permits and Fees before commencing any excavation.

1.8 Measurement and Payment

1.8.1 Payment for clearing and grubbing will be made under pay items in Section 31 11 01 – Clearing and Grubbing - 1.4.

1.8.2 Payment for topsoil stripping including stockpiling will be made under pay item in Section 31 22 01 - Site Grading - 1.4.1. and 1.4.6. Topsoil stripping and disposal will be treated as common excavation under this Section.

1.8.3 Payment for rock removal will be made under pay items in Section 31 23 17 - Rock Removal - 1.6.

1.8.4 Payment under this item will only apply to removal of the components included in this item under a separate operation as shown on the Drawings or as directed by the Contract Administrator. No payment will be made under this item for removal of these components as part of the operation for common excavation, and such removal will be treated as common excavation.

1.8.5 Payment for common excavation includes removal of existing pavements, curbs and gutters, sidewalks, utilities strips, driveways, pipes and conduits which are removed as part of the operation for common excavation.

Measurement for common excavation:

(1) Where the average thickness of excavation is 0.5 metre or more, in-place volume will be calculated for payment from cross-sections at sufficient and equal intervals taken by Contract Administrator in areas of excavation.

(2) Initial cross-sections will be taken after clearing and grubbing and stripping of topsoil, and immediately prior to excavation.

(3) Final cross-sections will be taken upon completion of excavation to lines and levels required prior to placing of other materials over the excavated surface.

(4) Where the average thickness of excavation is less than 0.5 metre, volume will be established from loose truck box volume as determined by Contract Administrator.

(5) Payment for on-site re-use includes compaction of the re-used materials.

1.8.6 Payment for double hauling (stockpiling and subsequent relocation from stockpile) of excavated material as specified or as directed by Contract Administrator will be based on measurements made before and after excavation from the stockpiled location.

1.8.7 Payment for imported embankment fill will be based on weigh tickets provided to Contract Administrator as loads are delivered to site and incorporated into the work and includes compaction.

1.8.8 Measurement for peat excavation and off-site disposal will be made by loose truck box volume in watertight truck box.

1.8.9 Payment for subgrade preparation includes finish grading of the subgrade, removal of surplus materials, adjustment of moisture content and compaction as specified.

1.8.10 Payment for replacement of areas of unsuitable subgrade revealed during proof rolling will include all remedial work, materials and requirements specified in this Section.
Payment will be based on quantity of suitable sub-grade delivered to site and incorporated into the work as given by weigh tickets provided to Contract Administrator.

1.8.11 No payment will be made for:

(1) Extra handling of windrowed materials blended on embankment slopes.

(2) Removal and correction of soft or unstable material put in place by Contractor.

1.8.12 All costs incurred as a result of unauthorized excavation beyond neat lines or limits of excavation shown on Standard Detail Drawings, or, where applicable, Contract Drawings including remedial backfilling, will be the Contractor's responsibility.

1.8.13 Payment for gravel berm includes base preparation, berm materials and formation of berm as shown on Contract Drawing and compaction, using the low permeability granular material specified.

1.9 Inspection and Testing

1.9.1 Refer to General Conditions, Clause 4.12, Tests and Inspections.

2.0 PRODUCTS

2.1 General

2.1.1 Unless shown otherwise on Standard Detail Drawings or, where applicable, Contract Drawings materials specified in 2.2 of this Section are approved for their respective uses.

2.2 Specified Materials

2.2.1 Backfill for embankment fill (subgrade fill) to be:

(1) Approved native or imported granular material.

(2) Pit run gravel.

(3) Pit run sand.

(4) River sand.

(5) Recycled concrete and asphalt (RCA)

2.2.2 Pit fines, cyclone sand and overburden may be utilized if approved by the Contract Administrator, but will not be acceptable if moisture content is too high to permit compaction to the specified density.

2.3 Materials

2.3.1 Refer to Section 31 05 17 - Aggregates and Granular Materials for specifications for approved granular materials.

2.3.2 Refer to Section 31 32 19 - Geosynthetics for specifications for geotextile material.

3.0 EXECUTION

3.1 General

3.1.1 Clear and grub limits of excavation and/or embankment fill in accordance with Section 31 11 01 - Clearing and Grubbing.

3.1.2 Strip all organic material to specified limits and specified depth or as directed by Contract Administrator. Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected. Remove all debris. Stockpile and place topsoil as specified.

3.1.3 Surface drainage:

(1) Provide suitable temporary ditches or other approved means of handling drainage prior to excavation and during construction to protect construction area and adjacent and other affected properties. Provide siltation controls to protect natural watercourses or existing municipal drainage facilities.

(2) Comply with Section 01 57 01 - Environmental Protection.

3.2 Excavation

3.2.1 Notify Contract Administrator sufficiently in advance of excavation operations for initial cross-sections to be taken.

3.2.2 Notify Contract Administrator whenever unsuitable materials are encountered in cut sections and remove unsuitable materials to depth and extent as directed by Contract Administrator.

3.2.3 If, during excavation, material appearing to conform to classification for rock is encountered, notify Contract Administrator in sufficient time to enable measurements to be made to determine volume of rock.

3.2.4 Rock excavation: Rock excavation to Section 31 23 17 - Rock Removal.

3.3 Inspection of Native Surface

3.3.1 Prior to placing embankment fill, proof roll graded native surface using fully loaded single or dual axle dump truck. Contract Administrator may authorize use of other acceptable proof rolling equipment. Remove soft or other unstable material. Replace with approved embankment fill and compact replacement fill to minimum 95% Modified Proctor density in compliance with ASTM D1557. (All following references to density imply compliance with ASTM D1557).

3.4 Placing

3.4.1 Place material only on clean unfrozen surface, properly shaped and compacted and free from snow or ice.

3.4.2 Begin spreading material on crown line or high side of one-way slope.

3.4.3 Place materials using methods which do not lead to segregation or degradation.

3.4.4 Place material to full width in uniform layers and compact to specified densities.

3.4.5 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

3.4.6 Remove and replace that portion of any layer in which material becomes segregated during spreading.

3.4.7 Where shown on Contract Drawings or as directed by Contract Administrator, scarify or bench existing slopes in side hill or sloping sections to ensure proper bond between new materials and existing surfaces.

3.4.8 Where fill material consists principally of rock:

(1) Place to full width in layers of sufficient depth to contain maximum sized rocks, but in no case is layer thickness to exceed 1 m.

(2) Individual rock fragments not exceeding 1.5 m in horizontal dimension permitted provided their vertical dimension does not exceed one third of fill section depth.

(3) Carefully distribute rock material to fill voids with smaller fragments to form compact mass.

(4) Fill surface voids at subgrade level with rock spalls or selected material to form an earth-tight surface.

(5) Do not place boulders and rock fragments with dimensions exceeding 150 mm within 300 mm of subgrade elevation.

3.5 Compaction

3.5.1 Compaction equipment to be capable of obtaining required densities in materials on project.

3.5.2 Compact to density of not less than 95% Modified Proctor density.

3.5.3 Shape and roll alternately to obtain smooth, even and uniformly compacted layers.

3.5.4 Apply water as necessary during compaction to obtain specified density. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is suitable for compaction.

3.5.5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers.

3.5.6 Finish slopes to neat condition, true to line and grade.

(1) Remove boulders encountered in cut slopes and fill resulting cavities.

(2) Hand finish slopes that cannot be finished satisfactorily by machine.

3.6 Finished Tolerances

3.6.1 Ensure finished subgrade surface within plus or minus 15 mm of specified grade and cross-section but not uniformly high or low.

3.6.2 Ensure finished subgrade surface has no irregularities exceeding 15 mm when checked with a 3 m straight edge placed in any direction.

3.6.3 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.7 Proof Rolling

3.7.1 For proof rolling use fully loaded single or dual axle dump truck.

3.7.2 Contract Administrator may authorize use of other acceptable proof rolling equipment.

3.7.3 Proof roll top of embankment fill upon completion of fine grading and compaction.

3.7.4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.

3.7.5 Where proof rolling reveals areas of unsuitable subgrade:

(1) Remove unsuitable embankment material to depth and extent directed by Contract Administrator.

(2) Replace with approved embankment material and compact in accordance with this section.

3.8 Place Topsoil

3.8.1 Place, spread and grade topsoil as shown on Contract Drawings.

3.8.2 Restore planted areas with topsoil, ground cover, and plants or shrubs to match existing planted areas as shown on Contract Drawings.

3.9 Maintenance

3.9.1 Maintain finished embankment fill in condition conforming to this section until succeeding material is applied or until granular base is accepted by Contract Administrator.

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END OF SECTION 31 24 13

1.0 GENERAL

1.0.1 Section 31 32 19 refers to those portions of the work that are unique to the supply and installation of geosynthetic materials. Geosynthetics include Geotextiles, Geogrids, Geocomposites and Geomembranes. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

1.0.2 Geotextiles are typically of either a "slit-film, woven" variety or a "continuous filament" variety. Geotextiles may be used for separation, filtration and reinforcement. Geogrids may be used for reinforcement. Geocomposites may be used for drainage and for separation/reinforcement or drainage/reinforcement. Geomembranes may be used for impermeable barriers.

1.0.3 This section currently provides minimum specifications for geotextiles only. Requirements for geogrids, geocomposites and geomembranes, if applicable, are shown on Contract Drawings and/or specified in Supplementary Specifications.

1.1 Related Work

1.1.1	Environmental Protection	Section 01 57 01
1.1.2	Roadway Excavation, Embankment and Compaction	Section 31 24 13
1.1.3	Gabions	Section 31 36 13
1.1.4	Riprap	Section 31 37 10

1.2 References

1.2.1 The abbreviated standard specifications for testing, materials, fabrication, supply and installation, referred to herein, are fully described in Section 01 42 00 – Reference Specifications – Site and Infrastructure.

1.3 Samples

1.3.1 Samples may be required.

1.4 Material Certification

1.4.1 Submit a "General Product Certification Sheet" clearly showing "Minimum Average Roll Values", as governed by ASTM D4354, with tender documents. All values to meet or exceed specified requirements.

1.4.2 At least 2 weeks prior to commencing work, and prior to material being accepted on site, submit original manufacturer's "Mill Certificates", showing actual MINIMUM test values and clearly identifying roll and batch numbers. Any material arriving on site which does not meet or exceed accepted "Minimum Average Roll Values" or that are not identified on original manufacturer's mill certification document to be removed at no cost to Owner.

1.4.3 All rolls of geosynthetics arriving on site to be clearly labelled identifying roll and batch number, original manufacturer's product identification number, and width and length of material contained within roll.

1.5 Delivery and Storage

1.5.1 Ensure each individual roll of geosynthetic is wrapped and covered to protect fabric from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, debris and rodents.

1.5.2 Use equipment that does not contact material itself during loading, unloading and handling. Slings or other lifting devices to provide adequate support without damaging material. Off-load in a minimum of steps directly to storage or installation area.

1.5.3 Store all rolls of geosynthetic on smooth, flat surfaces raised above ground that provide continuous support to rolls. Maintain additional protective cover if rolls are to be stored in excess of 30 days.

1.6 Measurement and Payment

1.6.1 Payment for geosynthetics will be made separately for each type of geosynthetics supplied and installed. Measurement of geosynthetics will be for the net surface of the work covered by the material. No allowance will be made for seams and overlaps.

1.7 Inspection and Testing

1.7.1 Refer to General Conditions, Clause 4.12, Tests and Inspections.

2.0 PRODUCTS

2.1 Geosynthetic

2.1.1 Geosynthetic: See detailed specifications in Supplementary Specifications or as shown on Contract Drawings.

2.1.2 Notwithstanding above, all specified properties represent "Minimum Average Roll Values" as governed by ASTM D4354.

2.1.3 Sewn seams (geotextiles) to be constructed using a 'j' configuration with 5 to 8 stitches per 25 mm in each of 2 lines of stitching separated by at least 12 mm. Stitches to be such that they will have an elongation at break equal to or greater than geosynthetic when tested in plane of seam. Ultimate grab strength perpendicular to seam to be equal to or exceed 90% of grab tensile strength of geosynthetic specified in Supplementary Specifications or on Contract Drawings.

2.1.4 Thread for sewn seams (geotextiles) to have an equal or better resistance to chemical and biological degradation as that of geosynthetic. For inspection purposes, thread used to be of a colour that will contrast with original geosynthetic. Threads comprising of any organic fibres (such as cotton) or nylon will not be accepted.

2.1.5 Seams for all other geosynthetics to be to manufacturer's recommendations.

3.0 EXECUTION

3.1 Installation

3.1.1 Where fabric seams are not sewn, ensure overlaps conform to Supplementary Specifications or as shown on Contract Drawings, but under no circumstances less than 600 mm.

3.1.2 When placing fabric which incorporates a sewn seam, place seam "thread up" to facilitate inspection and repair.

3.1.3 Place pins or staples, where used, at a maximum of 2 m intervals.

3.1.4 Minimum granular thicknesses:

(1) Minimum lift thickness, prior to compaction with non-vibratory equipment to be 300 mm.

(2) Minimum base course thickness prior to further compaction with vibratory equipment to be 600 mm (pre-compacted) as above.

3.2 Protection

3.2.1 Do not permit passage of any vehicle directly on geosynthetic at any time. Place fill by end-dumping or long-reach equipment

3.2.2 Maximum drop height for fill directly onto geosynthetic to not exceed 1 m.

3.3 Repairs

3.3.1 Repair seams which open, and tears and punctures, by removing fill and resetting fabric. Additional geosynthetic to be placed over area, extending beyond perimeter of failure a distance corresponding to lapping requirements for project. See 3.1.1 of this Section. Where practical, repaired geosynthetic to be pinned, bonded or stapled into place at intervals equal to or less than one-eighth perimeter of damage or 2 m, whichever is lesser.

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END OF SECTION 31 32 19

1.0 GENERAL

1.0.1 Section 32 11 16.1 refers to those portions of the work that are unique to the supply and placement of granular subbase materials. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

1.1 Related Work

1.1.1	Traffic Control, Vehicle Access and Parking	Section 01 55 00
1.1.2	Aggregates and Granular Materials	Section 31 05 17
1.1.3	Dust Control	Section 31 15 60
1.1.4	Roadway Excavation, Embankment and Compaction	Section 31 24 13
1.1.5	Cold Milling	Section 32 01 16.7
1.1.6	Full Depth Reclamation	Section 32 01 16.8

1.2 References

1.2.1 The abbreviated standard specifications for testing, materials, fabrication and supply, referred to herein, are fully described in Section 01 42 00 – Reference Specifications – Site and Infrastructure.

1.3 Samples

1.3.1 Samples may be required.

1.4 Measurement and Payment

1.4.1 Limit of payment for subbase under 1.4.3 will be 300 mm as shown on Standard Detail Drawing R1 – Paved Shoulders.

1.4.2 Measurement for granular subbase of variable thickness will be for actual quantity placed based on weigh tickets provided to Contract Administrator as loads are delivered.

1.4.3 Measurement for granular subbase for each specified thickness will be for the actual area placed.

1.4.4 Payment for 1.4.1 and 1.4.2 of this Section includes supply of the granular subbase material, adjustment of moisture content and compaction.

1.4.5 Payment for removal of unsuitable subgrade including disposal off-site will be made under Section 31 22 16.1 - Reshaping Existing Subgrade – 1.4.2.

1.5 Inspection and Testing

1.5.1 Refer to General Conditions, Clause 4.12, Tests and Inspections.

2.0 PRODUCTS

2.1 Specified Materials

2.1.1 Material for road subbase to be:

(1) Select granular subbase.

(2) 75 mm pit run gravel

(3) 75mm minus crushed gravel.

(4) Pit run sand.

(5) Approved native material.

(6) Other approved materials.

(7) River Sand.

(8) Recycled concrete and asphalt (RCA)

2.1.2 Refer to Section 31 05 17 - Aggregates and Granular Materials for material specifications.

2.1.3 Other granular materials: granular materials approved for road base or pipe bedding also acceptable for road subbase subject to approval of Contract Administrator.

3.0 EXECUTION

3.1 Inspection of Underlying Subgrade Surface

3.1.1 Ensure underlying subgrade surface true to cross-section and grade and compacted to specified density. Contract Administrator may accept satisfactory proof rolling as evidence of acceptable compaction of undisturbed native subgrade. Do not place granular subbase until subgrade is inspected and approved by Contract Administrator.

3.2 Placing

3.2.1 Place material only on clean unfrozen surface, properly shaped and compacted and free from snow or ice.

3.2.2 Begin spreading subbase material on crown line or high side of one-way slope.

3.2.3 Place granular subbase materials using methods which do not lead to segregation or degradation of aggregate.

3.2.4 Place material to full width in uniform layers not exceeding 300 mm compacted thickness. Contract Administrator may authorize thicker layers if specified compaction can be achieved.

3.2.5 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

3.2.6 Remove and replace portion of any layer in which material has become segregated during spreading.

3.3 Compaction

3.3.1 Compaction equipment to be capable of obtaining required densities in materials on project.

3.3.2 Compact to density not less than 95% Modified Proctor density.

3.3.3 Shape and roll alternately to obtain smooth, even and uniformly compacted subbase.

3.3.4 Apply water as necessary during compaction to obtain specified density. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is suitable for compaction.

3.3.5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers.

3.4 Finished Tolerances

3.4.1 Ensure finished subbase within plus or minus 15 mm of specified grade and cross-section but not uniformly high or low.

3.4.2 Ensure finished subbase surface has no irregularities exceeding 15 mm when checked with a 3 m straight edge placed in any direction.

3.4.3 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.5 Proof Rolling

3.5.1 For proof rolling use fully loaded single or dual axle dump truck.

3.5.2 Contract Administrator may authorize use of other acceptable proof rolling equipment.

3.5.3 Proof roll at level in subbase as required. If alternative proof rolling equipment is authorized, Contract Administrator will determine level of proof rolling.

3.5.4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.

3.5.5 Where proof rolling reveals areas of unsuitable subgrade:

(1) Remove subbase and subgrade material to depth and extent as directed by Contract Administrator.

(2) Backfill excavated subgrade with approved embankment material and compact in accordance with Section 31 24 13 - Roadway Excavation, Embankment and Compaction.

(3) Replace subbase material and compact in accordance with this section.

3.5.6 Where proof rolling reveals areas of unsuitable subbase, remove unsuitable materials to depth and extent directed by Contract Administrator and replace with new materials in accordance with this section at no extra cost.

3.6 Maintenance

3.6.1 Maintain finished subbase in condition conforming to this section until succeeding base is constructed, or until granular subbase is accepted by Contract Administrator.

END OF SECTION 32 11 16.1

1.0 GENERAL

1.0.1 Section 32 11 23 refers to those portions of the work that are unique to the supply and placement of granular base materials. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

1.1 Related Work

1.1.1	Reference Specifications – Site and Infrastructure	Section 01 42 00
1.1.2	Traffic Control, Vehicle Access and Parking	Section 01 55 00
1.1.3	Concrete Walks, Curbs and Gutters	Section 03 30 20
1.1.4	Aggregates and Granular Materials	Section 31 05 17
1.1.5	Dust Control	Section 31 15 60
1.1.6	Reshaping Existing Subgrade	Section 31 22 16.1
1.1.7	Roadway Excavation, Embankment and Compaction	Section 31 24 13
1.1.8	Cold Milling	Section 32 01 16.7
1.1.9	Full Depth Reclamation	Section 32 01 16.8
1.1.10	Granular Subbase	Section 32 11 16.1

1.2 References

1.2.1 The abbreviated standard specifications for testing, materials, fabrication and supply, referred to herein, are fully described in Section 01 42 00 – Reference Specifications – Site and Infrastructure.

1.3 Samples

1.3.1 Samples may be required.

1.4 Measurement and Payment

1.4.1 Limit of payment for granular base under this and sub-section 2 below will be up to 300 mm beyond back of curb as shown on Standard Detail Drawings. Granular Base for sidewalk and walkway construction is included in payment for sidewalk under Section 03 30 20 – Concrete Walks, Curbs and Gutters. Measurement for granular base of variable thickness will be for actual quantity placed based on weigh tickets provided to Contract Administrator as loads are delivered.

1.4.2 Measurement for granular base for each specified thickness will be for the actual area placed.

1.4.3 Payment for 1.4.1 and 1.4.2 of this Section includes supply of the granular base material, adjustment of moisture content and compaction.

1.4.4 Payment for removal of unsuitable subgrade including disposal off-site prior to direct placement of granular base will be made under Section 31 22 16.1 - Reshaping Existing Subgrade.

1.5 Inspection and Testing

1.5.1 Refer to General Conditions, Clause 4.12, Tests and Inspections.

2.0 PRODUCTS

2.1 Granular Base

2.1.1 Material for road base to be:

(1) 19 mm crushed gravel.

(2) Refer to Section 31 05 17 - Aggregates and Granular Materials for +material specifications.

3.0 EXECUTION

3.1 Inspection of Underlying Subbase

3.1.1 Ensure underlying subbase surface true to cross-section and grade, and of the specified material compacted to 95% Modified Proctor density in compliance with ASTM D1557. Do not place granular base until finished subbase surface is inspected and approved by Contract Administrator.

3.2 Placing

3.2.1 Place material only on clean unfrozen surface, properly shaped and compacted and free from snow or ice.

3.2.2 Begin spreading base material on crown line or on high side of one-way slope.

3.2.3 Place base material using methods which do not lead to segregation or degradation of aggregate.

3.2.4 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Contract Administrator may authorize thicker layers if specified compaction can be achieved.

3.2.5 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

3.2.6 Remove and replace portion of any layer in which material has become segregated during spreading.

3.3 Compaction

3.3.1 Compaction equipment to be capable of obtaining required densities in materials on project.

3.3.2 Compact to density not less than 95% Modified Proctor density.

3.3.3 Shape and roll alternately to obtain smooth, even and uniformly compacted base.

3.3.4 Apply water as necessary during compacting to obtain specified density. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is suitable for compaction.

3.3.5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers.

3.4 Finished Tolerances

3.4.1 Ensure finished base surface within plus or minus 10 mm of specified grade and cross-section but not uniformly high or low.

3.4.2 Ensure finished surface has no irregularities exceeding 10 mm when checked with a 3 m straight edge placed in any direction.

3.4.3 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.5 Proof Rolling

3.5.1 For proof rolling use fully loaded single or dual axle dump truck.

3.5.2 Contract Administrator may authorize use of other acceptable proof rolling equipment.

3.5.3 Proof roll top of base upon completion of fine grading and compaction.

3.5.4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.

3.5.5 Where proof rolling reveals areas of unsuitable subgrade:

(1) Remove base, subbase and subgrade material to depth and extent directed by Contract Administrator.

(2) Backfill excavated subgrade with approved embankment material and compact in accordance with Section 31 24 13 - Roadway Excavation, Embankment and Compaction.

(3) Replace subbase material and compact in accordance with Section 32 11 16.1 - Granular Subbase.

(4) Replace base material and compact in accordance with this Section.

3.5.6 Where proof rolling reveals areas of unsuitable base or subbase, remove unsuitable materials to depth and extent directed by Contract Administrator and replace with new materials in accordance with Section 32 11 16.1 - Granular Subbase and this Section at no extra cost.

3.6 Maintenance

3.6.1 Maintain finished base in condition conforming to this section until succeeding material is applied or until granular base is accepted by Contract Administrator.

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END OF SECTION 32 11 23

1.0 GENERAL

1.0.1 Section 32 12 16 refers to those portions of the work that are unique to the supply and placement of hot-mix asphalt (HMA) and warm-mix asphalt (WMA) concrete paving. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

1.0.2 WMA represents technologies which allow a reduction in the temperature at which asphalt mixtures are produced and placed. WMA technologies include those in which an additive is mixed with the asphalt cement or added to the mixture during production, and to plant foaming processes.

1.1 Related Work

1.1.1	Traffic Control, Vehicle Access and Parking	Section 01 55 00
1.1.2	Aggregates and Granular Material	Section 31 05 17
1.1.3	Reshaping Granular Roadbed	Section 31 22 16
1.1.4	Excavating, Trenching and Backfilling	Section 31 23 01
1.1.5	Full Depth Reclamation	Section 32 01 16.8
1.1.6	Asphalt Tack Coat	Section 32 12 13.1
1.1.7	Asphalt Prime	Section 32 12 13.2

1.2 References

1.2.1 The abbreviated standard specifications for testing, materials, fabrication and supply, referred to herein, are fully described in Section 01 42 00. Reference Specifications – Site and Infrastructure.

1.3 Material Certification

1.3.1 Upon request, submit manufacturer's test data and certification that asphalt cement meets requirements of this section.

1.4 Submission of Mix Design

1.4.1 Submit asphalt concrete mix design and trial mix test results to Contract Administrator for review at least one week prior to commencing work.

1.5 Measurement and Payment

1.5.1 Payment for asphaltic concrete paving includes all construction joint preparation, supply and placing of the asphaltic concrete, compaction, adjusting and cleaning frames, covers and lids of all castings affected and taped temporary pavement markings.
Measurement for asphaltic concrete paving for the specified design mixes for lower and upper courses will be for asphalt concrete actually incorporated into work based on weigh tickets provided to Contract Administrator as loads are delivered.

1.5.2 For measurement and payment purpose, Contract Administrator may order cores to be taken from finished paving to determine finished paving thickness. Three cores will be taken from paving areas up to 1,500m^2 each. Cores for each area will be averaged to determine overall thickness for that area.
If average thickness of cores indicates that pavement thickness varies from the thickness specified, Contract Administrator may do one of following:

(1) if thickness is less than that specified, Contract Administrator may require an overlay to be placed in deficient areas with no additional payment for the overlay and any other work necessary to place such overlay.

(2) if thickness is greater than specified, Contract Administrator may accept the work, if the excess thickness is acceptable; and calculate the amount of excess paving and, for payment purpose, reduce the quantity of asphaltic concrete paving placed accordingly.

1.5.3 Payment for asphaltic concrete sidewalks, driveways, in-fill strips and specified permanent patching paving includes all construction joint preparation, supply and placing of the asphaltic concrete, compaction and adjusting and cleaning frames, covers and lids of all castings affected.
Measurement for asphaltic concrete sidewalks, driveways, in-fill strips and specified permanent patching will be made separately for each of specified thicknesses which may be checked by Contract Administrator as given in 1.5.2 of this Section.

(1) if thickness is less than that specified, Contract Administrator may require an overlay to be placed in deficient areas with no additional payment for the overlay and any other work necessary to place such overlay.

(2) if thickness is less than specified, Contract Administrator may calculate amount of asphaltic concrete deficiency and, for payment purpose, reduce the item amount in pro-rata accordingly.

(3) if thickness is greater than specified, Contract Administrator may accept the work, if the excess thickness is acceptable; or may require the work to be removed and replaced with appropriate thickness, all without additional payment.

1.5.4 Payment for extruded asphalt concrete curb will be made separately for each type of curb specified and will include the asphaltic concrete, all preparatory work and placing by extrusion.

1.5.5 No additional payment will be made for work described in this Section for surface restoration if payment is already included under work described in other Sections.

1.5.6 Payment for all the above-described asphaltic concrete work placed by hand will only be made for such work specifically ordered by Contract Administrator.

1.5.7 Payment for saw cutting asphaltic concrete or Portland cement concrete pavement will only be made for permanent reinstatement and other specific work shown on Contract Drawings or as directed by Contract Administrator and will not include saw cutting prior to trench excavation for pipe laying work.

1.5.8 Payment for permanent reinstatement of pavement includes all work under Section 31 23 01 - Excavating, Trenching and Backfilling - 3.6.7, but not saw cutting edges of pavements.

1.6 Inspection and Testing

1.6.1 Refer to General Conditions, Clause 4.12, Tests and Inspections.

1.6.2 Testing laboratory to be approved by Contract Administration.

2.0 PRODUCTS

2.1 Materials

2.1.1 Asphalt cement: to CGSB-16.3-M90, Grade 80 - 100.

2.1.2 Reclaimed asphalt pavement (RAP): Crush and screen so that 100% of reclaimed asphalt pavement material passes 37.5 mm screen before mixing.

2.1.3 Aggregates: to Section 31 05 17 - Aggregates and Granular Materials and following requirements:

(1) Crushed stone or gravel consisting of hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

(2) Gradations to be within limits specified when tested to ASTM C136/C136M and ASTM C117.

Sieve Designation		Percent Passing				
		*Lower Course #1	*Lower Course #2	*Upper Course #1	*Upper Course #2	*Fi
25.0	mm	100	--	--	--	
19.0	mm	--	100	100	--	
12.5	mm	70 - 85	84 - 99	84 - 99	100	
9.5	mm	--	73 - 88	73 - 88	--	
4.75	mm	40 - 65	50 - 68	50 - 68	55 - 75	80
2.36	mm	32 - 53	35 - 55	35 - 55	38 - 58	64
1.18	mm	26 - 44	27 - 46	27 - 46	28 - 47	48
0.600	mm	18 - 36	18 - 36	18 - 36	20 - 36	32
0.300	mm	10 - 26	10 - 26	10 - 26	10 - 26	16
0.150	mm	4 - 17	4 - 17	4 - 17	4 - 17	6
0.075	mm	3 - 8	3 - 8	3 - 8	3 - 8	4

Footnote to asphalt mix-type selection:
Lower Course #1: Arterial and collector, lower course only.
Lower Course #2: Local, lower course only.
Upper Course #1: Arterial and collector, upper course only.
Upper Course #2: Local, surface course only.
Fine Mix: Skim patch on existing asphalt surface.

(3) Coarse aggregate is aggregate retained on 4.75 mm sieve and fine aggregate is aggregate passing 4.75 mm sieve when tested to ASTM C136/C136M.

(4) When dryer drum plant or plant without hot screening is used, process fine aggregate through 4.75 mm sieve and stockpile separately from coarse aggregate.

(5) Do not use aggregates having known polishing characteristics in mixes for upper courses.

(6) Sand equivalent: to ASTM D2419. Min: 40

(7) Magnesium Sulphate soundness: to ASTM C88/C88M.
Max % loss by mass after five cycles:

(1) Coarse aggregate: 15

(2) Fine aggregate: 18

(8) Los Angeles abrasion: Grading B, to ASTM C131/C131M.
Max % loss by mass:

(1) Coarse aggregate, upper course: 25

(2) Coarse aggregate, lower course: 35

(9) Absorption: to ASTM C127.
Max % by mass:

(1) Coarse aggregate, upper course: 1.75

(2) Coarse aggregate, lower course: 2.00

(10) Loss by washing: to ASTM C117.
Max % passing 0.075 mm sieve:

(1) Coarse aggregate, upper course: 1.5

(2) Coarse aggregate, lower course: 2.0

(11) Flat and elongated particles: (with length to thickness ratio greater than 3):
Max % by mass:

(1) Coarse aggregate, upper course: 10

(2) Coarse aggregate, lower course: 10

(12) Crushed fragments: at least 60% of particles by mass within each of following sieve designation ranges, to have at least 2 freshly fractured faces. Material to be tested according to ASTM C136/C136M and ASTM C117.

Determination of amount of fractured material will be in accordance with Ministry of Transportation and Highways' Specification I-11, Fracture Count for Coarse Aggregate, Method "B", which determines fractured faces by mass.

Passing		Retained On
25mm	to	12.5mm
12.5mm	to	4.75mm

(13) Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.

2.1.4 Mineral filler:

(1) Finely ground particles of limestone, hydrated lime, Portland cement or other approved non-plastic mineral matter, thoroughly dry and free from lumps.

(2) Add mineral filler when necessary to meet job mix aggregate gradation or as directed to improve mix properties.

(3) Mineral filler to be dry and free flowing when added to aggregate.

2.2 Mix Design

2.2.1 Submit job mix formula to Contract Administrator for review and approval. The mix design shall identify HMA or WMA with the respective mixing and compaction temperatures.

2.2.2 Mix may contain up to 15% recycled asphalt cement replacement without changing binder grade. Design of mix to include RAP from proposed source blended with virgin aggregate.

2.2.3 Design of mix: by Marshall method to requirements below.

(1) Compaction blows on each face of test specimens: 75

(2) Mix physical requirements:

Property		Pavement Course	
Marshall Stability at 60°C	kN min.	6.4 5.5 5.5	lower course upper course fine
Flow Value mm		2 – 4	
Air Voids in Mixture%		3 - 6 3 - 5 3 - 5	lower course upper course fine
Voids in Mineral Aggregate	% min.	13 14 14 15 15	lower course 1 lower course 2 upper course 1 upper course 2 fine
Index of Retained Stability	% min.	75	

(3)

(3) Measure physical requirements as follows:

(1) Marshall load and flow value: to ASTM D6927.

(2) Air voids: to ASTM D3203.

(3) Index of Retained Stability: measure in accordance with Marshall Immersion Test (ASTM D6927).

(4) Do not change job-mix without prior approval of Contract Administrator. Should change in material source be proposed, new job-mix formula to be submitted to Contract Administrator for review and approval.

(5) Percentage of RAP used shall be stated in the mix design report

(6) Minimum Tensile Strength Ratio (TSR): 80 for mix design with RAP content

2.2.4 Modification of asphalt cement either using additives or by foaming shall be in accordance with the approved mix design of the WMA.

3.0 EXECUTION

3.1 Plant and Mixing Requirements

3.1.1 Batch and continuous mixing plants:

(1) To ASTM D995.

(2) Heat asphalt cement and aggregate to mixing temperature. Do not heat asphalt cement above 160°C.

(3) Before mixing, dry aggregates to a moisture content not greater than 0.5% by mass or to a lesser moisture content if required to meet mix design requirements.

(4) Contract Administrator will monitor temperature of completed mix at plant and at paver after considering hauling and placing conditions.

(5) Feed aggregates from individual stockpiles through separate bins to cold elevator feeders.

(6) Feed cold aggregates to plant in proportions that will ensure continuous operations.

(7) Immediately after drying, screen aggregates into hot storage bins in sizes to permit recombining into gradation meeting job- mix requirements.

(8) Store hot screened aggregates in a manner to minimize segregation and temperature loss.

(9) Where RAP is to be incorporated into mix:

(1) Feed from separate cold feed bin specially designed to minimize consolidation of material. Provide 37.5 mm scalping screen on cold feed to remove oversized pieces of RAP.

(2) Ensure positive and accurate control of RAP cold feed by use of hydraulic motor or electric clutch and equip with anti-rollback device to prevent material from sliding backward on feed belt.

(3) Combine RAP and new aggregates in proportions as specified. Dry mix thoroughly, until uniform temperature within plus or minus 5°C of mix temperature is achieved prior to adding new asphalt cement. Do not add new asphalt cement where temperature of dry mix material is above 160°C.

(4) Use minimum 0.3% of anti-stripping agent, if Tensile Strength Ratio (TSR) is less than 80%.

(10) Maintain temperature of materials within plus or minus 5°C of specified mix temperature during mixing.

(11) Mixing time:

(1) In batch plants, dry mix for not less than 10 s. Continue wet mixing as long as necessary to obtain a thoroughly blended mix but not less than 30 s or more than 75 s.

(2) In continuous mixing plants, mixing time as required but not less than 45 s.

3.1.2 Dryer drum mixing plant:

(1) Where RAP to be incorporated into mix, dryer drum mixer to be designed to prevent direct contact of RAP with burner flame or with exhaust gases hotter than 180°C.

(2) Feed aggregates to burner end of dryer drum by means of a multi-bin cold feed unit and blend to meet job-mix requirements by adjustments of variable speed feed belts and gates on each bin.

(3) Feed RAP from separate cold feed bin designed to minimize reconsolidation of material.

(4) Meter total flow of aggregate and RAP by electronic weigh belt system with an indicator that can be monitored by plant operator and which is interlocked with asphalt pump so that proportions of aggregate and RAP and asphalt entering mixer remain constant.

(5) Provide for easy calibration of weighing systems for aggregates and RAP without having material enter mixer.

(6) Make provision for conveniently sampling full flow of materials from the cold feed.

(7) Provide screens or other suitable devices to reject oversize particles or lumps of aggregate and RAP from cold feed prior to entering drum.

(8) Provide a system interlock which will stop all feed components if either asphalt or aggregate from any bin stops flowing.

(9) Accomplish heating and mixing of asphalt mix in a drum dryer-mixer. Control heating to prevent fracture of aggregate or excessive oxidation of asphalt. Equip system with automatic burner controls and provide for continuous temperature sensing of asphalt mixture at discharge, with a printing recorder that can be monitored by plant operator. Submit printed record of mix temperatures at end of each week, if required.

(10) Mixing period and temperature to produce a uniform mixture in which particles are thoroughly coated, and moisture content of material as it leaves mixer to be less than 0.5%.

3.1.3 Temporary storage of hot mix:

(1) Provide mix storage of sufficient capacity to permit continuous operation, maintained at specified temperatures and designed to prevent segregation.

(2) Do not store asphalt mix in storage bins in excess of 12 h.

3.1.4 Mixing tolerances including variations resulting from adding RAP:

(1) Permissible variation in aggregate gradation from job mix (percent of total mass):

(1)	4.75 mm sieve and larger	5.5
(2)	2.36 mm sieve	4.5
(3)	0.600 mm sieve	3.5
(4)	0.150 mm sieve	2.5
(5)	0.075 mm sieve	1.5

(2) Permissible variation of asphalt cement from job mix, 0.3%.

(3) Permissible variation of mix temperature at discharge from plant, 5°C.

3.2 Equipment

3.2.1 Pavers: mechanical grade-controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown as shown on Contract Drawings.

3.2.2 Rollers: sufficient number of rollers of type and weight to obtain specified density of compacted mix.

3.2.3 Vibratory rollers:

(1) Minimum drum diameter: 1200 mm.

(2) Maximum amplitude of vibration (machine setting): 0.5 mm for lifts less than 40 mm thick.

3.2.4 Haul trucks: of adequate size, speed and condition to ensure orderly and continuous operation and as follows:

(1) Boxes with tight metal bottoms.

(2) Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.

(3) In cool weather or for long hauls, insulate entire contact area of each truck box.

(4) Trucks which cannot be weighed in a single operation on scales supplied will not be accepted.

3.2.5 Hand tools:

(1) Lutes or rakes with covered teeth for spreading and finishing operations.

(2) Tamping irons having mass not less than 12 kg and a bearing area not exceeding 310cm2 for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Contract Administrator, may be used instead of tamping irons.

(3) Straight edges, 3.0 m in length, to test finished surface.

3.3 Preparation

3.3.1 Reshape granular roadbed in accordance with Section 31 22 16 - Reshaping Granular Roadbed, Section 32 13 16.1 - Roller Compacted Concrete Paving and Section 32 01 16.8 - Full Depth Reclamation, if required.

3.3.2 When paving over existing asphalt surface, clean pavement surface in accordance with Section 32 01 11 - Pavement Surface Cleaning and Removal of Pavement Markings. When levelling course is not required, patch and correct depressions and other irregularities to approval of Contract Administrator before beginning paving operations.

3.3.3 Adjust existing castings to new elevations and protect from asphaltic mix.

3.3.4 When matching new pavement with existing pavement make vertical cut between existing pavement and new pavement as shown on Contract Drawings.

3.3.5 Apply prime coat and/or tack coat in accordance with Section 32 12 13.2 - Asphalt Prime and/or Section 32 12 13.1 - Asphalt Tack Coat prior to paving.

3.3.6 Prior to laying mix, clean surfaces of loose and foreign material.

3.4 Transportation of Mix

3.4.1 Transport mix to job site in vehicles cleaned of foreign material.

3.4.2 Paint or spray truck beds with light oil, limewater, soap or detergent solution, at least once a day or as required. Elevate truck bed and thoroughly drain. No excess solution will be permitted.

3.4.3 Schedule delivery of material for placing in daylight, unless Contract Administrator approves artificial light.

3.4.4 Deliver material to paver at a uniform rate and in an amount within capacity of paving and compacting equipment.

3.4.5 Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place mixes at temperature within specified range under the approved mix design.

3.5 Placing

3.5.1 Obtain Contract Administrator's approval of base, existing surface, tack coat, or prime coat prior to placing asphalt.

3.5.2 Place asphalt concrete to thicknesses, grades and lines as shown on Contract Drawings.

3.5.3 Placing conditions:

(1) Place asphalt mixtures only when air temperature is above 5°C. Place overlay pavement only when air temperature is above 10° C.

(2) When temperature of surface on which material is to be placed falls below 10°C, provide extra rollers as necessary to obtain required compaction before cooling.

(3) Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.

3.5.4 Place asphalt concrete in compacted lifts of thickness as shown on Contract Drawings:

(1) Levelling course(s) to thicknesses required but not exceeding 100 mm each.

(2) Lower course in layers not to exceed 100 mm each.

(3) Surface course in layers of maximum 60 mm each.

3.5.5 Where possible do tapering and levelling where required in lower lifts. Overlap joints by not less than 300 mm.

3.5.6 Spread and strike off mixture with self-propelled mechanical finisher.

(1) Construct longitudinal joints and edges true to line markings. Position and operate paver to follow established line closely.

(2) When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver. Work pavers as close together as possible and in no case permit them to be more than 30 m apart.

(3) If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.

(4) Correct irregularities in alignment left by paver by trimming directly behind machine.

(5) Correct irregularities in surface of pavement course directly behind paver. Remove by shovel or lute excess material forming high spots. Fill and smooth indented areas with hot mix. Do not broadcast material over such areas.

(6) Do not throw surplus material on freshly screeded surfaces.

3.5.7 When hand spreading is used:

(1) Approved wood or steel forms, rigidly supported to assure correct grade and cross section, may be used. Use measuring blocks and intermediate strips to aid in obtaining required cross-section.

(2) Distribute material uniformly. Do not broadcast material.

(3) During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes. Reject material that has formed into lumps and does not break down readily.

(4) After placing and before rolling, check surface with templates and straightedges and correct irregularities.

(5) Provide heating equipment to keep hand tools free from asphalt. Avoid high temperatures which may burn material. Do not use tools at a higher temperature than temperature of mix being placed.

3.6 Compaction

3.6.1 Roll asphalt continuously to average density not less than 97% of 75 blow Marshall density in accordance with ASTM D6927 with no individual test less than 95%.

3.6.2 General:

(1) Provide at least two rollers and as many additional rollers as necessary to achieve specified pavement density. When more than two rollers are required, one roller to be pneumatic tired type.

(2) Start rolling operations as soon as placed mix can bear weight of roller without undue displacement of material or cracking of surface.

(3) Operate roller slowly initially to avoid displacement of material. For subsequent rolling do not exceed 5 km/h for static steel- wheeled rollers and 8 km/h for pneumatic- tired rollers.

(4) For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of 20 impacts per metre of travel. For lifts less than 50 mm thick, impact spacing should not exceed compacted lift thickness.

(5) Overlap successive passes of roller by at least one-half width of roller and vary pass lengths.

(6) Keep wheels of roller slightly moistened with water to prevent pick-up of material but do not over-water.

(7) Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.

(8) Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.

(9) After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side.

(10) When paving in echelon, leave unrolled 50 to 75 mm of edge which second paver is following and roll when joint between lanes is rolled.

(11) Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling.

3.6.3 Breakdown rolling:

(1) Commence breakdown rolling immediately following rolling of transverse and longitudinal joint and edges.

(2) Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.

(3) Operate breakdown roller with drive roll or wheel nearest finishing machine. Exceptions may be made when working on steep slopes or super-elevated sections.

(4) Use only experienced roller operators for this work.

3.6.4 Second rolling:

(1) Use pneumatic-tired, steel wheel or vibratory rollers and follow breakdown rolling as closely as possible and while paving mix temperature allows maximum density from this operation.

(2) Rolling to be continuous after initial rolling until mix placed has been thoroughly compacted.

3.6.5 Finish rolling:

(1) Accomplish finish rolling with steel wheel rollers while material is still warm enough for removal of roller marks.

(2) Conduct rolling operations in close sequence.

3.7 Joints

3.7.1 General:

(1) Remove surplus material from surface of previously laid strip. Do not dispose on surface of freshly laid strip.

(2) Construct joints between asphalt concrete pavement and Portland cement concrete pavement as specified.

(3) Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.

3.7.2 Transverse joints:

(1) Offset transverse joint in succeeding lifts by at least 600 mm.

(2) Cut back to full depth vertical face and tack face with thin coat of asphalt prior to continuing paving.

(3) Compact transverse joints to provide a smooth riding surface.

3.7.3 Longitudinal joints:

(1) Offset longitudinal joints in succeeding lifts by at least 150 mm.

(2) Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100°C prior to paving of adjacent lane. If cold joint cannot be avoided, tack face of adjacent lane with thin coat of asphalt prior to continuing paving.

(3) Overlap previously laid strip with spreader by 100 mm.

(4) Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with a lute or rake.

(5) Roll longitudinal joints directly behind paving operation.

(6) When rolling with static roller, shift roller over onto previously placed lane in order that 100 to 150 mm of drum width rides on newly laid lane, then operate roller to pinch and press fines gradually across joint. Continue rolling until thoroughly compacted neat joint is obtained.

(7) When rolling with vibratory roller, have most of drum width ride on newly placed lane with remaining 100 to 150 mm extending onto previously placed and compacted lane.

3.7.4 Construct feather joints so that thinner portion of joint contains fine graded material obtained by changed mix design or by raking out coarse aggregate in mix. Place and compact joint so that joint is smooth and without visible breaks in grade. Location of feather joint as specified.

3.7.5 Construct butt joints at locations and to details as shown on Contract Drawings.

3.7.6 Wherever practical, locate joints under future traffic markings (paint lines).

3.8 Pavement Patching

3.8.1 Ensure temporary and permanent pavement patching done by handwork conforms to all standards specified for machine placed asphaltic concrete.

3.8.2 Subbase and base preparation as specified in Section 32 11 16.1 - Granular Subbase and Section 32 11 23 - Granular Base respectively, unless shown otherwise on Contract Drawings.

3.9 Sidewalks, Driveways and Curbs

3.9.1 Hot-mix asphalt concrete sidewalks, driveways and curbs as shown on Contract Drawings.

3.9.2 Machine place where practical.

3.9.3 Ensure placement by handwork conforms to all standards specified for machine placed asphaltic concrete.

3.9.4 Other than requirements relating specifically to Portland cement concrete, ensure hot-mix asphalt concrete sidewalks and curbs comply with all requirements of Section 03 30 20 - Concrete Walks, Curbs and Gutters.

3.9.5 Ensure hot-mix asphalt concrete driveways comply with all requirements of Section 32 12 16 - Hot-Mix Asphalt Concrete Paving.

3.10 Finished Tolerances

3.10.1 Ensure finished asphalt surface within 6 mm of design elevation but not uniformly high or low.

3.10.2 Ensure finished asphalt surface does not have irregularities exceeding 6 mm when checked with a 3 m straight edge placed in any direction.

3.10.3 Water ponding not permitted.

3.10.4 Against concrete gutter, finished asphalt surface to be higher than the gutter by not more than 6mm.

3.11 Defective Work

3.11.1 Correct irregularities which develop before completion of rolling by loosening upper mix and removing or adding material as required.

3.11.2 If irregularities or defects remain after final compaction, remove upper course promptly and lay new material to form a true and even surface and compact immediately to specified density.

3.12 Clean-Up

3.12.1 Remove lids or covers from all castings and clean any prime, tack coat or hot-mix asphaltic concrete from frames, lids and covers of all castings.

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END OF SECTION 32 12 16

1.0 GENERAL

1.0.1 Section 32 91 21 refers to those portions of the work that are unique to the supply and placement of growing medium (topsoil) and subsequent finish grading. In this Section, the term "growing medium" is used in place of the generic and commonly used term "topsoil". The term "topsoil" in this Section is used where appropriate to identify imported or on-site natural material conforming to 2.4 of this Section. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

1.0.2 This section is based on the "British Columbia Landscape Standard" published by the B. C. Society of Landscape Architects and the B. C. Nursery Trades Association. This standard is intended to set a level of quality which is to be equalled or bettered in the construction documents for each project. Guidance of a registered British Columbia Landscape Architect is recommended.

1.1 Related Work

1.1.1	Site Grading	Section 31 22 01
1.1.2	Hydraulic Seeding	Section 32 92 19
1.1.3	Seeding	Section 32 92 20
1.1.4	Sodding	Section 32 92 23
1.1.5	Planting of Trees, Shrubs and Ground Covers	Section 32 93 01

1.2 References

1.2.1 British Columbia Landscape Standard.

1.2.2 Canadian System of Soil Classification.

1.3 Source Quality Control

1.3.1 Advise Contract Administrator of sources of growing medium to be utilized 7 days in advance of starting work.

1.3.2 Contractor is responsible for soil analysis and requirements for amendments to supply growing medium as specified.

1.4 Measurement and Payment

1.4.1 Payment for growing medium and imported topsoil will be made separately for each type of growing medium and imported topsoil specified, and includes supply of materials, on-site handling, placement to thickness specified, application of fertilizers and finish grading. Payment for growing medium will be by actual area provided and payment for imported topsoil will be based on loose truck box volume.

1.4.2 Payment for placement and spreading of native topsoil previously stockpiled on site will be made under Section 31 22 01 – Site Grading - 1.4.6.

1.4.3 Payment for excavation of native topsoil and re-use on site will be made under Section 31 22 01 – Site Grading - 1.4.2.

1.5 Inspection and Testing

1.5.1 Refer to General Conditions, Clause 4.12, Tests and Inspections.

2.0 PRODUCTS

2.1 General

2.1.1 In this Section, a range of measurable physical and chemical properties are set out as being acceptable in a growing medium. Compliance with this Section is to be determined by testing for those properties. When imported or on-site soil is used, it is to be tested and modified as necessary by admixture of other components to bring its properties within ranges set in 2.10 of this Section for growing medium.

2.2 Applications

2.2.1 Three different growing medium types are described in this Section for different applications:

(1) Low traffic lawn areas, trees and large shrubs.

(2) High traffic lawn areas, having regular pedestrian traffic. This growing medium has relatively high structural strength but will require more care due to lower water and nutrient capacity.

(3) Growing medium for planting areas, such as for shrub and ground cover areas and in planters. This growing medium is similar to that for low traffic lawn areas, but has higher organic content and slightly lower pH. This may be achieved by adding peat moss to growing medium for low traffic lawn areas.

2.3 Native Topsoil

2.3.1 On-site native topsoil may be used, provided it meets standard set for imported topsoil and can be modified to meet requirements set out for specified growing medium.

2.3.2 If testing shows on-site soil to be suitable for landscaping, a sufficient quantity of stripped topsoil to be stockpiled where shown on Contract Drawings or in areas specified for stockpiling.

2.3.3 Do not handle topsoil while in a wet or frozen condition or in any manner in which structure is adversely affected.

2.4 Imported Topsoil

2.4.1 Imported topsoil to be friable loam, neither heavy clay nor of very light sandy nature, containing a minimum of 4% organic matter for clay loams and 2% for sand loams, to a maximum of 20% by volume. To be free from subsoil, roots, noxious grass, weeds, toxic materials, stones over 30 mm, foreign objects, and with an acidity range (pH) of 5.5 to 7.5. To be free from crabgrass, couch grass, equisetum or noxious weeds or seeds or parts thereof.

2.4.2 Freedom from rock or debris to be such that 95 - 100% of particles pass a 25 mm sieve and 85 - 100% pass a 9.5 mm sieve.

2.4.3 Population of any single species of plant pathogenic nematode to not exceed 1000 per litre of growing medium.

2.5 Peat Moss

2.5.1 Peat moss to be Horticultural grade, partially decomposed fibrous or cellular stems and leaves of Sphagnum Mosses with texture varying from porous to spongy fibrous, fairly elastic and substantially homogeneous with pH value not less than 3.5 and not greater than 4.5, free of decomposed colloidal residue, wood, sulphur and iron, brown in colour and medium to coarse shredded, suitable for horticultural purposes.

2.5.2 Salinity: saturation extract conductivity to not exceed 2.0 millimhos/cm at 25°C.

2.5.3 Organic content: to be no less than 90% based on dry weight as determined by ash analysis.

2.5.4 Nitrogen: to be no less than 0.8% based on dry weight.

2.5.5 Particle size:

(1) 95 - 100% passing a 9.5 mm sieve.

(2) 0 - 15% passing a 0.500 mm sieve.

2.6 Sand

2.6.1 Sand to be hard, granular sharp sand to CSA A82.50, well washed and free of impurities, chemical or organic matter.

2.6.2 Particle size in sand to be:

(1) 95 - 100% passing a 4.75 mm sieve.

(2) 0 - 40% passing a 0.500 mm sieve.

(3) 0 - 5% passing a 0.050 mm sieve.

2.7 Manure

2.7.1 Manure to be well-rotted farm animal manure, rotted to extent that liquids have been eliminated, and material is crumbly, free from weed seeds, rocks, sticks, rubble and containing not more than 40% sawdust, straw or shavings.

2.7.2 Manure to be free of harmful chemicals such as any used to artificially hasten decomposition, and to have salt content that gives an electrical conductivity reading of less than 0.5 mmho/cm.

2.7.3 Manure to contain not less than 1.0% nitrogen based on dry weight.

2.7.4 All particles in manure to pass a 6.35 mm sieve.

2.7.5 Manure to be free of viable seed, maximum two plants per litre of manure.

2.8 Wood Residuals

2.8.1 Where wood residuals such as fir or hemlock sawdust are present in growing medium, their quantities and properties to be such that total Carbon to total Nitrogen ratio is a maximum of 40:1.

2.8.2 Cedar or redwood sawdust to not be present in growing medium.

2.9 Fertilizers

2.9.1 Chemical Fertilizers:

(1) Fertilizers to be standard commercial brands, meeting requirements of Canada Fertilizer Act.

(2) All fertilizers to be in granular, pelleted or prill form, and to be dry, free-flowing and free from lumps.

(3) Fertilizers to have a guaranteed N-P-K analysis.

(4) Fertilizer to be packed in standard waterproof containers, clearly marked with name of manufacturer, weight and analysis.

(5) Fertilizer to be stored in weatherproof storage place and in such a manner that it will stay dry and its effectiveness is not impaired.

Fertilizers to include, but not be limited to, those shown in Table 1.

Table 1: Fertilizers

Name	Minimum Proportion by Weight	Main Element
Ammonium Nitrate	33.5%	N
Ammonium Sulfate	21.0%	P (20% P_2O_5)
Superphosphate (0-20-0)	8.5%	P (20% P_2O_5)
Superphosphate (0-45-0)	19.5%	P (45% P_2O_5)
Potassium Sulfate	41.5%	K (50% K_2O)
Potassium Chloride (muriate)	50.0%	K (60% K_2O)
Potassium Nitrate	13.0%	N
Iron Sulfate	20.0%	Fe, as metallic
Gypsum	23.0%	Ca
Rock or oyster shell lime, limestone flour	40.0%	Ca
Dolomite Lime	20.0% 13.0%	Ca M
Bone meal	20.0% 3.0%	Phosphoric Acid N

(Bone meal, Gypsum and limes to be finely ground, to 12 mesh or finer)

2.10 Growing Medium

2.10.1 Growing medium is any soil, soil substitute, or mixture whose chemical and physical properties fall within ranges required by this Section for a particular application.

2.10.2 Growing medium to be free of plants or their roots, sticks, building materials, wood chips (in excess of 10 mm in maximum dimensions), chemical pollutants, and other extraneous materials not contributing to generally desirable physical and chemical properties for landscaping purposes.

2.10.3 Growing medium to require not more than 0.5 kg/m^2 of dolomite lime to reach required pH level.

2.10.4 Fertility (nitrogen, phosphorous and potassium) and pH: may be modified after growing medium is placed, by incorporation of lime and fertilizers, or by incorporating these chemicals when mixing and screening.

2.10.5 Salinity: saturation extract conductivity to not exceed 3.0 millimhos/cm at 25°C.

2.10.6 Boron: concentration in saturation extract to not exceed 1.0 ppm.

2.10.7 Sodium: sodium adsorption ratio (SAR) as calculated from analysis of saturation extract to not exceed 8.0.

2.10.8 Total Nitrogen: to be 0.2% to 0.4% by weight.

2.10.9 Available Phosphorous: to be 50 to 70 ppm.

2.10.10 Available Potassium: to be 50 to 100 ppm.

2.10.11 Cation Exchange Capacity: to be 30 to 50 meq.

2.10.12 Carbon to Nitrogen Ratio: to be not more than 40:1.

2.10.13 Acidity: to be within pH range shown in Table 2 for intended application.

2.10.14 Texture: particle sizes and proportions of each size particle to be within ranges shown in Table 2 for intended application.

2.10.15 Organic Content: to be within range shown in Table 2 for intended application.

2.10.16 Drainage of growing medium can be measured only after growing medium in place. Mixing and handling or growing medium to be done in such a manner that minimum saturated hydraulic conductivity shown in Table 2 is achieved.

2.10.17 Tolerances: samples of growing medium taken just before planting to have above properties to within tolerances of ±20%, except for salinity, which is to be less than stated limit.

TABLE 2: Properties of Growing Medium for Different Applications

Properties		Low Traffic Lawn Areas, Trees and Large Shrubs	High Traffic Lawn Areas	Planting Areas, Planters, Shrub and Groundcover Areas
TEXTURE: Particle size classes by Canadian System of Soil Classification		Percent of Dry Weight Mineral Fraction (%)		
	Gravel greater than 2 mm less than 75 mm	0 - 10	0	0
	Sand greater than 0.05 mm less than 2 mm	50 - 70	80 - 90	50 - 70
	Silt greater than 0.002 mm less than 0.05 mm	10 - 30	5 - 20	10 - 30
	Clay less than 0.002 mm	7 - 20	2 - 5	7 - 20
ACIDITY (pH)		6.0 - 6.5	6.0 - 6.5	5.0 - 6.0
DRAINAGE: Minimum saturated hydraulic conductivity (cm/hr) in place		2.0	7.0	2.0
ORGANIC CONTENT: Percent of Dry Weight (%)		5 - 10	3 - 5	25 - 30

3.0 EXECUTION

3.1 Stripping of Topsoil

3.1.1 Strip existing topsoil in accordance with Section 31 22 01 - Site Grading.

3.2 Preparation of Subgrade

3.2.1 Prepare subgrade in accordance with Section 31 22 01 - Site Grading.

3.2.2 Verify that grades are correct. If discrepancies occur, notify Contract Administrator and do not commence work until instructed by Contract Administrator.

3.2.3 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.

3.2.4 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials. Remove soil contaminated with calcium chloride, toxic materials and petroleum products. Remove debris which protrudes more than 75 mm above surface. Dispose of removed material to approved off-site disposal area.

3.2.5 Coarse cultivate entire area which is to receive growing medium to minimum depth of 150 mm immediately before placing growing medium. Cross cultivate areas where equipment used for hauling and spreading has compacted soil.

3.3 Processing Growing Medium

3.3.1 Ensure commercial processing and mixing of growing medium components are done thoroughly by mechanized screening process. Do not mix by hand. Ensure resulting product is homogeneous mixture having required properties throughout.

3.3.2 Ensure moisture content of peat moss at time of mixing not less than 50% to 75%. Peat moss to form a ball when squeezed and retain shape upon release of pressure. Insufficient moisture will result in peat moss not holding together, while excessive moisture is evident when ball formed is pliable with a clear water sheen on surface.

3.3.3 Do not prepare or handle growing medium in a wet or frozen condition.

3.4 Placing Growing Medium

3.4.1 When subgrade accepted by Contract Administrator commence placing growing medium.

3.4.2 Place growing medium over prepared subgrade and allow to settle or compact by light rolling such that it is firm against deep footprints. Do not compact growing medium more than necessary to meet this requirement.

3.4.3 Ensure growing medium is moist (25% to 75% of field capacity) but not wet when placed, and do not handle if frozen or so wet that its structure will be altered.

3.4.4 Manually spread growing medium around trees, shrubs and obstacles.

3.4.5 Table 3 sets out minimum depths of growing medium after settlement for various types of subgrade.

TABLE 3: Minimum Growing Medium Depths

Application	Minimum Depths		
	Over Prepared Subsoil		Over Structures
	Where subsoil has medium (loamy) texture	Where subsoil has coarse (sandy) or fine (clay) texture	
Low traffic lawn areas:			
i) irrigated	100 mm	150 mm	150 mm
ii) not irrigated	100 mm	150 mm	225 mm
High traffic lawn areas:	100 mm	150 mm	-----
Planting medium:			
i) ground cover areas	150 mm	300 mm	225 mm
ii) shrub areas - small shrubs	300 mm	450 mm	300 - 500 mm
iii) shrub areas - large shrubs	450 mm	600 mm	500 - 900 mm
iv) tree pits	225 mm on sides and bottom of rootball	300 mm on sides and bottom of rootball	See Section 02950

3.5 Applying Fertilizers

3.5.1 Add fertilizers to bring growing medium fertility within ranges set out in this Section.

3.5.2 Add lime (if required) and potassium (if required) to growing medium at time of screening. Add all other fertilizers (such as nitrogen, phosphorus and micronutrients) to growing medium by thorough cultivation after medium is in place (if required).

3.5.3 Spread fertilizers evenly over growing medium with suitable mechanical spreader.

3.5.4 Ensure fertilizers are fully incorporated to minimum depth of 150 mm, except in lawn areas, where they are to be incorporated to depth of 50 mm.

3.5.5 Minimum one week separation between application of lime and fertilizers other than lime.

3.6 Finished Grading

3.6.1 Fine grade growing medium after placing to specified areas to ensure positive surface drainage.

3.6.2 Finish surface smooth, uniform, firm against deep footprinting with a fine loose surface texture.

3.7 Acceptance

3.7.1 Contract Administrator will inspect and test growing medium in place and determine acceptance of material, depth of growing medium and finish grading. Approval of growing medium material subject to soil testing and analysis.

3.8 Restoration of Stockpile Sites

3.8.1 Restore stockpile sites as specified in Contract Documents.

3.9 Clean-up

3.9.1 Dispose of surplus materials and all construction debris off-site.

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END OF SECTION 32 91 21

1.0 GENERAL

1.0.1 Section 33 11 01 refers to those portions of the work that are unique to the supply and installation of water mains, hydrants, valves and valve boxes, service connections and related appurtenances. This Section must be referenced to and interpreted simultaneously with all other Sections pertinent to the works described herein.

1.0.2 All details of waterworks facilities not specifically covered in this Section to comply with respective AWWA standards and/or manuals of practice as specified in Contract Documents.

1.1 Related Work

1.1.1	Concrete Reinforcement	Section 03 20 01
1.1.2	Cast-in-Place Concrete	Section 03 30 53
1.1.3	Cathodic Protection	Section 26 42 13
1.1.4	Aggregates and Granular Materials	Section 31 05 17
1.1.5	Excavating, Trenching and Backfilling	Section 31 23 01
1.1.6	Manholes and Catchbasins	Section 33 44 01

1.2 References

1.2.1 The abbreviated standard specifications for testing, materials, fabrication and supply, referred to herein, are fully described in Section 01 42 00 - Reference Specifications – Site and Infrastructure.

1.3 Samples

1.3.1 Samples may be required.

1.4 Material Certification

1.4.1 Products having CSA certification to be used where readily available. Product to be certified to CSA standard(s) by an approved independent third- party certification body accredited by the Standards Council of Canada and that is acceptable to the Contract Administrator. Products to be marked with certification body logo and CSA standard markings.

1.4.2 At least 2 weeks prior to commencing work, submit manufacturer's recent test data and certification that materials to be incorporated into works are representative and meet requirements of this Section. Include manufacturer's drawings where pertinent.

1.5 Shop Drawings and Technical Data

1.5.1 Shop drawings and technical data are not required unless specified otherwise in Supplementary Specifications.

1.5.2 Where specified, refer to General Conditions, Clause 5, Shop Drawings.

1.6 Record Drawings

1.6.1 Provide record drawings, including directions for operating valves, list of equipment required to operate valves, details of pipe material, location of air and vacuum release valves, hydrant details, maintenance and operating instructions.

1.7 Scheduling of Work

1.7.1 Schedule work to minimize interruptions to existing services.

1.7.2 Submit schedule of expected interruptions to Contract Administrator for approval and adhere to approved schedule.

1.7.3 Notify Contract Administrator, affected residences and businesses minimum of 24 h in advance of any interruption in service.

1.7.4 Do not interrupt water service for more than 3 h and confine this period between 09:00 and 16:00 h unless otherwise authorized.

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

1.8 Measurement and Payment

1.8.1 Payment for watermain will be made separately for various sections of watermain consistent with pipe materials and diameters, depths of mains and backfill requirements shown on Contract Drawings and described under the individual payment items in the Schedule of Quantities and Prices.

1.8.2 Payment for watermain and service connection include saw cutting pavement, trench excavation, disposal of surplus excavated material, bedding, supply and installation of all pipe, bolts, gaskets and tie rods, imported or native backfill as shown on the Drawings, cleaning, pressure and leakage testing, flushing, disinfection, all surface restoration as specified under Section 31 23 01 - Excavating, Trenching and Backfilling - 3.6, except permanent pavement restoration, and all other work and materials necessary to complete the installation as shown on the Drawings and specified under this Section.

Measurement for watermain will be made along centreline of main, through valves and fittings, with no deduction for length of valves or fittings, over surface after work has been completed.

1.8.3 Payment for inline gate valves or butterfly valves including valve boxes; and for crosses, tees, bends, reducers, blind flanges and caps will be made for items identified on Contract Drawings and installed as part of watermain as described under 1.8.2 of this Section.

Measurement will be for each respective item installed without deduction of length of valves and fittings from length of pipe measured for payment under 1.8.1 & 1.8.2 of this Section.

1.8.4 Payment for service connection includes mainline saddles where specified, corporation stops, curb stops, service pipes and all related fittings and appurtenances specified and/or shown on Standard Detail Drawings W2a or W2b, as applicable. Payment includes all applicable work described in 1.8.2 of this Section.

Measurement for service connections will be for each complete service installed, with no regard to length of service pipe installed.

1.8.5 Payment for test points, air-release/air-vacuum and combination air valves and apparatus and blow-off assembly as separate items includes all materials, works and appurtenances shown on Standard Detail Drawings W5 to W8 and W10 with valve chambers to be paid for under separate items. Payment includes all applicable work described in 1.8.2 of this Section.

1.8.6 Payment for air valve chamber complete with drain arrangement includes all materials, work and incidentals shown on Standard Detail Drawings W6 and W7 as separate items for each location. Payment includes all applicable work described in 1.8.2 of this Section.

1.8.7 Payment for blow-down chamber complete with backflow prevention device and drain arrangement includes all materials, work and incidentals shown on Standard Detail Drawings W9 and W10 as separate items for each location. Payment includes all applicable work described in 1.8.2 of this Section.

1.8.8 Payment for concrete bedding, or controlled density fill, where shown on Contract Drawings will be made as extra over payment to watermain under 1.8.2 of this Section. No payment will be made for concrete bedding or controlled density fill required as a result of unauthorized excavation beyond neat lines or limits of excavation shown on Contract Drawings or Standard Detail Drawing G4.

1.8.9 Payment for localised concrete encasement, thrust and anchor blocks and support blocks as shown on Contract Drawings or directed by Contract Administrator includes all necessary extra excavation and formwork and supply and placement of concrete as specified in Section 03 30 53 – Cast-In-Place Concrete. Measurement will be based on volume calculated from actual measurement of the dimensions of the components constructed as detailed in the Contract Drawing

1.8.10 Payment for watermain undercrossing other underground services will only be made for crossing with use of a pipe casing as shown on the Contract Drawings or directed by Contract Administrator. Payment item includes the pipe casing and all other work and materials as specified in 3.9 of this Section. Payment will be extra over the watermain item under 1.8.2 of this Section for each undercrossing installation.

1.8.11 Payment for under pressure branching includes branch saddle with integral isolation valve, special under pressure branching equipment, all necessary excavation and backfill and surface restoration requirements in 1.8.2 of this Section.

1.8.12 Payment for tie-ins to existing mains where all pipework is to be undertaken by Owner's crew includes exposing the existing system to confirm conditions and location, shoring, all labour, materials, equipment, reinstatement to facilitate the Owner's crew to carry out the tie-in work, remaining in attendance and co-ordinating with Owner's crew to complete tie-in as shown on Contract Drawings.

1.8.13 Payment for tie-ins to existing mains where all pipework is to be undertaken by the Contractor will be as 1.8.12 of this Section, including all pipes, fittings and necessary tie-in work to complete tie-in as shown on Contract Drawings.

1.8.14 Payment for hydrants includes the hydrant body, lateral connections from mainline tee off watermain to hydrants, isolation valve at the mainline tee and curb valve with adjustable valve box and all other incidental work as shown on Standard Detail Drawing W4.

1.8.15 Payment for poly encasement surrounding pipeline and appurtenance, where shown on Contract Drawings will be made as extra over payment to watermain under 1.8.2 of this Section. Measurement will be along centreline of pipeline, through valves and fittings, with no deduction for length of valves or fittings, over surface after work has been completed.

1.9 Inspection and Testing

1.9.1 Refer to General Conditions, Clause 4.12, Tests and Inspections.

2.0 PRODUCTS

2.1 General

2.1.1 Pipe material as shown on Contract Drawings, excluding main pipe within chambers which shall be steel, and leads to fire hydrants which shall be ductile iron or PVC.

2.1.2 All products are specified by reference to approved specifications and/or standards. Refer to Supplementary Specifications and/or Contract Drawings for specified or approved manufacturers or trade names.

2.1.3 All mainline pipe, joints and fittings regardless of material, will have a cast iron outside diameter.

2.2 Mainline Pipe, Joints and Fittings

2.2.1 Ductile iron pipe:

(1) Pipe: to AWWA C151, to Pressure Class or Special Thickness Class specified in Contract Documents, and standard cement mortar lined to AWWA C104/A21.4.

(2) Joints: Single rubber gasket for push-on bell and spigot type joint and/or mechanical pipe joints: to AWWA C111 Tyton.

2.2.2 Polyvinyl Chloride (PVC) Pressure Pipe:

(1) Pipe:

(1) Pipe to be manufactured to specifications for pipe size ranges as follows:

Pipes 100 to 1500mm dia. - AWWA C900

AWWA C900 pipe to Pressure Class specified in Contract Documents.

Pipes to be certified by Canadian Standards Association for pipe size ranges 100mm to 1500mm dia. - CSA B137.3.

(2) ULC listed.

(3) Cast iron pipe equivalent outside diameter.

(4) To be compatible with specified mechanical joint and push-on joint fittings and valves without use of special adapters.

(2) Joints: It is mandatory that the push-on integrally thickened bell and spigot type conform to ASTM D3139 Clause 6.2 with single elastomeric gasket to ASTM F477.

2.2.3 High Density Polyethylene Pipe:

(1) Pipe:

(1) To AWWA C906 pressure class specified in Contract Documents.

(2) Pipes to be certified by Canadian Standard Association CSA B137.1

(3) To be compatible with specified mechanical joint fittings and valves without special adapters.

(2) Joints: Heat butt fusion to ASTM D2657 and in accordance with manufacturer's recommendations.

(3) Fittings:

(1) Fabricated HDPE mitred fittings to AWWA C906 suitable for pressure rating specified in Contract Documents.

(2) Moulded HDPE fittings to ASTM 3261 suitable for pressure rating specified and fusion to main pipe, dimensions as specified in Contract Documents.

(3) Flanged joints to AWWA C906 flat faced stub end and loose hot-dip galvanized ductile iron (ASTM A536) backup ring drilling to ANSI/ASME B16.1, ANSI/ASME B16.5, or AWWA C207, class suitable for pressure rating specified in Contract Documents.

(4) Nuts and bolts as specified for "Fittings" in this section.

2.2.4 Fittings:

(1) Ductile iron fittings to AWWA C110 suitable for pressure rating of 2415 kPa, cement mortar lined to AWWA C104/A21.4.

(2) Compact ductile iron fittings to AWWA C153/A21.53-94 suitable for pressure rating of 2415 kPa, cement mortar lined to AWWA C104/A21.4.

(3) PVC injection-moulded fittings shall be DR18, conforming to AWWA C907 and certified to CSA B137.2. PVC compound is 12454B according to ASTM D1784.

(4) PVC fabricated fittings shall conform to either AWWA C900 and be certified to CSA B137.3. Fabricated fittings to be made from CSA certified PVC pipe of the same pressure class or pressure rating as the pipe.

(5) Single rubber gasket for push-on bell and spigot type joint and/or mechanical pipe joints: to AWWA C111. All push-on joint hubs to be equipped with tie-rod lugs.

(6) Flanged Joints:

(1) Flat faced conforming to the face dimension and drilling of ANSI/ASME B16.1, Class 125

(2) On AWWA C110 fittings to AWWA C110 with minimum pressure rating 1035 kPa or higher as specified in Contract Documents.

(3) On AWWA C153 fittings to AWWA C153 with minimum pressure rating of 1723 kPa or higher as specified in Contract Documents.

(7) Flange gaskets:

(1) Flange gaskets to be manufactured from black natural rubber 3.175 mm thick with layer of cotton on both sides.

(2) Gaskets to be nitrile or NBR.

(8) Bolts and nuts:

(1) Bolts to be carbon steel, Grade B to ASTM A307, heavy hex style, zinc plated to ASTM B633 or cadmium plated to ASTM B766. Bolt sizes to AWWA C110.

(2) Nuts and washers: Nuts to be carbon steel, Grade A to ASTM A563. Washers to be flat hardened steel to ASTM F436/F436M. Nuts and washers to be zinc plated to ASTM B633 or cadmium plated to ASTM B766.

(9) Tie Rods and Nuts:

(1) Tie rods to be continuous threaded, quenched and tempered alloyed steel to ASTM A354, Grade BC. To be zinc plated to ASTM B633 or cadmium plated to ASTM B766. Tie rod sizes to be minimum 19 mm diameter or greater as shown on Contract Drawings.

(2) Nuts and internally threaded couplings to be heavy hex finish to ASTM A563. Washers to be flat hardened steel to ASTM F436/F436M. All to be zinc plated to ASTM B633 or cadmium plated to ASTM B766.

(10) Fabricated steel pipe fittings: to AWWA C208 and AWWA C207 if flanged, interior and exterior protected with hot applied coal tar enamel to AWWA C203 or liquid epoxy coating to AWWA C210.

(11) Couplings and Flanged Coupling Adapters:

(1) General Requirements:

Suitable for pressure class specified in Contract Documents.

Flanges and full-face flange gaskets where applicable to Clauses 2.2.4.7 and 2.2.4.8 of this Section.

To AWWA C219

Anti-corrosion coating of interior and exterior centre sleeve and end rings to AWWA C219, AWWA C213, AWWA C210, or AWWA C550 as specified in Contract Documents.

Compression gaskets to AWWA C219.

Bolts and nuts high strength low alloy steel to AWWA C111, stainless steel to ASTM F593 or ASTM F738 for bolts and ASTM F594 or ASTM F836M for heavy hex nuts, as specified in Contract Documents. Rolled threads, fit and dimensions to AWWA C111.

Ductile iron castings to ASTM A536, Grade 65-45-12.

(2) Plain end or transition couplings as specified in Contract Documents.

(3) Flanged coupling adapters as specified in Contract Documents.

(12) Joint Restraint Devices: General Requirements:

(1) Ductile iron castings to ASTM A536.

(2) Anti-corrosion coating of ductile iron castings to AWWA C219, AWWA C210, C213 or C550.

(3) Bolts and nuts high strength low alloy steel to AWWA C111 or as specified in Contract Documents, stainless steel to ASTM F593 or F738 for bolts and ASTM F594 or F836 for heavy hex nuts. Rolled threads, fit and dimensions to AWWA C111.

(4) Tie rods to 2.2.3.8 of this Section.

(5) Restrainers for ductile iron pipe shall be mechanical joint fittings or push-on joint fittings with tie rod.

(6) Restrainers for PVC pipe shall be mechanical joint fittings or push-on joint fittings with tie rod lugs.

(7) Restrained harnesses or integral restraint systems manufactured as part of the pipe joint.

(8) All joint restraint systems for PVC pipe be approved by the specific PVC pipe manufacturer and that they do not derate the pipe manufacturer's recommended working pressures.

(9) Restrainers for PVCO pipe shall be mechanical joint fittings or push-on joint fittings with tie rod lugs.

(10) All joint restraint systems for PVCO pipe be approved by the specific PVCO pipe manufacturer, and that they do not derate the pipe manufacturer's recommended working pressures.

(13) Tapping sleeves for branch connections 75 mm and larger:

(1) General Requirements:

1. Location, type and pressure class as specified in Contract Documents. (Exterior condition of existing water mains as found in the field may alter type and/or materials. Refer to General Conditions, Clause 11, Concealed or Unknown Conditions.)

2. To AWWA C219 for sleeve and gasket materials and generally for design, manufacture and performance.

3. Flanges and flange gaskets to 2.2.4.7 and 2.2.4.8 of this Section and AWWA C207 and AWWA C208 for fabricated carbon steel sleeves. Flange gaskets for use with epoxy coated flanges to be annular ribbed type.

4. Anti-corrosion coating of fabricated carbon steel and ductile iron sleeve assemblies to AWWA C213 (Fusion-Bonded Epoxy) or shop coated to AWWA C219 if field applied dressings are specified in Contract Documents.
5. Bolts and nuts high strength low alloy steel to AWWA C111 or as specified in Contract Documents, stainless steel to ASTM F593 or ASTM F738 for bolts and ASTM F594 or ASTM F836M for heavy hex nuts. Rolled threads, fit and dimensions to AWWA C111.
6. Ductile iron castings to ASTM A536, grade 65-45-12.
7. Flanged branches for welding to steel pipe mains to AWWA C207 and AWWA C208.
8. Branches shall include a threaded test plug 19 mm NPS minimum if tapping machine to be used does not have provision for pressure testing.

(2) Tapping sleeves for cast iron, ductile iron, asbestos cement, PVC to AWWA C900, pre-stressed concrete pressure pipe or steel mains for taps other than size-on size:

1. Split assembly to incorporate an annular gasket cemented or mechanically held in place on the branch end **or** split assembly incorporating ring seal and wrap around sleeve length gasket liner.
2. Acceptable models: as specified in Contract Documents.

(3) Tapping sleeves for size on size taps on cast iron, ductile iron, asbestos cement, PVC to AWWA C900, pre-stressed concrete pressure pipe or steel:

1. Split assembly incorporating ring seal and wrap around sleeve length gasket/liner.
2. Acceptable models: as specified in Contract Documents.

(4) Tapping sleeves for size on size tap on ductile iron pipe and PVC to AWWA C900 only:

1. Acceptable models: as specified in Contract Documents.

(14) Repair clamps shall be constructed of 18-8 stainless steel passivated for corrosion resistance. Stainless steel components shall be Type 304 or 304L. All surfaces including weld areas shall be thoroughly cleaned of scale, grease or other contaminants. Welding must be performed in a controlled environment to prevent sensitization. Nuts and bolts shall be Type 304 18-8 stainless steel 5/8 X 11 NC rolled thread lubricated to prevent galling. Gasket shall be SBR (Buna) rubber per ASTM D2000.

2.2.5 Pre-stressed Concrete Pressure Pipe:

(1) Pipe to AWWA C300, AWWA C301 and AWWA C303

(2) Joints: push-on bell and spigot joints complete with rubber gasket

2.2.6 Steel Pipe:

(1) To AWWA C200 for pipe diameter 600mm or less. Pipe with diameter greater than 600mm shall be designed by Professional Engineer registered with EGBC.

(2) All longitudinal and girth seams, whether straight or spiral, shall be butt-welded using an approved electric-fusion-weld process.

(3) Field welding shall be completed according to AWWA C206.

(4) Steel pipe flanges to AWWA C207. Dimensions for fabricated steel water pipe fittings to AWWA C208.

(5) Finishes for Pipe and Fittings - exterior and interior finishes shall be in accordance with AWWA C205, AWWA C210, or AWWA C222.

2.2.7 Oriented Polyvinyl Chloride (PVCO) Pressure Pipe:

(1) Pipe:

(1) Pipe to be manufactured to specifications for pipe size ranges as follows:

1. Pipes 100 to 600mm dia. - AWWA C909

2. Pipes to be certified by Canadian Standards Association for pipe size ranges 100mm to 600mm dia. - CSA B137.3.1

(2) Cast iron pipe equivalent outside diameter.

(3) To be compatible with specified mechanical joint and push-on joint fittings and valves without use of special adapters.

2.2.8 Joints: Push-on integrally thickened bell and spigot type to ASTM D3139 with single elastomeric gasket to ASTM F477.

2.3 Valves and Valve Boxes

2.3.1 Mainline Valves - General Requirements:

(1) Valves to open counter-clockwise.

(2) All valves to have manufacturer's name, year of manufacture, size and working pressure on the bonnet or body.

(3) Valves 400 mm and larger to have by-pass sized to AWWA C500.

(4) Gate valves 400 mm and larger to have gear operators.

2.3.2 Mainline Gate valves:

(1) Locations of solid wedge or double disc valves and resilient-seated valves as shown on Contract Drawings.

(2) To AWWA C500: 75 to 300 mm to working pressure 1380 kPa; 400 mm and larger to working pressure 1035 kPa, cast ductile iron body, bronze mounted solid wedge, or double disc, non-rising stem, hub or flanged ends.

(3) To AWWA C509: 75 to 300 mm to working pressure 1380 kPa; ductile iron body, resilient seated, non-rising stem, hub or flanged ends.

(4) Stem seal to be O-ring type.

(5) Hydrant valves - to be as specified for mainline gate valves.

(6) Valves to be complete with 50 mm square operating nut for underground service.

(7) Acceptable manufacturers are as specified in Contract Documents.

2.3.3 Mainline butterfly valves: Butterfly valves: to AWWA C504 Class 150B, as specified in Contract Documents.

2.3.4 Blowdown or Blow-Off Valves: 50 mm to AWWA C800 for working pressure 1035 kPa threaded ends, 75 mm to 300 mm as specified for mainline gate valves.

2.3.5 Air Release, Air/Vacuum and Combination Air Valves:

(1) ductile iron body.

(2) Threaded or flanged connections.

(3) Maximum working pressure 2070 kPa.

(4) To AWWA C512.

2.3.6 Mainline Valve Boxes:

(1) To be as specified in Contract Documents: telescoping, cast iron, top flange type service box:

(1) Rectangular type to be as specified in Contract Documents.

(2) Circular type to be as specified in Contract Documents.

(2) Valve box riser pipe to be 150 mm diameter PVC DR 35 or better.

2.3.7 Service Valve Boxes:

(1) Curb stop valve boxes (300 mm from property line) on 25 mm diameter or smaller services to be telescoping assembly comprised of threaded cast iron top with bronze pentagon centre plug, 25 NPS iron pipe, cast iron base allowing threaded insertion of 25 NPS pipe and accommodation for curb stop valve (cast iron base section may thread onto curb stop valve) and 14 mm diameter steel operating rod attached to curb stop valve with bronze cotter pin, as specified in Contract Documents.

(2) Curb stop valve boxes (300 mm from property line) on 32 mm dia. to 50 mm dia. services to be assembly specified in 2.3.7.1 of this Section, except with 19 mm dia. steel operating rod, or as specified in Contract Documents.

(3) Curb stop valve boxes (300 mm from property line) alternative on 19 mm dia. to 50 mm dia. services without operating rods to be assembled as specified in 2.3.6.1.2 and 2.3.6.2 of this Section.

(4) Curb stop valve boxes (300 mm from property line) on services 75 mm dia. and larger as specified for Mainline Valve Boxes.

(5) Corporation stop valve boxes (at mainline tees or tappings) on services 75 mm dia. and larger as specified for Mainline Valve Boxes.

2.3.8 Check Valves:

(1) To AWWA C508: 50 to 300 mm to working pressure 1200 kPa; 400 to 500 mm to working pressure 1035 kPa; ductile cast iron body, clear waterway type, metal to metal seat, mechanical joint ends to AWWA C111 or flanged ends to AWWA C110.

2.4 Valve and Large Meter Chambers

2.4.1 Applicability: for mainline butterfly valves or mainline gate valves 400 mm and larger and for meters 200 mm and larger.

2.4.2 As specified in Contract Documents, valve chambers for pressure reducing valves, meters and backflow prevention devices may have special and additional requirements and features.

2.4.3 Materials and installation for Cast-in-place chambers to Section 33 44 01 - Manholes and Catchbasins.

2.4.4 Concrete and reinforcing steel: to Section 03 20 01 - Concrete Reinforcement and Section 03 30 53 - Cast-in-Place Concrete.

2.4.5 Precast concrete sections to ASTM C478M. Ladder rungs be cast integral with unit; field installation not permitted. Precast concrete lids to H-20 loading conditions.

2.4.6 Jointing materials:

(1) Manufacturer's rubber ring gaskets,

(2) Mastic joint filler,

(3) Cement mortar or,

(4) Combination of above types.

2.4.7 Mortar: aggregate to CAN/CSA-A82.56, masonry cement to CSA A3000.

2.4.8 Ladder rungs for valve chambers: minimum 20 mm diameter, for 76 mm minimum embedment in precast or cast-in-place concrete, minimum rung length 250 mm, minimum projection 100 mm, maximum vertical spacing 300 mm, minimum design liveload 1334N, cold rolled steel to CAN/CSA-G40.20, hot-dip galvanized after fabrication to CAN/CSA-G164 or aluminum alloy #6061-T6 to CAN3-S157 and NBC 1990. Rungs to be safety pattern. Hand holds at top entry to conform to minimum design liveload and dimensions.

2.4.9 Valve chamber frames and covers: as specified in Contract Documents.

2.4.10 Mechanical and Electrical: as specified in Contract Documents.

2.5 Service Connections, Pipe, Joints and Fittings

2.5.1 Pipe diameter 19 mm to 75 mm to be Polyethylene to AWWA C901, Pressure Class 160 tubing certified to CSA B137.1 or Type K annealed copper, to ASTM B88M or Polyethylene/Aluminum/Polyethylene composite pipe certified to CSA B137.9 or CSA B137.10

2.5.2 Pipe diameter 100 mm and larger to be of material specified for mainline pipe.

2.5.3 Service saddles:

(1) Tapping threads to be tapered to AWWA C800.

(2) Saddles for ductile iron pipe:

(1) Saddles for 19 to 50 mm services to have a ductile iron body to ASTM A536.

(2) Anti-corrosive coating to AWWA C219, AWWA C210, or AWWA C213, as specified in Contract Documents.

(3) Two high strength low alloy steel straps to AWWA C111, or Type 304 stainless steel U-bolt straps, with minimum width per strap of 50 mm, as specified in Contract Documents.

(3) Saddles for PVC pipe to AWWA C900:

(1) To provide full support around circumference of pipe; saddles with lugs or U-bolt straps that may gouge or deform the pipe are not allowed.

(2) Saddles for 19 to 50 mm services as specified in Contract Documents:

1. Bronze body to ASTM B62 and two T304 stainless steel straps with minimum width per strap of 50 mm.

2. Ductile iron body to ASTM A536:

1. Anti-corrosive coating to AWWA C219, AWWA C210, or AWWA C213, as specified in Contract Documents.

2. Two high strength low alloy steel straps to AWWA C111, or Type 304 stainless steel U-bolt straps, with minimum width per strap of 50 mm, as specified in Contract Documents.

3. T304 stainless steel broadband saddle; 19 and 25 mm services to have single bolt and minimum band width of 125 mm; 37 and 50 mm services to have double bolt and minimum width of 190 mm.

2.5.4 For services 75 mm and larger use tapping sleeves to 2.2.4.14 of this Section.

2.5.5 Copper tubing joints to be flared or compression type suitable for 1100 kPa working pressure.

2.6 Hydrants

2.6.1 Hydrants to: AWWA C502, standard specifications for dry barrel Fire Hydrants for ordinary waterworks service; typical fire hydrant detail drawing and B.C. Standard for Fire Hydrants with following supplementary details:

(1) Shut-Off: compression type or slide gate as per supplementary specifications or contract documents.

(2) Inlet Connection: to be 150 mm nominal diameter, bell type with harness lugs.

(3) Bury Length: nominal bury length as shown on Contract Drawings.

(4) Delivery Classification: two hose nozzles and one pump nozzle. Each outlet nozzle to be locked or screwed in place to safeguard against blowing out, turning or backing out.

(5) Diameter:

(1) hose nozzles to be 65 mm nominal diameter.

(2) pump nozzles to be 100 mm nominal diameter.

(6) Hose and Pump Nozzle Threads:

(1) Hose nozzle to BC Fire Code Regulation 263/2012 (76.20 mm outside diameter and 8 threads per 25.4 mm)

(2) Pump nozzle to be 117.475 mm outside diameter and 6 threads per 25.4 mm.

(3) As an alternate pump nozzle may be specified in Municipal Supplementary Specifications as an alternate dimension thread ratio or a “quick connect” STORZ type.

(7) Nozzle Cap Gasket: to be provided with each nozzle cap.

(8) Opening Direction: counter-clockwise.

(9) Operating Nut and Cap Nuts: to BC Fire Code Regulation 263/2012. Pentagonal 3.75 mm point to flat.

(10) Working parts to be removable without disturbing barrel or base of hydrant and without excavation. Main operating stem to be non-rising. Hydrant to be so designed that its top section may, without excavation, be rotated at any angle relative to the inlet pipe if desired and bolted or locked in place without decreasing its strength or causing it to leak when under pressure.

(11) Hydrants to be subjected to hydrostatic pressure test of 2070 kPa in compliance with AWWA C502. Provide "Affidavit of Compliance" if requested by Contract Administrator.

2.6.2 Colour: as specified in Contract Documents.

2.6.3 Approved standard 150 mm Fire Hydrants are as specified in Contract Documents or Municipal Supplementary Specifications.

2.7 Underground Service Line Valves and Fittings

2.7.1 Underground service line valves and fittings 19 to 50 mm to AWWA C800 suitable for 1035 kPa working pressure.

2.7.2 Corporation Stops:

(1) 19 to 50mm to be brass to ASTM B584 Alloy C89833 or C89520 (Wetted Surfaces) with a maximum lead content of .25% by weight, and certified to NSF 61, AWWA thread inlet, compression type outlet.

(2) To be as specified in Contract Documents.

2.7.3 Curb Stops:

(1) 19 to 50mm to be brass to ASTM 584 Alloy C89833 or C85920 (Wetted Surfaces) with a maximum lead content of .25% by weight, and certified to NSF 61, ball valve type construction.

(2) 37 to 50mm to be brass to ASTM B584 Alloy C89833 or C85920 (Wetted Surfaces) with a maximum lead content of .25% by weight, and certified to NSF 61, ball valve type construction.

(3) To be full flow, full port, as specified in Contract Documents.

(4) Fittings: to be compression type for underground services.

(5) All fitting and valve connections on polyethylene to have solid fluted stiffening liners manufactured from stainless steel to ANSI T304 designed for the appropriate type and inside dimension of pipe, warranted by the manufacturer for that use.

2.7.4 Underground service line valves 75 mm and larger to 2.3.1 and 2.3.2 of this Section.

2.8 Granular Pipe Bedding and Surround Material

2.8.1 As shown on Contract Drawings.

2.8.2 Refer to Section 31 05 17 - Aggregates and Granular Materials for materials specifications.

2.9 Backfill Material

2.9.1 As shown on Contract Drawings.

2.9.2 Refer to Section 31 05 17 - Aggregates and Granular Materials for material specifications.

3.0 EXECUTION

3.1 General

3.1.1 Pipe bedding details, including granular surround (pipe cushion) and material specifications to be as shown on Contract Drawings, including Standard Detail Drawing G4.

3.2 Preparation

3.2.1 Clean pipes, fittings, valves, hydrants, and appurtenances of debris and water before installation. Carefully inspect materials for defects before installing. Remove defective materials from site.

3.3 Trenching

3.3.1 Do trenching in accordance with Section 31 23 01 - Excavating, Trenching and Backfilling.

3.3.2 Trench alignment and depth as shown on Contract Drawings.

3.3.3 Trench depth to provide cover over pipe of not less than 1.0 m from finished grade unless shown otherwise on Contract Drawings.

3.4 Concrete Bedding and Encasement

3.4.1 Do concrete work in accordance with Section 03 30 53 - Cast-in-Place Concrete. Place concrete to details as shown on Contract Drawings.

3.4.2 Pipe may be positioned on concrete blocks to facilitate placing of concrete. When necessary, rigidly anchor or weight pipe to prevent flotation when concrete is placed.

3.4.3 Do not backfill over concrete within 24 h after placing.

3.5 Granular Bedding

3.5.1 Fill over-excavation below design elevation of bottom of specified bedding with granular bedding placed and compacted in accordance with 3.5.2 and 3.5.5 of this Section. Drain rock may be used for backfill of over-excavation only with Contract Administrator's approval.

3.5.2 Place granular bedding material across full width of trench bottom in uniform layers to depth shown on Standard Detail Drawings.

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

3.5.4 Shape transverse depressions in bedding as required to suit joints.

3.5.5 Compact each layer full width of bed to minimum 95% Modified Proctor Density in compliance with ASTM D1557. (All following references to density imply in compliance with ASTM D1557).

3.5.6 Place watermain pipe and water service tubing on prepared flat-bottomed trench free of rock in excess of 50 mm without bedding and backfill with approved native or imported material and compact as specified. Use hand tools to compact material under 'haunch' area of pipe and around fittings and other materials.

3.5.7 Use imported bedding material when native material is deemed unsuitable for backfill by Contract Administrator or when trench has been excavated in rock.

3.5.8 Use imported bedding material when using pipe materials other than ductile iron or copper.

3.5.9 Use imported bedding when proposed work is installed through paved areas, when native material is deemed unsuitable for backfill by Contract Administrator or when trench has been excavated in rock.

3.6 Pipe Installation

3.6.1 Handle pipe in accordance with pipe manufacturer's recommendations. Do not use chains or cables passed through pipe bore so that weight of pipe bears on pipe ends.

3.6.2 Lay and join pipes to manufacturer's instructions and specifications except as noted otherwise herein. PVC pipe to AWWA M23 and AWWA C605; ductile iron pipe to AWWA C600. Steel Pipe to AWWA C604.

3.6.3 Horizontal tolerance: plus or minus 50 mm from specified alignment. Vertical tolerance: plus or minus 25 mm from specified grade.

3.6.4 Lay pipes on prepared bed, true to line and grade. Ensure barrel of each pipe is in contact with shaped bed throughout its full length.

3.6.5 Face socket ends of pipe in direction of laying. For mains on a grade of 2% or greater, face socket ends up-grade.

3.6.6 Do not exceed maximum joint deflection recommended by pipe manufacturer. Refer to AWWA C600 for ductile iron pipe: and AWWA C605 for PVC pipe. For PVC pipe deflections exceeding manufacturer's recommendation, use:

(1) PVC High Deflection coupling rated at 1380kPA (100mm-300mm)

(2) PVC long radius 5 degree bend rated at 1620kPa (100mm-750mm)

3.6.7 Keep jointing materials and installed pipe free of dirt, water and other foreign materials. Whenever work is stopped, install a removable watertight bulkhead at open end of last pipe laid to prevent entry of water and foreign materials.

3.6.8 Position and join pipes with equipment and methods specified in 3.6.2 of this Section.

3.6.9 Cut pipes as required, as recommended by pipe manufacturer, without damaging pipe or its coating and leave smooth end at right angles to axis of pipe.

3.6.10 Joints:

(1) Install gaskets as recommended by manufacturer.

(2) Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.

(3) Align pipes carefully before joining.

(4) Maintain pipe joints free from mud, silt, gravel and other foreign material.

(5) Avoid displacing gasket or contaminating with dirt or other foreign material. Remove disturbed or dirty gaskets; clean, lubricate and replace before joining is attempted.

(6) Complete each joint before laying next length of pipe.

(7) Minimize joint deflection after joint has been made to avoid joint damage.

(8) Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.

(9) For ductile iron pipe do not install bronze wedges or other conductivity devices unless specified in Contract Documents.

(10) Butt-fuse high density polyethylene in strict accordance with manufacturer's instruction by manufacturer or by manufacturer trained personnel.

3.6.11 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes or as specified otherwise.

3.6.12 When any stoppage of work occurs, restrain pipes in an approved manner to prevent "creep" during down time.

3.6.13 Recheck components assembled above ground after placing in trench to ensure that no movement of joints has taken place.

3.6.14 Test and/or bleed points consisting of Corporation cocks, sized to achieve minimum flushing velocities of 0.8 m/s in accordance with AWWA C651, to be provided where shown on Contract Drawings or as required by Contractor for pressure testing and flushing.

3.7 Valve Installation

3.7.1 Install valves to manufacturer's recommendations at locations shown on Contract Drawings.

3.7.2 Support valves located in valve boxes by means of either concrete or pressure treated and end treated wood blocks, located between valve and solid ground. Maximum length of pipe on each end of valve to be 1 m. Valves not to be supported by pipe.

3.7.3 Support valves located in valve chambers by means of either concrete blocks or fabricated steel pipe stands as shown on Contract Drawings.

3.7.4 Valves to be installed in vertical position with actuating stem plumb.

3.8 Valve Chambers

3.8.1 Use cast-in-place or precast units as shown on Contract Drawings. Precast units to be in accordance with Section 33 44 01 - Manholes and Catchbasins. Cast-in-Place units to be in accordance with Section 03 20 01 - Concrete Reinforcement and Section 03 30 53 - Cast-in-Place Concrete.

3.8.2 Construct units as shown on Contract Drawings, plumb and with valve chamber openings centred over valve nut, true to alignment and grade. Valve chambers not to rest on pipe.

3.8.3 Place reinforcing steel and miscellaneous metals required to be embedded in concrete to details shown on Contract Drawings and in accordance with Section 03 30 53 - Cast-in-Place Concrete.

3.8.4 Cast bottom slabs for precast units directly on undisturbed ground where shown on Contract Drawings, set precast concrete slab on 100 mm minimum of compacted granular material.

3.8.5 Set bottom section of precast unit in bed of cement mortar and bond to bottom slab. Make each successive joint watertight with approved rubber ring gaskets, mastic joint filler, cement mortar, or combination thereof.

3.8.6 Clean surplus mortar and joint compounds from interior surface of valve chamber as work progresses.

3.8.7 Plug lifting holes with precast concrete plugs set in non-shrink non-staining grout or non-shrink, non-staining mortar.

3.8.8 Set frame and cover to required elevation on at least two and not more than four courses of brick or precast concrete riser rings. Make brick or riser ring joints and join brick or riser rings to frame with cement mortar, parge and trowel smooth.

3.8.9 Cover to be marked as specified in Contract Documents.

3.8.10 Clean valve chambers of debris and foreign materials; remove fins and sharp projections.

3.8.11 Set valve boxes centrally over valve nut. Set valve boxes and any other boxes around appurtenances and complete backfill within 24 h of setting appurtenance.

3.8.12 Install sump drainer assemblies to manufacturer's instructions and to AWWA C510 and AWWA C511.

3.9 Under-crossing

3.9.1 Excavate working pit to dimensions shown on Contract Drawings, outside right-of-way to be crossed.

3.9.2 Excavate working pit to not less than 0.6 m below lowest invert of encasing pipe.

3.9.3 Dewater excavation.

3.9.4 Dewater area of under-crossing.

3.9.5 Install heavy timber or steel frame backstop.

3.9.6 Place encasing pipe to exact line and grade shown on Contract Drawings. Encasing pipe to cross under obstruction at angle shown on Contract Drawings.

3.9.7 Install encasing pipe by jacking, boring or tunnelling methods approved by Contract Administrator.

3.9.8 Encasing pipe not to be in tension.

3.9.9 Joints for encasing pipe to be welded to AWWA C206.

3.9.10 Submit shop drawings showing proposed method of installation of carrier pipe.

3.9.11 For ductile iron carrier pipe only, install continuous zinc strip sacrificial anode electrically bonded to carrier pipe shown on Contract Drawings. Install sacrificial anodes for encasing pipe per Section 26 42 13 – Cathodic Protection.

3.9.12 Insert carrier pipe into encasing pipe, in end with largest open area, after placing levelling pad.

3.9.13 Use approved chromated copper arsenate salt treated blocking method or fabricated high density polyethylene casing spacers to maintain carrier pipe in true alignment and uniform separation from encasing pipe.

3.9.14 Clearance between blocks or casing spacers and encasing pipe to be maximum 15 mm when carrier pipe is in position.

3.9.15 Join carrier pipe one length at a time outside encasing pipe. Push or pull carrier pipe into position.

3.9.16 Couplings of carrier pipe not to rest on levelling pad when carrier pipe is in position.

3.9.17 Place 20 MPa concrete cradle around carrier pipe after it is positioned. Cradle to be minimum of 225 mm and maximum of 300 mm above levelling pad.

3.9.18 Fill open annular space at each end of encasing pipe with burlap bags filled with 20 MPa concrete.

3.10 Service Connection Installation

3.10.1 Install service connections to 3.6 of this Section and as shown on Standard Detail Drawings as directed by Contract Drawings or Contract Administrator.

3.10.2 Construct service connections at right angles to watermain unless otherwise directed. Locate curb stops as shown on Contract Drawings.

3.10.3 Complete service connections before pressure testing of water main.

3.10.4 Tappings in cast iron or ductile iron mains 200 mm or greater in diameter may be threaded without service clamps provided specified pipe wall thickness is sufficient to conform to ANSI/ASME B1.20.1 for at least 3 threads as shown in Appendix A to AWWA C151.

3.10.5 Tappings in cast iron or ductile iron mains smaller in diameter than 200 mm; or cast iron or ductile iron mains with wall thickness which will not allow at least 3 full threads; or tap sizes beyond those shown in the following table are to be made using double strap saddles to 2.5.3 of this Section or tapping sleeves to 2.2.14 of this Section.

Pipe Diameter (mm)	Maximum Tap Without Clamp (mm)	Maximum Tap With Clamp (mm)
100	19	25
150	25	32
200	25	50
250	25	50
300	32	75

3.10.6

3.10.6 Tappings in PVC mains to AWWA C900 pipe to be with service saddles specified in 2.5.3.3 of this Section. Nuts on service saddle straps to be tightened to torque range specified by manufacturer and in no case in excess of that torque. Use core-out type bit, provide coupons to Contract Administrator.

3.10.7 Tap main as shown on Standard Detail Drawings W2a and W2b, not closer to a joint nor closer to adjacent service connections than recommended by manufacturer, or 1 m, whichever is greater. No two adjacent connections on same pipe length to be on same plane of pipe.

3.10.8 Leave corporation stop valves fully open.

3.10.9 In order to relieve strain on connections, install service pipe in "Goose Neck" form "laid over" into horizontal position.

3.10.10 Install rigid stainless steel liners in small diameter plastic pipes with compression fittings.

3.10.11 Install curb stop with curb stop valve box on services 50 mm or less in diameter. Equip larger services with a gate valve and cast iron valve box. Set box plumb over stop or valve and adjust top flush with final grade elevation. Leave curb stop or service valves fully closed.

3.10.12 Place temporary location marker at ends of plugged or capped unconnected water lines. Each marker to consist of 40 x 90 mm stake extending from pipe end at pipe level to 500 mm above grade. Mark and paint blue exposed portion of stake with designation "WATER".

3.11 Tapping Sleeve Installation

3.11.1 Thoroughly clean the exterior of the main to be tapped. Grind or file any protrusions or irregularities in the pipe exterior which may interfere with uniform seating of gaskets or clamping bands. In accordance with Section 10 of AWWA C651, dust interior surface of the tapping sleeve annulus with calcium hypochlorite powder before attaching to the main.

3.12 Hydrants

3.12.1 Install hydrant assemblies at locations shown on Contract Drawings.

3.12.2 Install hydrant assemblies in accordance with AWWA M17 and in accordance with Standard Detail Drawing W4.

3.12.3 Set hydrants plumb, with hose nozzles parallel with edge of pavement or curb line, with pumper nozzle facing roadway at right angles to road centreline and with body flange set at elevation of 50 to 150 mm above final grade.

3.12.4 Place concrete thrust blocks as shown and as specified ensuring that drain holes are unobstructed.

3.12.5 To provide proper draining for each hydrant, excavate a pit as shown and backfill with coarse gravel or crushed stone to a level 150 mm above drain holes.

3.12.6 For hydrants not in service, place an orange painted sign, 30 cm x 30 cm, lettered "Not In Service" on the main port. Remove when water main is accepted by the Contract Administrator.

3.13 Thrust Blocks

3.13.1 Place concrete thrust blocks between valves, tees, plugs, caps, bends, changes in pipe diameter, reducers, hydrants and fittings and undisturbed ground as shown on Contract Drawings or as directed by Contract Administrator and as detailed on Standard Detail Drawing W1.

3.13.2 Place 6 mil polyethylene between interface of concrete and fitting.

3.13.3 Where shown in Contract Documents, joint restraint devices to 2.2.13 of this Section.

3.13.4 Do concrete work in accordance with Section 03 30 53 - Cast-in-Place Concrete.

3.13.5 Keep joints and couplings free of concrete.

3.13.6 Do not backfill over concrete within 24 h after placing.

3.14 Corrosion Protection

3.14.1 Where specified, provide corrosion protection measures per Section 26 42 13 – Cathodic Protection.

3.15 Pipe Surround

3.15.1 Upon completion of pipe laying and after Contract Administrator has inspected work in place, surround and cover pipes as shown on Standard Detail Drawing G4.

3.15.2 Hand place surround material in uniform layers simultaneously on both sides of pipe. Do not dump material within 1 m of exposed pipe.

3.15.3 Compact each layer from pipe invert to underside of backfill to minimum 95% Modified Proctor Density.

3.15.4 Install concrete encasement where shown on Contract Drawings or as directed by Contract Administrator. For PVC mainline or service pipe install high deflection PVC coupling 0.3 m minimum to 0.5 m maximum from end of encasement. For ductile iron mainline or service pipe ensure hub joint occurs 0.3 m minimum to 0.5 m maximum from end of encasement.

3.16 Backfill

3.16.1 Place and compact backfill material in accordance with Section 31 23 01 - Excavating, Trenching and Backfilling.

3.16.2 Backfill requirements, including type of material and compaction requirements as shown on Contract Drawings, including Standard Detail Drawing G4.

3.17 General Procedure Flushing, Testing, and Disinfection

3.17.1 All cleaning, flushing, pressure and leakage testing, disinfection and final flushing to be done by Contractor. Costs are included in payment for items described in 1.8 of this Section.

3.17.2 Perform all tests in presence of Contract Administrator. Notify Contract Administrator 24 h in advance of proposed test.

3.17.3 Where any section of system is provided with concrete thrust blocks, do not conduct tests until at least 5 days after placing concrete or 2 days if high early strength concrete is used.

3.17.4 Obtain municipal approval prior to discharging flushing water to municipal sewers or drainage ditches.

3.17.5 Comply with General Conditions, Clause 20.4, Environmental Laws, in regard to discharge of flushing water.

3.17.6 Provide Contract Administrator with all required approvals prior to discharging flushing water.

3.18 Cleaning and Preliminary Flushing

3.18.1 Before flushing and pressure testing, ensure waterworks system is completely finished except tie-ins to existing watermains and make arrangements with Contract Administrator for scheduling of testing and disinfection of mains. Testing and disinfection to be witnessed by Contract Administrator.

3.18.2 Isolation of existing water system where required will be performed by Municipality. Do not operate any existing valves without Contract Administrator's authorization.

3.18.3 Water may be supplied from municipal fire hydrants upon application for a Hydrant Use Permit and presentation of valid test certificate for reduced pressure principle backflow prevention device conforming to AWWA C511.

3.18.4 Remove foreign material from pipe and related appurtenances by flushing with water. Main to be flushed at water velocities as high as can be obtained from available water sources. Minimum velocity to be 0.8 m/s and/or in accordance with AWWA C651. Continue flushing at least until flow from most distant point has reached discharge point and until water discharged is clean and clear.

3.19 Testing Procedure

3.19.1 Upon completion of construction of any section, which shall be defined as that pipeline and appurtenances located between any two adjacent line valves, make section ready for testing. Carry out testing in accordance with 3.19.2 of this Section.

3.19.2 Before pipe is filled with water, pipe bedding, concreting of all valves and fittings and backfilling to be completed as required in this specification. Fill each section of pipe and allow to remain full of water for a period of at least 24 hours prior to commencement of any pressure tests. Submit pipeline to a test of 1.5 x working pressure applied at highest elevation in each section, with a minimum of 1380 kPa applied at lowest point of test section. Ensure that test pressure does not exceed pipe or thrust restraint design pressures. Maximum allowable leakage rate at test pressure to not exceed 1.25 litres per millimetre diameter of pipe per kilometre per 24 hour period. Minimum duration of test period to be 2 hours. Maximum test pressures should not exceed those specified in CSA B137.3 - Table 9

3.19.3 Perform pressure and leakage testing of ductile iron piping to AWWA C600 and AWWA M41.

3.19.4 Perform pressure and leakage testing of polyvinyl chloride (PVC) piping to AWWA M23 and AWWA C605.

3.19.5 Perform testing of welded steel piping to AWWA C206; no leakage allowed.

3.19.6 Perform pressure and leakage testing of HDPE as follow:

Pressure and leakage testing of high-density polyethylene pipe shall consist of an initial expansion phase and a test phase. Prior to testing, pressurize the HDPE pipe to test pressure for 4 hours and maintain pressure on an hourly basis to accommodate the initial expansion. Subject pipeline to a test of 150% working pressure applied at the highest elevation in each section, with a minimum of 1380 kPa at the lowest point of the test section, and under no circumstances should the total time with the pipe at 150% working pressure be exceeding 8 hours. Immediately upon completion of the initial expansion phase, begin a 2 hour test period. During the test, allowable leakage should not exceed the following:

Nominal Pipe Size (mm)	Allowable Leakage (L/km)
75	18.6
100	31.1
150	74.5
200	124.2
250	161.5
300	285.6
350	335.3

Temperature correction factor to be applied to allowable leakage. Temperature to be taken as temperature of test water in the pope measured after the initial expansion phase. Temperature correction factor for pressure testing to be:

Temperature (oC)	Correction Factor
23.0	1.0
22.3	0.9
21.0	0.8
19.0	0.7
16.2	0.6
13.0	0.5
9.5	0.4
5.2	0.3
-1.0	0.2

3.19.7 Should any test disclose excessive leakage, repair or replace defect and retest section until specified testing requirement is achieved.

3.20 Disinfection, General

3.20.1 After Contract Administrator has certified that pipes and appurtenances have passed all specified tests, flush and disinfect pipes and appurtenances.

3.20.2 Disinfect and flush in accordance with 3.21 of this Section.

3.21 Disinfection and Flushing Procedures

3.21.1 Do not use granular hypochlorite for disinfection of PVC pipe with solvent welded joints, as there is an explosive reaction potential.

3.21.2 Retain water containing not less than 25 mg/L free chlorine in water system for a period of at least 24 h, in accordance with AWWA C651, Continuous Feed Method. Submit outline of proposed disinfection procedure accompanied by marked up schematic drawing to Contract Administrator for approval 48 h in advance of commencement of disinfection.

3.21.3 Allow water from existing distribution system, isolated by reduced pressure principle backflow prevention device or other approved source of supply, to flow at constant, measured rate into newly laid watermain. In absence of a meter, rate may be approximated by methods such as placing Pitot gauge in discharge, measuring time to fill container of known volume, or measuring trajectory of discharge and using formula presented in AWWA C651.

3.21.4 At a point not more than 3 m downstream from beginning of new main, ensure water entering new main receives dose of chlorine fed at constant rate such that water will have not less than 25 mg/L free chlorine. To assure that this concentration is provided, measure chlorine concentration at regular intervals as specified in AWWA C651.

3.21.5 Amount of chlorine required to produce 25 mg/L concentration in 30 m of pipe of various sizes is given in following table:

Pipe Size (mm)	100 Percent Chlorine (kg)	1 Percent Chlorine Solution (Litres)
100	0.006	0.61
150	0.014	1.36
200	0.024	2.46
250	0.039	3.86
300	0.054	5.45
400	0.098	9.85

3.21.6

3.21.6 Allow flow of water containing chlorine to continue until entire main, all service connections, extremities and hydrants to be treated are filled with 25 mg/L chlorine solution. To ensure that this concentration has been attained throughout, measure free chlorine residual at a number of points and extremities along main. Retain chlorinated water in main for at least 24 h. During this time operate all valves, curb stops and hydrants in section treated in order to disinfect them thoroughly.

3.21.7 At end of this 24 h period, treated water to contain no less than 10 mg/L free chlorine throughout main. If chlorine content is less than 10 mg/L repeat chlorination procedure until specifications are met.

3.21.8 After completion of chlorination, flush chlorinated water from system, hydrants and services until chlorine concentration in remaining water is less than 0.3 mg/L chlorine residual.

3.21.9 Upon completion of disinfection and flushing, Contractor to remove test and bleed point apparatus and backfill and complete any other work required for placing of waterworks system in service.

3.22 Servicing Fire Hydrants

3.22.1 Immediately following completion, all hydrants installed as part of the project will be serviced by Municipality. All repair costs (parts and labour) to remedy defective parts or installation will be charged to Contractor.

3.23 Connections to Existing Mains

3.23.1 Connections to existing waterworks systems will normally be made by the Waterworks owner; or at the direction of the Contract Administrator by the Contractor. Make all necessary arrangements with Contract Administrator to schedule work to prevent construction delays.

END OF SECTION 33 11 01