REGIONAL DISTRICT
of Fraser-Fort George

Tender Invitation

George Street Parking Lot

ADM-23-04

Regional District of Fraser-Fort George
155 George Street, Prince George BC V2L 1P8
Telephone 250-960-4400 / Toll Free 1-800-667-1959 / Fax 250-562-8676 http://www.rdffg.bc.ca

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INVITATION TO TENDER
PART A – INTRODUCTION

The Regional District of Fraser-Fort George invites tenders for the construction of a parking lot at the Regional District's main office at 155 George Street, Prince George, BC.

The Regional District is looking for the project to be completed by late fall 2023.

Tender Documents

The Invitation to Tender documents may be obtained on or after July 18, 2023:

(a) in a PDF (Public Document Format) file format from the Regional District's website at www.rdffg.bc.ca;

(b) on the BCBid® website at www.bcbid.gov.bc.ca .

It is the sole responsibility of the respondent to ascertain that they have received a full set of Tender Documents. Upon submission of their bid, the respondent will be deemed conclusively to have been in possession of a full set of Tender Documents.

DELIVERY OF TENDERS AND CLOSING DATE:

The closing date and time for this tender is **August 1, 2023** at 2:15 p.m. local Prince George Time (the **"Closing Date"**).

"Prince George Time" will be conclusively deemed to be the time indicated in the electronic timestamp the Tender receives upon delivery to the email address specified herein for electronic tender submissions.

Tenderers must submit all portions of their Tender by email in accordance with the following:

Electronic tender submissions must be submitted by email to **purchasing@rdffg.bc.ca.** The subject line of an email submission should read **George Street Parking Lot ADM-23-04**. All emailed documents must be in PDF format and should be in one combined file. Tenderers should ensure that the files should not collectively exceed **15 MB**. Zip the files to reduce the size or email separately, if needed. Submitting the files via Drop Box, FTP, or similar programs, is not acceptable.

The Regional District does not assume any risk or responsibility or liability, including in contract or tort (including negligence), whatsoever to any Tenderer:

1. for ensuring that any electronic email system being operated by or for the Regional District is in good working order, able to receive transmissions, or not engaged in receiving other transmissions such that a Tenderer's electronic transmission, including the transmission of an electronic copy of its Tender, cannot be received;

2. for errors, problems, or technical difficulties with respect to a Tenderer's electronic transmission, including the transmission of an electronic copy of its Tender;

3. that a Tenderer's electronic transmission, including the transmission of an electronic copy of its Tender, is received by the Regional District in its entirety or within any time limit specified by this Tender.

The lowest or any Tender will not necessarily be accepted. The Regional District of Fraser-Fort George reserves the right to accept or reject any or all Tenders. **All Tender Documents must be received by the Closing Date in order for the Tender to receive consideration.**

INVITATION TO TENDER
PART B – INSTRUCTIONS TO TENDERERS

The Regional District of Fraser-Fort George, hereinafter referred to as the Regional District, invites Tenders for:

Regional District of Fraser-Fort George, George Street Parking Lot, ADM-23-04.

Instructions regarding obtaining the Tender Documents are contained in Part A: Introduction.

Questions relating to the tender process must be directed to:

Jim Martin, CAO
Regional District of Fraser-Fort George
155 George Street
Prince George, BC V2L 1P8
Phone: 250-960-4410
Email: jmartin@rdffg.bc.ca
Fax: 250-563-7520

Deadline for all question submissions is 10:00 a.m. (local time) July 27, 2023.

Those questions that are determined to be of a common interest to all potential proponents will be summarized and posted as Addendum(s) on the website.

Do not email questions to the tender submission **email address** (purchasing@rdffg.bc.ca) as this address is for tender submissions only and is not monitored for tender questions.

ACKNOWLEDGEMENT LETTER

Upon receipt of this Invitation to Tender, a potential Tenderer should complete and sign the Acknowledgement Letter at Appendix A, and email the signed Acknowledgement Letter to Project Manager, jmartin@rdffg.bc.ca . A Tenderer who signs and returns the Acknowledgement Letter is not obligated to submit a Tender.

Any Tenderer who does not submit the Acknowledgement Letter will not be sent any answers to questions and may be disqualified.

OPTIONAL SITE MEETING

All Proponents should attend the site meeting. The Project Manager or delegate will provide an overview of the contract expectations and be available for questions pertaining to this RFP. The purpose of the site meeting is for Tenderer to satisfy themselves as to the nature of the work in general, to clarify their understanding of the scope of work, to view the sites, to determine specifications, and to have the opportunity to ask questions regarding the project and any other circumstances which may influence their Tender.

Oral questions will be allowed at the Tenderers' meeting. However, questions of a complex nature, or questions where the Tenderer requires anonymity, should be forwarded in writing, prior to the meeting, to the Project Manager.

The Regional District will not, under any circumstances, make accommodations for rescheduling, or holding any additional site meetings or providing individuals access to the sites.

The site visit will be held at 10:00 a.m. July 24, 2023.

TENDER PROCESS

1.0 Definitions

1.1 "**Addenda**" means all additional information regarding this ITT including amendments to the ITT.

1.2 "**BC Bid**" means the BC Bid website located at www.bcbid.ca.

1.3 "**Board**" means the Board of the Regional District.

1.4 "**Closing Location**" means the location specified in Part A - Introduction.

1.5 "**Closing Time**" means the closing time and date specified in Part A - Introduction.

1.6 "**Contract**" means the contract substantially in the form attached to this ITT.

1.7 "**Contractor**" means the successful Tenderer to the ITT who enters into a Contract with the Regional District.

1.8 "**Form of Tender**" means the form of tender attached to this ITT.

1.9 "**Irrevocable Commercial Letter of Credit**" means the irrevocable commercial letter of credit required by and in the form attached to this ITT to be suppled by the successful Tenderer as a performance security deposit.

1.10 "**ITT**" means the solicitation described in this document, including any attached or referenced appendices, schedules or exhibits and as may be modified in writing from time to time by the Regional District by Addenda.

1.11 "**Project Manager**" means the Regional District's representative.

1.12 "**Tender**" means a submission in response to this ITT.

1.13 "**Tender Documents**" means the documents listed in section 2.1.

1.14 "**Tenderer**" means the person submitting a Tender.

1.15 "**Regional District**" means the Regional District of Fraser-Fort George.

1.16 "**Must**" means a requirement that must be met in order for a Tender to receive consideration.

1.17 "**Should**", or "**May**" means a requirement having a significant degree of importance to the objective of the ITT, but which the Regional District would strongly prefer to be fulfilled, and which the Regional District may in its sole discretion elect to treat the failure to fulfill as a grounds for rejection of a Tender.

1.18 "**Work**" means the total construction and related services required by the Tender documents.

2.0 Tender Documents

2.1 The Tender Documents are:

(a) Part A – Introduction;

(b) Part B – Instructions to Tenderers; and

(c) Appendices:

i. Appendix A – Acknowledgment Letter;

ii. Appendix B – Bidder Checklist;

iii. Appendix C – Tender Form;

iv. Appendix D – Schedule of Prices – Tendered Price;

v. Appendix E – Schedule of Prices – Force Account Work;

vi. Appendix F – List of Contractor's Personnel;

vii. Appendix G – List of Sub-contractors;

viii. Appendix H – List of Equipment;

ix. Appendix I – Tender's Experience in Similar Work;

x. Appendix J – Conflict of Interest Disclosure Statement

xi. Appendix K – Goods and Services Tax Information;

xii. Appendix L – Irrevocable Commercial Letter of Credit;

xiii. Appendix M – Specifications and Drawings.

2.2 If there is a conflict between or among (i) the Specifications and (ii) the other Tender Documents, the other Tender Documents shall prevail over the Specifications.

3.0 Acceptance of Terms and Conditions

3.1 Submitting a Tender indicates acceptance of all the terms and conditions set out in the ITT, including those that follow and that are included in all appendices and any Addenda.

4.0 Submission Instructions

4.1 Each Tenderer must complete and provide Appendix A and C through K.

4.2 All prices and notations should be legibly written in a non-erasable medium. Erasures, interlineations or other corrections should be initialed by an authorized signatory of the Tenderer.

4.3 Subject to any alternatives or options in respect of which the Regional District requests pricing or other information in an Appendix to the ITT, Tenders are to be all inclusive and without qualification or condition.

4.4 The Regional District may, at any time and for any reason, extend the Closing Time by means of a written amendment published on the Regional District's website, at www.rdffg.bc.ca and at BC Bid.

4.5 Each Tender must be signed by an authorized signatory or authorized signatories of the Tenderer, as is necessary for due execution on behalf of the Tenderer. Each Tender by a company or partnership should specify the full name of the legal entity submitting the Tender.

4.6 It is the sole responsibility of the Tenderer to ascertain that they have received a full set of the Tender Documents. Upon submission of their Tender, the Tender will be deemed conclusively to have been in possession of a full set of the Tender Documents.

4.7 If the Regional District, in the Regional District's sole discretion, determines that a clarification, addition, deletion, or revision of the ITT is required then the Regional District will issue an addendum and the addendum will be posted on the Regional District website and BC Bid.

4.8 It is the sole responsibility of the Tenderer to check for addenda. Addenda issued during the time of Tendering must be signed by the Tenderer and included with the Tender and will become a part of the Tender documents.

4.9 The Regional District will not be responsible for any costs incurred by the respondent which may result from the preparation or submission of documents pertaining to this Tender. Accuracy and completeness of a Tender is the Tenderer's responsibility.

5.0 Discrepancies or Omissions

5.1 Tenderers finding discrepancies or omissions in the specifications or other documents herein or having doubts on the meaning or intent of any part thereof, should immediately request in written form, either by fax, by Email or by mail, clarification from Jim Martin. Upon receipt of the written request for clarification, Jim Martin may, in his sole discretion, send written instructions or explanations to all parties registered as having returned the

Acknowledgement Letter, and make amendments to this ITT. No responsibility will be accepted for oral instructions. Any requests must be received prior to July 27, 2023.

5.2 It is the responsibility of each Tenderer to thoroughly examine the Tender Documents and satisfy itself as to the full requirements of this ITT and their acceptability to the Tenderer.

6.0 Late Submissions

6.1 Tenders will be marked with their receipt time upon receipt. Only complete Tenders received before the Closing Time will be considered to have been received on time. Tenders received late will be marked late and not considered or evaluated. In case of a dispute, the Tender receipt time as recorded by the Regional District will prevail whether accurate or not.

7.0 Changes to Tenders

7.1 A Tenderer that has already submitted a Tender may amend its Tender prior to the Closing Time:

(a) For changes to price only, by submitting an amendment via email to purchasing@rdffg.bc.ca, identifying a plus or minus variance to the Tenderer's Tender Price; or

(b) in all cases, by delivering a completely new Tender in accordance with Part A to this Invitation to Tender, clearly indicating it replaces the previously submitted Tender.

Any such revision must clearly identify the ITT number and the Closing Time. A Tender revision submitted as aforesaid shall effectively amend the Tender and the Regional District shall only review and evaluate the Tender as amended.

8.0 Bid Prices

8.1 The Tenderer will be deemed to have satisfied themselves as to the sufficiency of the Tender for the work and the price stated in the Schedule of Prices. These prices will cover all their obligations under the Contract, and all matters necessary to the proper completion and maintenance of the work, and will include the supply of all labour, equipment material, supervision, services, taxes and assessments, together with the Tenderer's overhead and profit, except where otherwise provided elsewhere in this ITT.

8.2 Tender prices must remain open for acceptance for a period of sixty (60) days from the Closing Date unless otherwise stated by the Regional District.

9.0 Subcontractors

9.1 All subcontractors, including affiliates of the Tenderer, should be clearly identified in the Tender as per the form attached as Appendix G.

9.2 A Tenderer may not subcontract to a firm or individual whose current or past corporate or other interests, may, in the Regional District's opinion, give rise to an actual, perceived or

potential conflict of interest in connection with the services described in the Tender. This includes, but is not limited to, involvement by the firm or individual in the preparation of the Tender or a relationship with any employee, contractor or representative of the Regional District involved in preparation of the Tender, participating in evaluation or in the administration of the Contract. If a Tenderer is in doubt as to whether a proposed subcontractor might be in a conflict of interest, the Tenderer should consult with the Project Manager prior to submitting a Tender. By submitting a Tender, the Tenderer represents that it is not aware of any circumstances that would give rise to a conflict of interest that is actual, perceived or potential, in respect of the Tender.

10.0 Rejection of a Tender

10.1 The Regional District may, in its sole discretion, reject any and all Tenders, or accept the Tender deemed most favourable in the interests of the Regional District. The lowest, or any Tender, will not necessarily be awarded.

10.2 Tenders which contain qualifying conditions or otherwise fail to conform to the instructions contained in this ITT may be disqualified or rejected. The Regional District may, however, in its sole discretion, reject or retain for its consideration Tenders which are non-conforming because they do not contain the content or form required by the ITT, or for failure to comply with the process for submission set out in this ITT, whether or not such non-compliance is material.

10.3 The Regional District's intent is to enter into a Contract with the Tenderer who has submitted the best offer. The Regional District reserves the right to accept any or none of the Tenders submitted and will evaluate Tenders based on the best value offered to the Regional District and not necessarily the lowest price. The Regional District reserves the right in its sole unrestricted discretion to:

(a) accept any Tender which the Regional District deems most advantageous to itself;

(b) reject any and/or all irregularities in a Tender submitted;

(c) waive any defect or deficiency in a Tender whether or not that defect or deficiency materially or substantially affects the Tender and accept that Tender;

(d) reject any and/or all Tender for any reason, without discussion with the Tenderer(s);

(e) accept a Tender which is not the lowest Tender; and

(f) cancel or reissue the Tender without any changes.

10.4 Without limiting any other provision of this Tender, the Regional District may, in its sole discretion, reject a Tender submitted by a Tenderer, if the Tenderer or any officer or director of a corporate Tenderer, is, or has been within a period of two years prior to the Closing Time, engaged either directly or indirectly through another corporation or legal entity in a legal proceeding initiated in any court against the Regional District in relation to any contract with, or works or services provided to the Regional District.

11.0 Conflict of Interest

11.1 When submitting a Tender, the Tenderer must complete, sign and include with their Tender a Conflict of Interest Disclosure Statement (Appendix J).

11.2 Without limiting any other provision of this ITT, the Regional District may reject a Tender based on an actual, potential or perceived conflict of interest.

The Regional District may reject any Tender where:

a. one or more of the directors, officers, principals, partners, senior management employees, shareholders or owners of the Tenderer, is an officer, employee or director of the Regional District or a consultant involved in the procurement process, or is a member of the immediate family of an officer, employee or director of the Regional District or a consultant involved in the procurement process; or

b. in the case of a Tender submitted by a Tenderer who is an individual person, where that individual is an officer, employee or director of the Regional District or a consultant involved in the procurement process, or is a member of the immediate family of an officer, employee or director of the Regional District or a consultant involved in the procurement process.

A Tenderer who has any concerns regarding whether a current or prospective employee, advisor or member of that Tenderer is, or may be, a Restricted Party, is encouraged to request an advance decision by submitting to the Project Manager, not less than ten (10) working days prior to the Closing Time, by email, the following information:

(a) names and contact information of the Tenderer and the person for which the advance opinion is requested;
(b) a description of the relationship that raises the possibility or perception of a conflict of interest or unfair advantage; and
(c) copies of any relevant documentation.

The Regional District may make an advance decision regarding whether the person is a Restricted Party, and whether the Regional District will reject a Tender based on the information provided.

12.0 Tender Evaluation

12.1 The purpose of this ITT is to select a Tenderer with the capability and experience to efficiently and cost effectively complete the work described in this ITT.

12.2 The Regional District shall be the sole judge of a Tender and its decision shall be final. The Regional District staff shall use the following criteria to evaluate tenders received:

(a) Tenderer's Qualifications, Experience, and References;

(b) Past Work Experience with the Regional District;

(c) Tender Price; and

(d) Any other criteria staff deem relevant.

12.3 The Tenderer acknowledges that the Regional District may rely upon criteria that the Regional District deems relevant even though such criteria may not have been disclosed to the Tenderer. By submitting a Tender, the Tenderer acknowledges the Regional District's right under this clause and absolutely waives any right of action against the Regional District for the Regional District's failure to accept the Tenderer's Tender, whether or not such right of action arises in contract, negligence, bad faith or any other cause of action.

12.4 Notwithstanding any other provision in this ITT, the award of a Contract by the Regional District may be subject to the availability of funding and the approval of the Board.

13.0 Proof of Ability

13.1 The Tenderer will be competent and capable of performing the Work. The Tenderer is required to provide evidence of previous experience and financial responsibility before the contract is awarded.

14.0 Equipment

14.1 A complete list of the equipment, which the Tenderer will make available for the completion of the Contract, will be included with each Tender.

15.0 Insurance and Contract Security

15.1 Insurance - Revise Clause GC 11.1.1.1:

General Liability Insurance - General liability insurance shall be in the joint names of the *Contractor,* the *Owner,* and the *Consultant,* with limits of not less than $3,000,000 per occurrence and with a property damage deductible not exceeding $2,500.

15.2 Contract Security - Upon written notice of award of Contract by the Regional District the successful bidder will provide an Irrevocable Commercial Letter of Credit as a contract performance security deposit. The Regional District will not execute a Contract until it is in possession of the required Irrevocable Letter of Credit. The Irrevocable Commercial Letter of Credit will be equivalent to twenty-five percent (25%) of the total sum of the contract price. The Irrevocable Commercial Letter of Credit will be kept current for the life of the Contract until substantial completion of the project is completed. Failure to provide the required Irrevocable Commercial Letter of Credit will result in forfeiture of the award if the tender.

Other forms of surety bonds will not be accepted for this project.

16.0 Examination of Contract Documents and Site

16.1 The Tenderer will satisfy themselves as to the practicality of executing the work in accordance with the Contract, and they will be held to have satisfied themselves in every particular before making up their Tender by inquiry, measurement, calculation and inspection of the site.

16.2 The Tenderer will examine the site and its surroundings and, before submitting their Tender will satisfy themselves as to the nature of the site, the quantities and nature of the work and equipment necessary for the completion of the work, and the means to access to the site, the accommodation they may require, and in general, will obtain all relevant information as to risks, contingencies and other circumstances which may influence their Tender.

17.0 Liability for Errors

17.1 The Regional District will not be responsible for any costs incurred by Tenderers as a result of the preparation or submission of a tender pertaining to this ITT. The accuracy and completeness of the Tender is the Proponent's responsibility. If errors are discovered, they will be corrected by the Tenderer at their expense.

17.2 Proponents acknowledge that the Regional District, in the preparation of the ITT supply of oral or written information to Tenderers, review of Tenders or the carrying out the Regional District's responsibilities under this ITT, does not owe a duty of care to Tenderers.

18.0 Limitation of Liability

18.1 Except for claims for costs of preparation of its Tender, each Tenderer, by submitting a Tender, irrevocably waives any claim, action, or proceeding against the Regional District including without limitation any judicial review or injunction application or against any of the Regional District's employees, advisors or representatives for damages, expenses or costs including costs of Tender preparation, loss of profits, loss of opportunity or any consequential loss for any reason including: any actual or alleged unfairness on the part of the Regional District at any stage of the Tender process; if the Regional District does not award or execute a contract; or, if the Regional District is subsequently determined to have accepted a noncompliant Tender or otherwise breached or fundamentally breached the terms of this ITT.

19.0 Ownership of Tender and Freedom of Information

19.1 Tenders will be received and held in confidence by the Regional District, subject to the provisions of the Freedom of Information and Protection of Privacy Act and this ITT. Each Tender should clearly identify any information that is considered to be confidential or proprietary information.

19.2 As an exception to Tenders being received and held in confidence, Tenderers are advised and acknowledge that any contract entered into as a result of this Tender may be subject to Board approval, which may be discussed and voted on at a meeting of the Board that is open to the public. If Board approval is required, details of Tenders, including but not limited to proposed or negotiated fees, may be provided to the Board in a publicly available staff report, discussed at a Council meeting that is open to the public, and posted on a publicly available electronic agenda on the Regional District's website.

20.0 Confidentiality

20.1 In accordance with the *Freedom of Information and Protection of Privacy Act*, Tenderers will treat as confidential and will not, without prior written consent of the Regional District, publish, release, or disclose, or permit to be published, released, or disclosed, any information supplied to, obtained by, or which comes to the knowledge of a Tenderer as a result of this ITT except insofar as such publication, release or disclosure is required by the laws of British Columbia.

21.0 Form of Contract – The successful Tenderer will be required to enter into contract using CCDC 18, 2001.

APPENDIX A
ACKNOWLEDGEMENT LETTER

The undersigned has received the full set of Tender Documents.

_____	_____
Signature	Company
_____	_____
Name (please print)	Address
_____	_____
Title	City
_____	_____
Phone Number	Fax Number
_____	_____
Date	Email Address

We presently intend to _____ provide/_____ not provide a Tender as requested.

Return immediately to:

Jim Martin
Regional District of Fraser-Fort George
155 George Street
Prince George BC V2L 1P8
jmartin@rdffg.bc.ca

APPENDIX B
BIDDER CHECKLIST

Before submitting your tender bid, check the following points:

- ❑ Has the Tender Form been signed and witnessed? _____
- ❑ Is the Schedule of Prices completed? _____
- ❑ Are the following pages included?

    - Schedule of Prices – Tendered Price _____
    - Schedule of Prices – Force Account Work ___
    - List of Contractor's Personnel? _____
    - List of Sub-Contractors? _____
    - List of Equipment? _____
    - Tenderer's Experience in Similar Work? _____
    - Goods and Services Tax Information?
    - Conflict of Interest Disclosure Statement _____
    - Addenda _____

- ❑ Are the documents complete? _____
- ❑ Are the documents enclosed in a sealed envelope? _____

Note: Your tender may be disqualified if ANY of the applicable foregoing points have not been complied with.

APPENDIX C
TENDER FORM

Date: _____

Regional District of Fraser-Fort George
155 George Street
Prince George, BC
V2L 1P8

ATTENTION: General Manager of Financial Services

Dear Sir/Madam:

Having carefully examined the Tender Documents and subsequent written addenda (if any), and having visited the site(s) and attended the mandatory pre-tender meeting for purposes of examining site conditions and having become familiar with all conditions that affect the execution of the work, and having satisfied themselves as to the sufficiency of the Tender and undersigned agrees to furnish all labour, equipment, materials, supervision and services and do all work necessary for and reasonably incidental to the **George Street Parking Lot ADM-23-04** as specified, in accordance with the contract documents.

The Tenderer agrees that in condition of having its Tender considered for the prices shown on the Schedule of Prices, the Tendered price is open for acceptance within sixty (60) days of the Tender opening and will not be withdrawn during that period of time.

The Tendered price includes all taxes, duties and all other additional charges on any or all materials, equipment and labour, and it is understood that payment will be made for the completion of all Work specified in the Contract on the basis of the prices Tendered only and that any approved extras or refunds will be made by mutual agreement between the Regional District and the Contractor.

The undersigned agrees that the sub-contractor(s) employed will be as listed and further agrees that no changes or additions will be made to this list without written approval of the Regional District.

If the undersigned be notified in writing of the acceptance of this tender, they agree that within fourteen (14) days of the date of the acceptance notice they will enter into a contract and execute an agreement for the stated sum in the form of the specimen submitted to guarantee completion of the contract in accordance with the contract documents and within the time stated in the Tender documents.

It is understood that the award of Tender may be revoked if the Tenderer fails or refuses to execute a contract and provide the Irrevocable Commercial Letter of Credit (Performance Security) within fourteen (14) days after notification that they are the successful Tenderer.

The undersigned agrees that the Regional District of Fraser-Fort George reserves the right to retain for consideration Tenders which are nonconforming because they do not contain the content or form required by the Instructions to Tenderers or for failure to comply with the process

for submission contained in the ITT. The undersigned further agrees that the Regional District may reject any or all tenders, or accept the tender deemed most favourable in the interests of the Regional District.

The tenderer hereby acknowledges receipt and inclusion of the following addenda to the Tender Documents:

Addendum No. _____ dated _____ Addendum No. _____ dated _____

Addendum No. _____ dated _____ Addendum No. _____ dated _____

SIGNED on behalf of the Tenderer this day of _____ by the duly authorized signatory or signatories of the Tenderer:

Per: _____

Name and Title: _____

Per:_____

Name and Title: _____

If the Tenderer is an individual, a proprietorship or a partnership, the above signature(s) should be witnessed:

_____
Witness signature

_____
Witness name

_____
Witness address

_____

_____

_____
Address of Tenderer

APPENDIX D
SCHEDULE OF PRICES – TENDERED PRICE

GENERAL					
ITEM	**DESCRIPTION**	**UNIT**	**QTY**	**UNIT RATE**	**AMOUNT**
1	Mobilization & Demobilization	L.S.	1		
2	Bonding & Insurance	L.S.	1		
CIVIL - PHASE ONE					
ITEM	**DESCRIPTION**	**UNIT**	**QTY**	**UNIT RATE**	**AMOUNT**
1	Strippping	cu. m	200		
2	Excavation to Waste	cu. m	400		
3	0.45m Sub-Base Gravel	Sq. m	900		
4	0.150m Crushed Gravel	Sq. m	900		
5	Curb & Gutter	l.m.	120		
6	65mm Ashpault	Sq. m	760		
7	Concrete Driveway Letdown / sidewalk crossing	l.m.	10		
8	Rock Pit/ Storm Drainage	Each	1		
9	Catch Basin	Each	1		
10	Connect to city storm	Each	1		
11	200mm SDR PVC Catch Basin Lead	l.m.	12		
12	300mm SDR 35 PVC Storm	l.m.	10		
13	Line Painting	L.S.	1		
14	Concrete Sidewalk 1.5m width	l.m.	10		
SUB-TOTAL					
CONTINGENCY ALLOWANCE					
ITEM	**DESCRIPTION**	**UNIT**	**QTY**	**UNIT RATE**	**AMOUNT**
1	Vehicle Access Gate	Each	1	$ 5,000	$ 5,000
2	Man Access Gate	Each	1	$ 2,000	$ 2,000
3	Fencing	l.m.	90	$ 200	$ 18,000
4	Parking Lot Lighting	Each	3	$ 10,000	$ 30,000
5	Landscaping	L.S.	1	$ 30,000	$ 30,000
6	Flag Poles	Each	3	$ 500	$ 4,500
SUB-TOTAL					**$ 89,500**

TENDER PRICE	
GST	
TOTAL TENDER PRICE INCLUDING GST	

APPENDIX E
SCHEDULE OF PRICES – FORCE ACCOUNT WORK

The Contractor will supply Force Account hourly rates for labour and equipment that the Contractor may be able to make available for additional work in accordance with the Contract. List type, make, model, year and serial number and hourly rate of equipment to the utilized.

Type, make, model, year and serial number of equipment	Rate Per Hour (Excluding Taxes)

APPENDIX F
LIST OF CONTRACTOR'S PERSONNEL

The Contractor agrees that the personnel employed by them will be as listed below and further agrees that any changes or additions made to this list will be made in writing to the Regional District.

Name of Employee	Employee's Experience/Qualifications

APPENDIX G
LIST OF SUB-CONTRACTORS

The Contractor agrees that the Sub-Contractors engaged by it will be as listed below and further agrees that any changes or additions made to this list will be made in writing to the Regional District.

Name and Address of Sub-Contractor	Work to be Performed by Sub Contractor

APPENDIX H
LIST OF EQUIPMENT

The Tenderer will list size, model, year and operating weight of equipment they propose to use to complete the work herein. No changes or additions will be made to this list without the written approval of the Regional District.

State standby equipment to be used in the event of breakdown of above, and where it will be drawn from.

Primary Equipment	Size	Model	Make	Type of Engine	Year	Weight

Secondary Standby Equipment	Size	Model	Make	Type of Engine	Year	Weight

APPENDIX I
TENDERER'S EXPERIENCE IN SIMILAR WORK

Year	Work Performed	Reference Contact (name and phone number)	Value

APPENDIX J

CONFLICT OF INTEREST STATEMENT

PROCUREMENT PROCESS
ADM-23-04 George Street Parking Lot

Vendor Name:_____

The Vendor, including its officers, employees, and any person or other entity working on behalf of or in conjunction with, the Vendor on this Procurement Process (check the boxes that apply):

☐ is free of any conflict of interest that could be perceived to improperly influence the outcome of this procurement process.

☐ has not, and will not, participate in any improper procurement practices that can provide the Vendor with an unfair competitive advantage including obtaining and using insider type information to prepare a solicitation offer or participating in bid rigging.

☐ has an actual, perceived or potential conflict of interest regarding this procurement process as a result of:

State reason(s) for Conflict of Interest:

_____

_____

_____

_____

By signing below, I certify that all statements made on this form are true and correct to the best of my knowledge.

_____
Print Name of Person Signing Disclosure

_____ _ _____
Signature of Person Making Disclosure Date Signed

APPENDIX K
GOODS AND SERVICES TAX INFORMATION

Supplier: _____
Name

_____
Address

_____
City Province

_____
Postal Code Phone Number

Are you a GST Registrant? Yes_____ No_____

If YES, please indicate your registration number: _____

If NO, please fill in the following (check appropriate box):

- ❑ Supplier qualifies as a small supplier under s. 148 of the legislation
- ❑ Other: Specify _____

_____ _____
Signature of Authorized Person Print Name

_____ _____
Title Date

APPENDIX L
IRREVOCABLE COMMERCIAL LETTER OF CREDIT

(to be on bank letterhead)

Letter of Credit No. _____ Amount $_____

Regional District of Fraser-Fort George
155 George Street
Prince George, BC V2L 1P8

Dear Sir:

Re: Irrevocable Letter of Credit No. _____

In accordance with the Contract to provide services at the George Street Parking Lot ADM-23-04 construction project, we hereby authorize you to draw on _____(name and address of bank) Province of British Columbia, for account of _____(name of Tenderer) up to an aggregate amount of $_____ available on demand for 100% value.

Pursuant to the request of our customer _____, we the _____ Bank hereby establish and give you an Irrevocable Letter of credit in your favour in the above amount which may be drawn on by you at any time and from time to time upon written demand for your payment made upon us by you, which demand we will honour without enquiring whether you have the right as between yourself and the said customer to make such demand and without recognizing any claim of our said customer, or objection by it to payment by us.

1. Draws are to be made in writing to _____ (name of bank).

2. Partial draws may be made.

3. The Bank will not inquire as to whether or not the Regional District of Fraser-Fort George has the right to make demand on this Letter of Credit.

4. This Letter of Credit is irrevocable up to sixty (60) days after the termination of the contract.

Demands must be made not later than 60 days following the expiration of the contract.

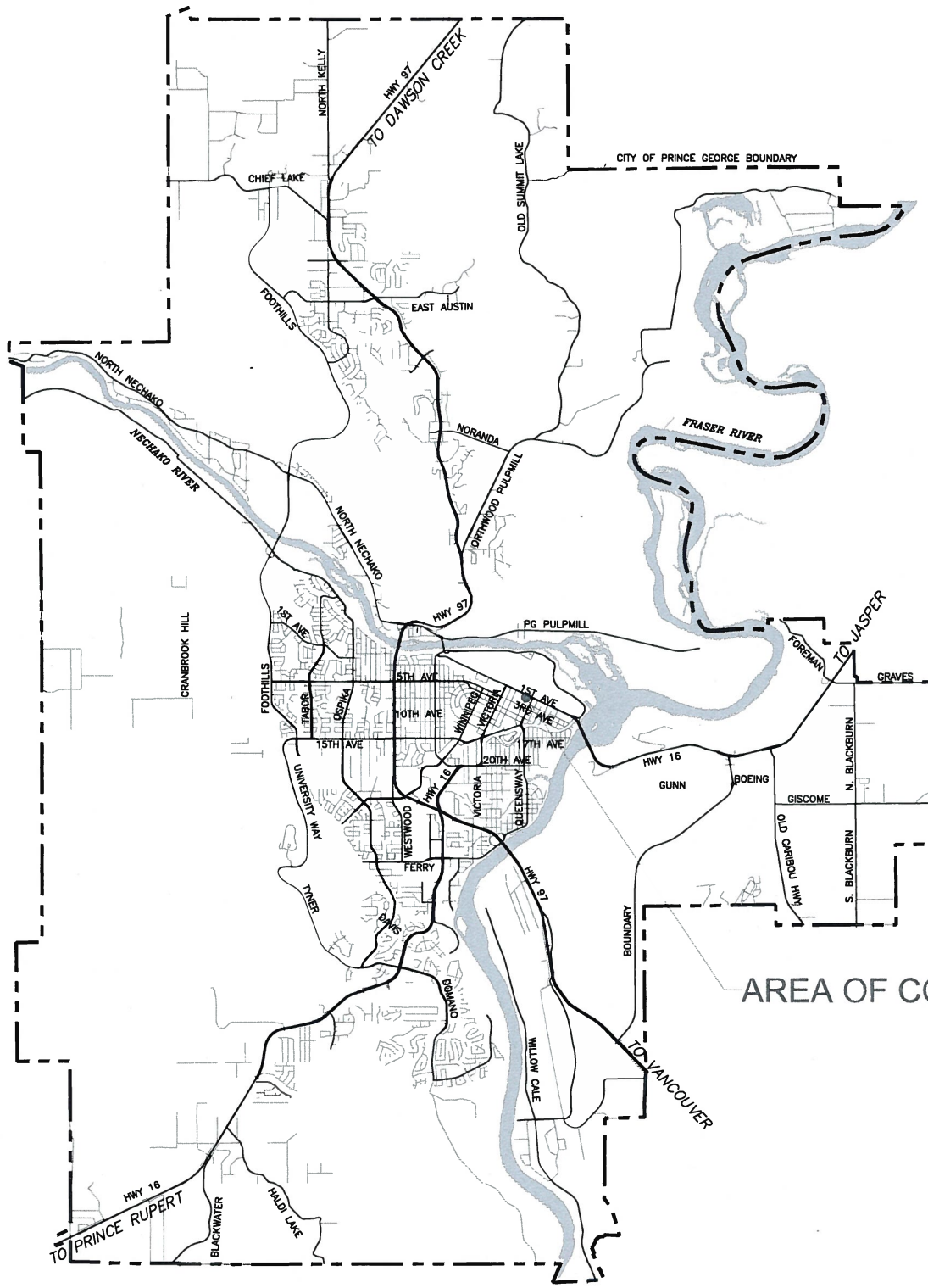
The Demands made under this Credit are to be endorsed hereon and will state on their face that they are drawn under _____(name and address of bank), Letter of Credit No. _____.

Yours truly,

Manager,
(On behalf of Name of Bank)

APPENDIX M
SPECIFICATIONS AND DRAWINGS

REGIONAL DISTRICT
of Fraser-Fort George



AREA OF CONSTRUCTION

LOCATION MAP

N.T.S.

DRAWING INDEX

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
S. R. BILBROUGH
24902

Stantec

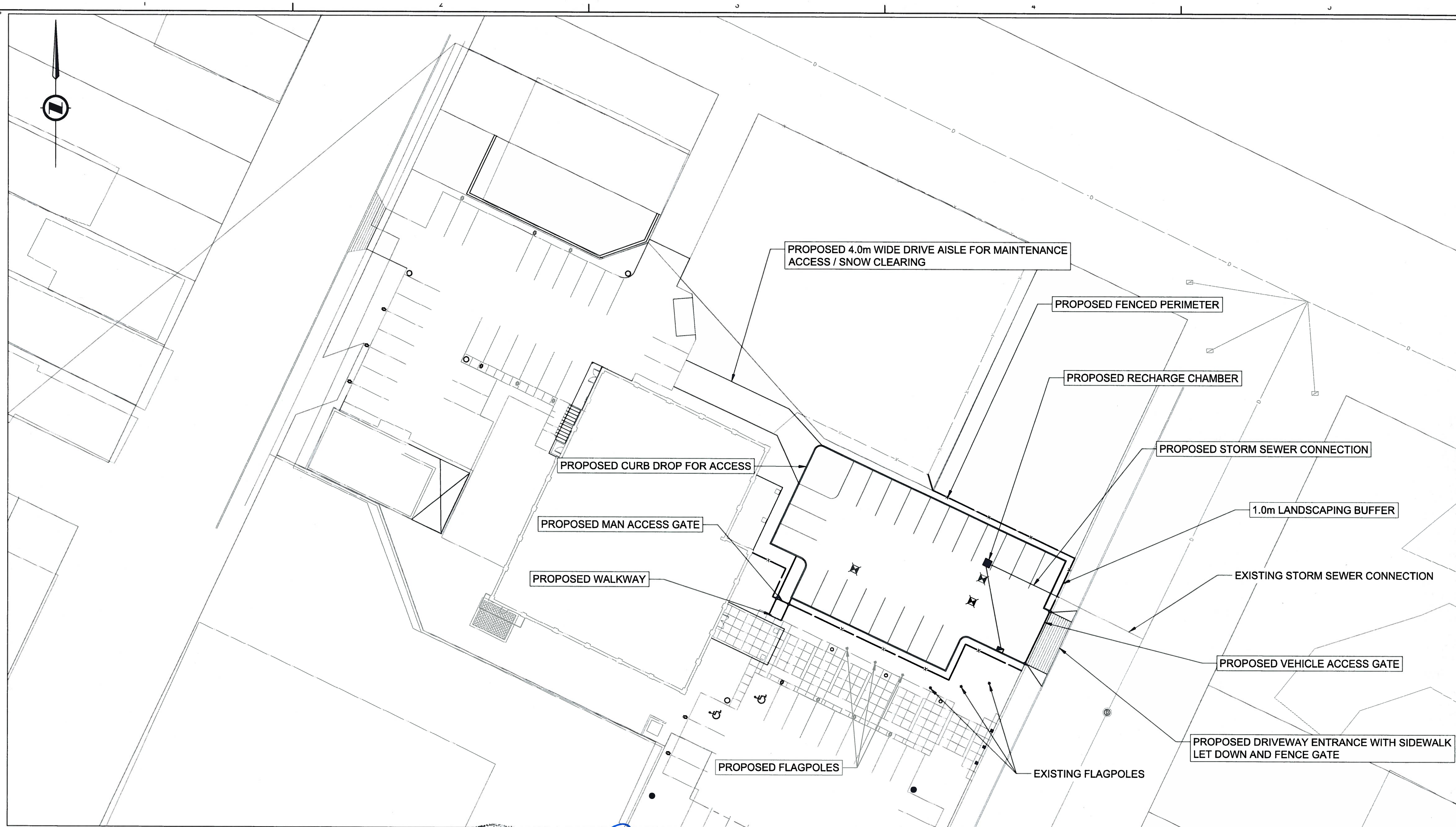
Regional District of Fraser-Fort George
155 George Street Prince George, BC V2L 1P8
250-960-4400
district@rdffg.ca

Project Manager: Scott Bilbrough

Designer: Scott Bilbrough

Draftsperson: Jackson Girard

Project No. 115823092



Revision	By	Appd	YYYY.MM.DD

Issued	By	Appd	YYYY.MM.DD
ISSUED FOR TENDER	JG	SB	2023.07.07

Permit-Seal

PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA, S. R. BILBROUGH # 24902

STANTEC PERMIT #1002862

Consultant

Stantec

Stantec
205 - 1302 7th AVENUE
PRINCE GEORGE, B.C.
Tel: (250) 596-9422
www.stantec.com

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Client/Project Logo

REGIONAL DISTRICT of Fraser-Fort George

Client/Project
REGIONAL DISTRICT OF FRASER-FORT GEORGE

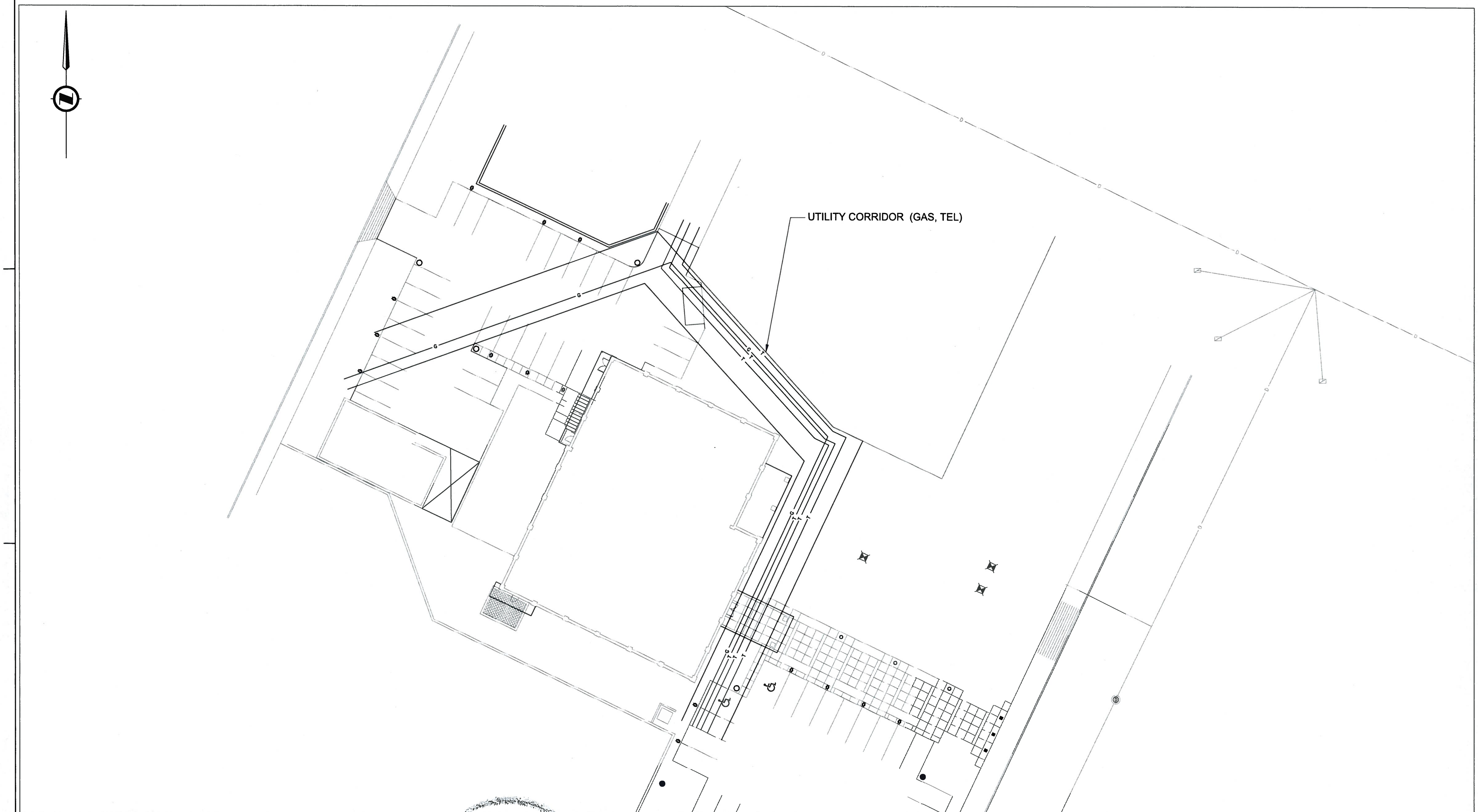
GEORGE STREET PARKING LOT

PRINCE GEORGE, BC

File Name: 115823092 - RDFFG PARKING LOT	JG	SB	SB	2023.07.06
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
SITE PLAN

Project No. 115823092
Scale 1:500
Revision 1
Sheet 1 of 4
Drawing No. **C101**



Revision	By	Appd	YYYY.MM.DD
-	-	-	-

Issued	By	Appd	YYYY.MM.DD
ISSUED FOR TENDER	JG	SB	2023.07.07

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PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — S. R. BILBROUGH # 24302

STANTEC PERMIT #1002862

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REGIONAL DISTRICT of Fraser-Fort George

Client/Project
REGIONAL DISTRICT OF FRASER-FORT GEORGE

GEORGE STREET PARKING LOT

Prince George, BC

File Name: 115823092 - RDFFG PARKING LOT	JG	SB	SB	2023.07.06
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
UTILITIES

Project No. 115823092

Scale 1:500

Revision 1

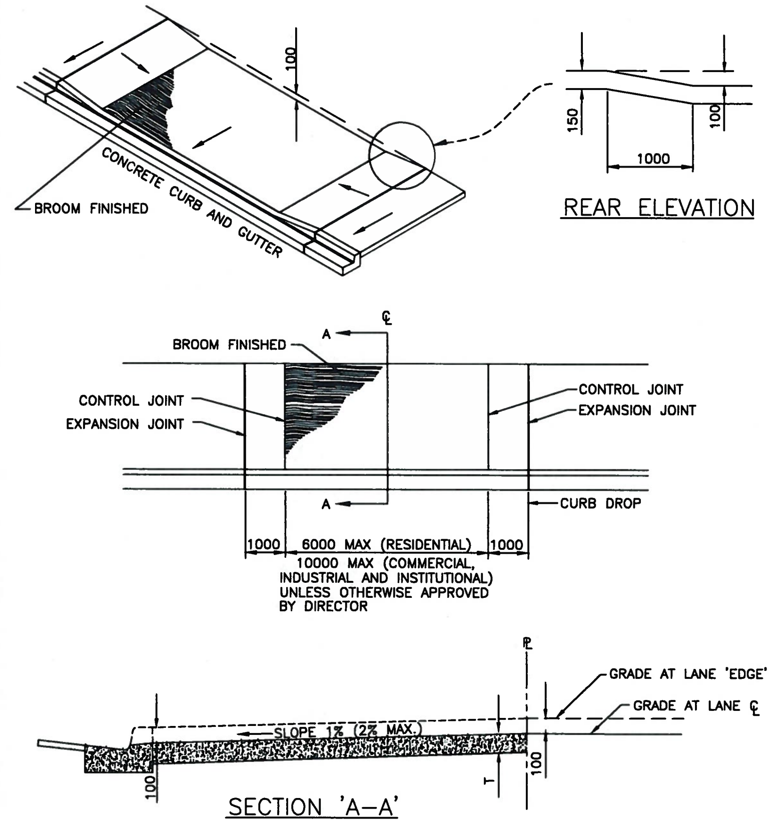
Sheet 2 of 4

Drawing No. C102

SIDEWALK CROSSING

C7

CITY OF PRINCE GEORGE



T = 150 – IN RESIDENTIAL AREAS
T = 200 – IN COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL AREAS

NOTE:
1. REFER TO SECTION 03300 OF STANDARD SPECIFICATIONS FOR CONCRETE DETAILS
2. FOR SUBGRADE DETAILS SEE DWG. C6
3. WIDTH OF CROSSING TO SUIT DEVELOPMENT IN ACCORDANCE WITH ZONING BYLAW

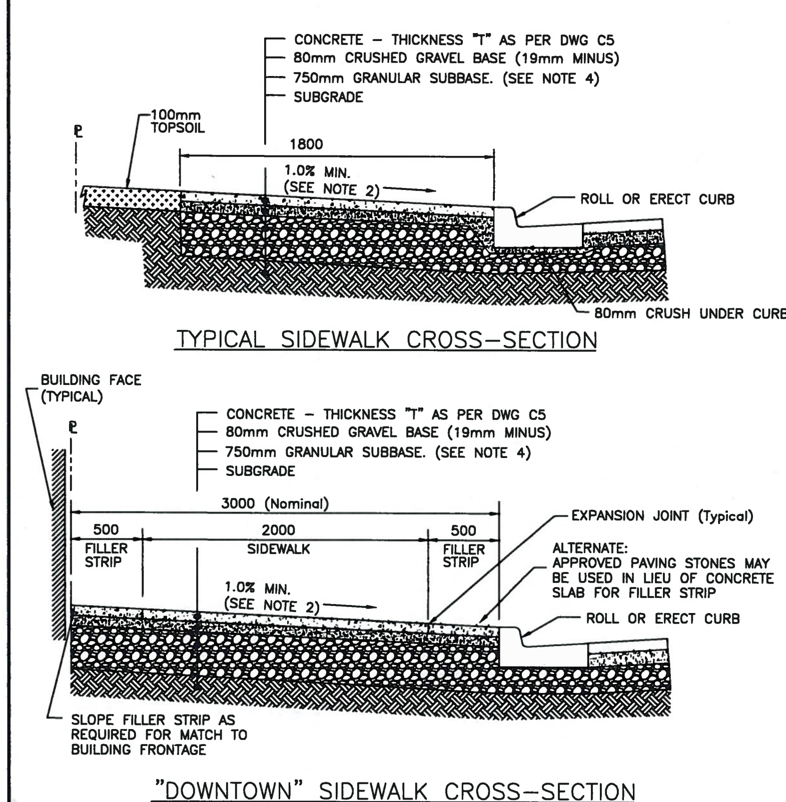
DATE OF REVISION	REVISION NUMBER	SCALE	DRAWING NUMBER
SEPT 2004	0	N.T.S.	C7

2004

SIDEWALK BASE CONSTRUCTION

C6

CITY OF PRINCE GEORGE



NOTES:
1. WHERE NATIVE SUBGRADE IS GRANULAR THE 300mm SUBBASE IS NOT REQUIRED.
2. SIDEWALK CROSSFALL TO BE 1.0% MINIMUM(RECOMMENDED), 2.0% MAXIMUM.
3. REFER TO DRAWINGS C7 AND C8 FOR SIDEWALK WIDTHS AT CROSSWALKS AND PEDESTRIAN RAMPS. REFER TO DRAWING C5 FOR ADDITIONAL SIDEWALK DETAILS.
4. DEPTH OF GRANULAR SUBBASE MAY BE ADJUSTED TO RECOMMENDATION OF GEOTECHNICAL ENGINEERING REPORT APPROVED BY DIRECTOR OF DEVELOPMENT SERVICES.

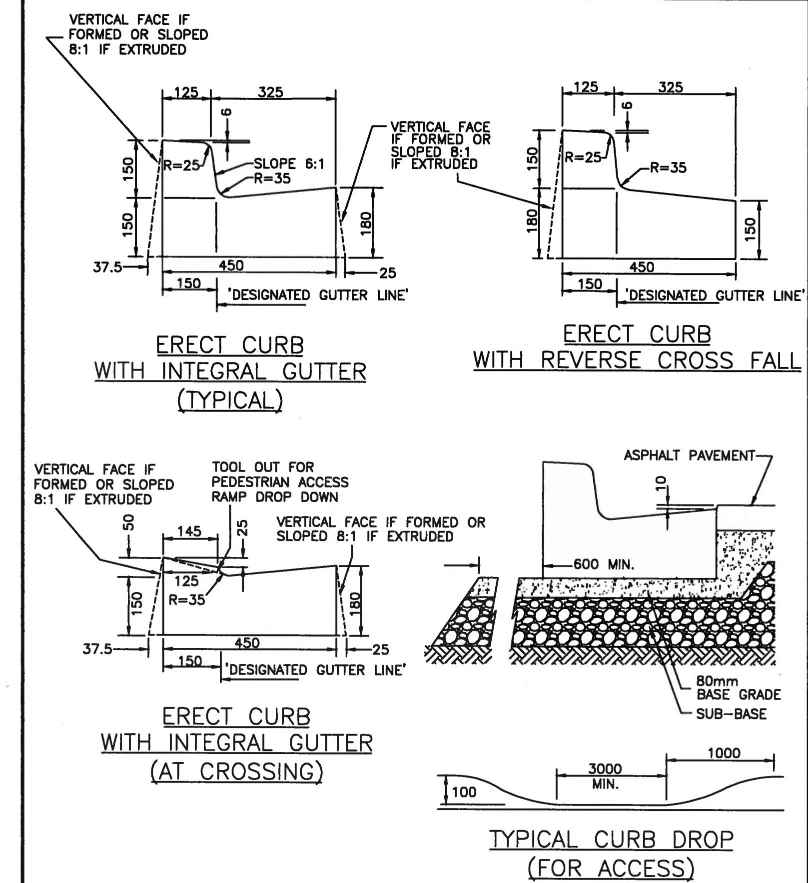
DATE OF REVISION	REVISION NUMBER	SCALE	DRAWING NUMBER
JUN 2004	0	N.T.S.	C6

2004

ERECT CURB AND GUTTER

C1

CITY OF PRINCE GEORGE



NOTES:
1. REFER TO SECTION 03300 OF STANDARD SPECIFICATIONS FOR CONCRETE DETAILS
2. MAXIMUM CROSS FALL FOR GUTTER IS 1:12.
3. ALL EXPOSED CORNERS TO BE SLIGHTLY ROUNDED.
4. PROVIDE CONTROL JOINTS AT 3m INTERVALS ALONG CURB.

DATE OF REVISION	REVISION NUMBER	SCALE	DRAWING NUMBER
JUN 2004	0	N.T.S.	C1

2004

Revision	By	Appd	YYYY.MM.DD
-	-	-	-

Issued	By	Appd	YYYY.MM.DD
ISSUED FOR TENDER	JG	SB	2023.07.07

Permit/Seal

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — S. R. BILBROUGH # 24902

STANTEC PERMIT # 1002862

Consultant

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REGIONAL DISTRICT of Fraser-Fort George

Client/Project
REGIONAL DISTRICT OF FRASER-FORT GEORGE

GEORGE STREET PARKING LOT

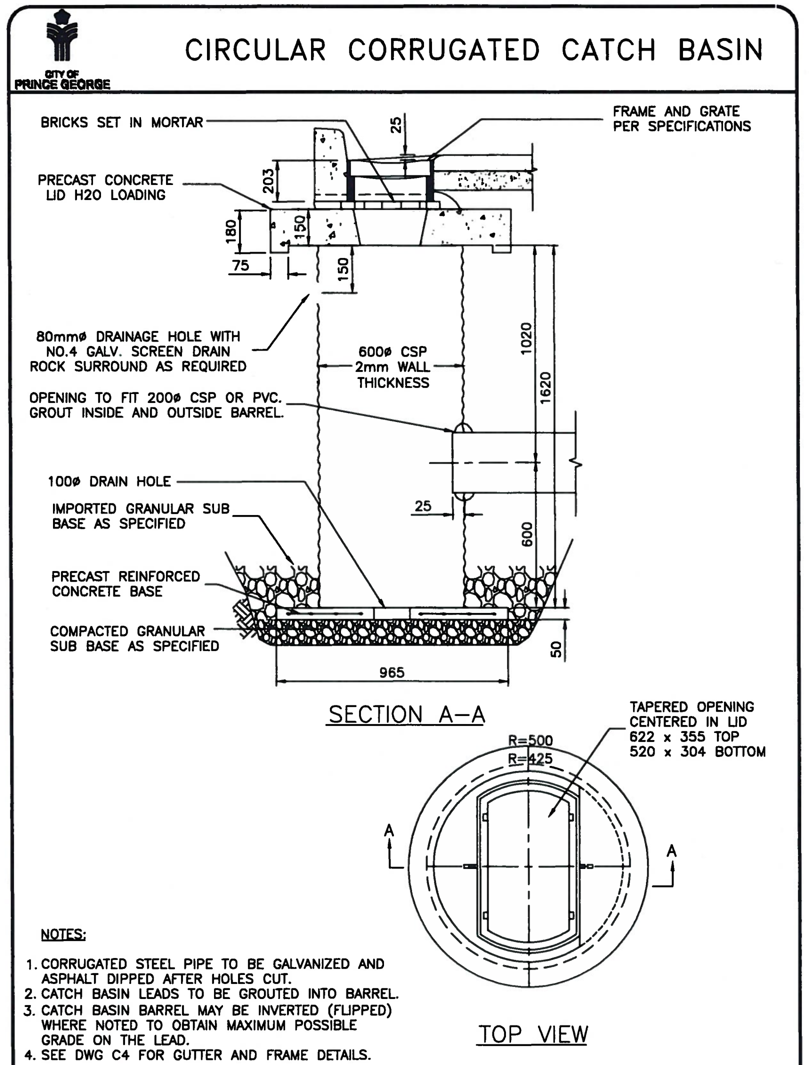
PRINCE GEORGE, BC

File Name: 115823092 - RDFFG PARKING LOT | JG Dwn. | SB Dsgn. | SB Chkd. | 2023.07.06 YYYY.MM.DD

Title
STANDARD DETAILS

Project No. 115823092 | Scale AS NOTED

Revision 1 | Sheet 3 of 4 | Drawing No. C501

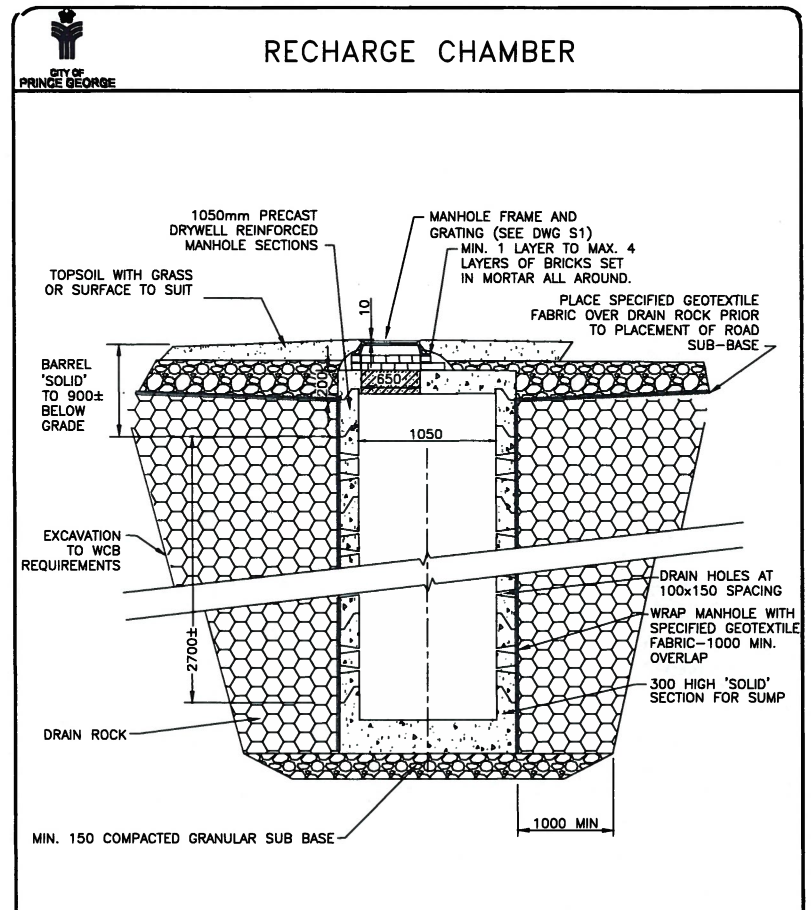


NOTES:

1. CORRUGATED STEEL PIPE TO BE GALVANIZED AND ASPHALT DIPPED AFTER HOLES CUT.
2. CATCH BASIN LEADS TO BE GROUTED INTO BARREL.
3. CATCH BASIN BARREL MAY BE INVERTED (FLIPPED) WHERE NOTED TO OBTAIN MAXIMUM POSSIBLE GRADE ON THE LEAD.
4. SEE DWG C4 FOR GUTTER AND FRAME DETAILS.

2004

DATE OF REVISION	REVISION NUMBER	SCALE	DRAWING NUMBER
JUN 2004	0	N.T.S.	S8



NOTE:

1. CHAMBER BARREL SIZE MAY BE INCREASED IN DIAMETER TO SUIT SITE CONDITIONS.
2. ALTERNATIVE RECHARGE CHAMBERS DESIGNED BY PROFESSIONAL ENGINEER MAY BE SUBSTITUTED WHEN APPROVED BY DIRECTOR.

2004

DATE OF REVISION	REVISION NUMBER	SCALE	DRAWING NUMBER
SEPT 2004	0	N.T.S.	S11

Issued	By	Appd	YYYY.MM.DD
ISSUED FOR TENDER	JG	SB	2023.07.07

Permit/Seal

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA S. R. BILBROUGH # 24902

STANTEC PERMIT #1002862

Consultant

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Client/Project Logo

REGIONAL DISTRICT of Fraser-Fort George

Client/Project
REGIONAL DISTRICT OF FRASER-FORT GEORGE
GEORGE STREET PARKING LOT
PRINCE GEORGE, BC

File Name: 115823092 - RDFFG PARKING LOT | JG Dwn. | SB Dsgn. | SB Chkd. | 2023.07.06 YYYY.MM.DD

Title
STANDARD DETAILS

Project No. 115823092
Scale AS NOTED
Revision 1
Sheet 4 of 4
Drawing No. C502

1 GENERAL

1.1 Section Includes

1.1.1 Connecting to existing services.

1.1.2 Special scheduling requirements.

1.2 Related Sections

1.2.1 Section 01353 – Traffic Control.

1.2.2 Section 01560 – Temporary Barriers and Enclosures.

1.3 Existing Services

1.3.1 Notify City and utility companies of intended interruption of services and obtain required permission.

1.3.2 Where Work involves breaking into or connecting to existing services, provide City with a minimum of ten (10) working days of notice to arrange for scheduling of service connections and to arrange for any interruption of service to City customers. Duration of interruptions shall be kept to a minimum. All tie-ins, connections and adjustments to existing active water, sanitary and storm mains are to be performed by the City.

1.3.3 Provide for pedestrian and vehicular traffic.

1.3.4 Construct barriers in accordance with Section 01560 – Temporary Barriers and Enclosures.

1.4 Special Requirements

1.4.1 Carry out noise generating work in accordance with the City of Prince George Noise, Nuisance & Disturbances Bylaw No. 3848.

2 PRODUCTS

(Not Applicable)

3 EXECUTION

(Not Applicable)

END OF SECTION 01140

1 GENERAL

1.1 Description

1.1.1 Coordinate progress schedules, submittals, use of site, temporary utilities, construction facilities, and construction Work with progress of Work of other contractors and Work by City.

1.2 Related Sections

1.2.1 Section 01520 – Construction Facilities.

1.3 Project Meetings

1.3.1 Schedule and administer project meetings with subcontractors as required throughout progress of Work.

1.3.2 Provide physical space and make arrangements for meetings.

1.3.3 Attend regular construction progress meetings as determined by Engineer. Arrange for attendance by subcontractors as required. Recording and distributing of minutes will be done by Engineer.

1.4 Construction Organization

1.4.1 Coordinate allocation of mobilization areas of site; for field offices and sheds, access, traffic, and parking facilities.

1.4.2 Coordinate use of site and facilities among subcontractors. Coordinate submittals, reports and records, schedules and drawings. Resolve ambiguities and conflicts among subcontractors.

1.4.3 Coordinate Progress Schedules, including dates for submittals and for delivery of products.

1.4.4 Comply with instructions of Engineer for use of temporary utilities and construction facilities.

1.4.5 Coordinate field engineering and layout work with Engineer.

1.5 On-Site Documents

1.5.1 Maintain at job site, one copy each of the following:

- Contract drawings.
- Specifications.
- Addenda.
- Reviewed shop drawings.
- Change orders.

- Other modifications to Contract.
- Field test reports.
- Copy of approved Work schedule.
- Manufacturers' installation and application instructions.
- Labour conditions and wage schedules

1.6 Schedules

1.6.1 Submit preliminary construction progress schedule to Engineer for review.

1.6.2 After review, revise and resubmit schedule to comply with revised project schedule.

1.6.3 During progress of Work revise and resubmit as directed by Engineer.

1.7 Submittals

1.7.1 Review shop drawings, product data, and samples for compliance with Contract Documents and for coordination among work of subcontractors then transmit to Engineer for review.

1.7.2 Submit requests for payment for review by Engineer.

1.7.3 Submit requests for interpretation of Contract Documents, and obtain instructions through Engineer.

1.7.4 Process substitutions and change orders through Engineer.

1.7.5 Deliver closeout submittals for review and preliminary inspections to Engineer.

1.8 Records During Construction

1.8.1 Maintain one complete set of construction drawings on the site for use as Record Documents.

1.8.2 Store Record Documents and Samples in Field Office, or other approved location, apart from documents used for construction. Provide files, racks, and secure storage.

1.8.3 Maintain Record Documents in a clean, dry and legible condition. Do not use Record Documents for construction purposes.

1.8.4 Keep Record Documents and samples available for inspection by Engineer.

1.8.5 At the completion of the construction period, turn over the set of Record Documents which have been marked up with changes during the course of the work to the Engineer to permit the Engineer to prepare drawings of record for the work..

1.9 Recording Actual Site Conditions

1.9.1 Record information concurrently with construction progress. Do not conceal work until required information is recorded.

1.9.2 Legibly mark each item to record actual construction, including:

- Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements and survey datum, as directed by the Engineer.
- Field changes of dimension and detail.
- Changes made by Addendum, Change Order or Field Order.
- Details not on original Contract Drawings.

1.10 Warranties and Bonds

1.10.1 Provide required Warranties and Bonds to the Authorized Person.

1.10.2 Except for items put into use with Authorized Person's permission, leave date of beginning of time of warranty until the Date of Substantial Completion is determined.

1.10.3 Verify that documents are in proper form and contain full information.

1.11 Closeout Procedures

1.11.1 Notify Engineer when Work is considered ready for Substantial Completion.

1.11.2 Accompany Engineer on preliminary inspection to determine items to be listed for completion or correction.

1.11.3 Comply with Engineer 's instructions for correction of items of Work

2 PRODUCTS

(Not Applicable)

3 EXECUTION

(Not Applicable)

END OF SECTION 01310

1 GENERAL

1.1 Administrative

1.1.1 Submit to the City submittals listed for review. Submit with reasonable promptness and in orderly sequence to allow opportunity for City review prior to ordering of materials or tendering of works for construction. Failure to submit in ample time is not considered sufficient reason for an extension of development, subdivision or project requirements and may cause delays in the scheduling works to be completed by City forces as part of the development, subdivision or project. No claim for extension by reason of such default will be allowed.

1.1.2 Work affected by submittal shall not proceed until review is complete.

1.1.3 Present shop drawings, product data, samples and mock-ups in SI Metric units.

1.1.4 Where items or information is not produced in SI Metric units converted values are acceptable.

1.1.5 Review submittals for projects prior to submission to City. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of the Work and the Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and shall be considered rejected.

1.1.6 Notify City in writing at time of submission, identifying deviations from requirements of Contract Documents and stating reasons for deviations.

1.1.7 Verify that field measurements and affected adjacent Work are coordinated.

1.1.8 The Owner’s, Developer’s or Contractor's responsibility for errors and omissions in submission is not relieved by the City's review of submittals.

1.1.9 The Owner’s, Developer’s or Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by the City review.

1.1.10 Keep one reviewed copy of each submission on site.

1.2 Shop Drawings and Product Data

1.2.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data, which are to be provided by Contractor to illustrate details of a portion of Work.

1.2.2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of the Section under which adjacent items will be supplied and installed. Indicate cross-references to design drawings and specifications.

1.2.3 Allow ten days for City's review of each submission.

1.2.4 Make changes in shop drawings as City may require, consistent with Contract Documents. When resubmitting, notify City in writing of any revisions other than those requested.

1.2.5 Accompany submissions with transmittal letter containing:

1.2.6.1 Date.

1.2.6.2 Project title and number.

1.2.6.3 Contractor's name and address.

1.2.6.4 Identification and quantity of each shop drawing, product data and sample.

1.2.6.5 Other pertinent data

1.2.6 Submissions shall include:

1.2.6.6 Date and revision dates.

1.2.6.7 Project title and number.

1.2.6.8 Name and address of:

- Contractor or Subcontractor.
- Supplier.
- Manufacturer.

1.2.6.9 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.

1.2.6.10 Submit 6 prints of shop drawings for each requirement requested in specification Sections and as City may reasonably request. One transparency of each shop drawing may be submitted in lieu of the multiple copies. Electronic copies may be used for submission upon approval by City.

1.2.6.11 Submit 6 copies of product data sheets or brochures for requirements requested in specification Sections and as requested by City where shop drawings will not be prepared due to standardized manufacture of product.

1.2.6.12 Delete information not applicable to project.

1.2.6.13 Supplement standard information to provide details applicable to project.

1.2.6.14 If upon review by City, no errors or omissions are discovered or if only minor corrections are made, three copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

2 PRODUCTS

(Not Applicable)

3 EXECUTION

(Not Applicable)

---

1 GENERAL

1.1 Related Sections

1.1.1 Section 01140 – Work Restrictions.

1.1.2 Section 01560 – Temporary Barrier Enclosures

1.1.3 Section 02317 - Roadway Excavation Embankment and Compaction.

1.1.4 Section 02721 - Granular Base.

1.1.5 Section 02723 - Granular Sub-base.

1.1.6 Section 02741 - Hot Mix Asphalt Concrete Paving.

1.2 References

1.2.1 Manual of Uniform Traffic Control Devices for Canada, (MUTCD) published by Transportation Association of Canada.

1.2.2 British Columbia Ministry of Transportation Traffic Control Manual for Work on Roadways.

1.2.3 City of Prince George Procedure for Notice of Traffic Disruptions.

1.3 Protection of Public Traffic

1.3.1 Comply with requirements of Acts, Regulations and By-Laws in force for regulation of vehicle and pedestrian traffic or use of roadways in areas affected by the work zone.

1.3.2 Provide Traffic Management Plan to requirements of Procedure of Notice of Traffic Disruptions. Do not proceed with work until Traffic Management Plan has been approved by City.

1.3.3 When working on travelled way:

1.3.3.1 Ensure delimited work zone and equipment placement minimizes interference and hazards to the traveling public.

1.3.3.2 Do not leave equipment on travelled way overnight unless authorized by the City.

1.3.4 Do not close any lanes of road or highway without approval of City. Before re-routing traffic, erect suitable traffic controls in accordance with instructions contained in Part D of MUTCD.

1.3.5 Keep travelled way well graded, free of pot holes and of sufficient width for required number of lanes of traffic.

1.3.5.1 Provide minimum 7 metre wide temporary roadway for traffic in two-way sections through Work and on detours

1.3.5.2 Provide minimum 5 metre wide temporary roadway for traffic in one-way sections through Work and on detours

1.3.6 As required, provide gravelled detours or temporary roads to facilitate passage of traffic around restricted construction area.

1.3.7 Provide and maintain road access and egress to property fronting along Work under Contract and in other areas as indicated, unless other means of road access exist that meet approval of City.

1.4 Traffic Control Devices

1.4.1 Meet with City prior to commencement of Work to prepare list of traffic control devices required for project. If situation on site changes, revise list to approval of City.

1.4.2 Continually maintain traffic control devices in use by:

1.4.2.1 Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.

1.4.2.2 Removing or covering signs which do not apply to conditions existing from day to day.

1.4.3 At the completion of the project, ensure all temporary traffic control devices have been removed.

1.5 Control of Public Traffic

1.5.1 Provide competent flag persons, trained in accordance with, and properly equipped as specified in, MUTCD manual in following situations:

1.5.1.1 When public traffic is required to pass working vehicles or equipment which block the travelled roadway.

1.5.1.2 When it is necessary to institute alternating one-way traffic system through construction area or detour routes.

1.5.1.3 When construction blocks roadways where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use.

1.5.1.4 When workmen or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.

1.5.1.5 Where temporary protection is required while other traffic control devices are being erected or taken down.

1.5.1.6 For emergency protection when other traffic control devices are not readily available.

1.5.1.7 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.

1.5.1.8 At each end of restricted sections where pilot cars are required.

1.5.2 Maximum Traffic Delays

1.5.2.1 Delays to public traffic due to contractor's operations to be maximum 15 minutes.

1.5.3 Equip pilot cars with orange flashing lights and signs clearly designating vehicles as pilot cars.

1.5.4 Provide portable traffic signal system where construction operations may restrict two-way roadways to alternating one lane traffic for 12 hours or more each day. Identify in Traffic Management Plan.

1.6 Operational Requirements

1.6.1 Maintain existing conditions for traffic throughout period of contract except where a traffic management plan has been submitted to and approved by the City to restrict existing conditions for traffic when required for construction under contract.

1.6.2 Maintain existing conditions for traffic crossing right-of-way.

1.6.3 Maintain access and passage for emergency vehicles.

2 PRODUCTS

(Not Applicable)

3 EXECUTION

(Not Applicable)

1 GENERAL

1.1 Standard Specifications

1.1.1 Wherever standard specifications are referred to in these STANDARD CONSTRUCTION SPECIFICATIONS the current edition shall apply.

1.1.2 Where there is a clear conflict between the standard specifications and the STANDARD CONSTRUCTION SPECIFICATIONS, the STANDARD CONSTRUCTION SPECIFICATIONS shall apply.

1.2 Associations

1.2.1 AA - Aluminum Association, 900 19th Street N.W., Washington, D.C., U.S.A. 20006 URL http://www.aluminum.org

1.2.2 AASHTO - American Association of State Highway and Transportation Officials, 444 N Capitol Street N.W., Suite 249, Washington, D.C., U.S.A. 20001 URL http://www.aashto.org

1.2.3 ANSI - American National Standards Institute, 11 West 42nd Street, New York, New York, U.S.A. 10036 URL http://www.ansi.org

1.2.4 API - American Petroleum Institute,1220 L St. Northwest, Washington, D.C., U.S.A. 20005-4070 URL http://www.api.org

1.2.5 ASPT Association for Asphalt Paving Technologists, 400 Selby Avenue, Suite 1, St. Paul, MN 55102 U.S.A. URL http://www.asphalt.org

1.2.6 ASTM - American Society for Testing and Materials, 100 Barr Harbor Drive West, Conshohocken, Pennsylvania 19428-2959 URL http://www.astm.org

1.2.7 AWS - American Welding Society, 550 N.W. LeJeune Road, Miami, Florida U.S.A. 33126 URL http://www.amweld.org

1.2.8 AWWA - American Water Works Association, 6666 W. Quincy Avenue, Denver, Colorado, U.S.A. 80235 URL http://www.awwa.org

1.2.9 CGSB - Canadian General Standards Board, Place du Portage, Phase III, 6B1, 11 Laurier Street, Hull, Quebec K1A 1G6 URL http://w3.pwgsc.gc.ca/cgsb

1.2.10 CNLA - Canadian Nursery Landscape Association, RR #4, Stn. Main, 7856 Fifth Street, Milton, Ontario. L9T 2X8 URL http://www.canadanursery.com

1.2.11 CSA - Canadian Standards Association International, 178 Rexdale Blvd., Toronto, Ontario M9W 1R3 URL http://www.csa-international.org

1.2.12 CSPI - Corrugated Steel Pipe Institute, 201 Consumers Road, Suite 306, Willowdale, Ontario M2J 4G8

1.2.13 CUFCA Canadian Urethane Foam Contractor's Association

1.2.14 EC - Environment Canada, Conservation and Protection, Ottawa, Ontario KIA 0H3 URL http://www.ec.gc.ca

1.2.15 EEMAC - Electrical and Electronic Manufacturers' Association of Canada, 5800 Explorer Drive, Suite 200, Mississauga, Ontario L4W 5K9 URL http://www.electrofed.ca

1.2.16 EIMA EIFS Industry Manufacturer's Association, 3000 Corporate Center Drive, Suite 270, Morrow, Georgia U.S.A. 30260 URL http://www.eifsfacts.com

1.2.17 FCC - Fire Commissioner of Canada, Place du Portage, Phase II, 165 rue Hotel de Ville, Hull Quebec K1A 0J2 URL http://www.hrdc-drhc.gc.ca

1.2.18 IEEE - Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York U.S.A. 10017 URL http://www.ieee.org

1.2.19 MSS - Manufacturers Standardization Society of the Valve and Fittings Industry, 127 Park Street, N.E., Vienna, Virginia U.S.A.22180

1.2.20 NEMA - National Electrical Manufacturers Association,1300 N. 17th Street, Suite 1847, Rosslyn, Virginia 22209 URL http://www.nema.org

1.2.21 NFPA - National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101Quincy, Massachusetts, U.S.A. 02269-9101 URL http://www.nfpa.org

1.2.22 NRC - National Research Council, Montreal Road, Ottawa, Ontario K1A 0S2 URL http://www.nrc.gc.ca

1.2.23 SCC - Standards Council of Canada, 200 Albert Street, Suite 2000, Ottawa, Ontario K1P 6N7 URL http://www.scc.ca

1.2.24 SSPC - The Society for Protective Coatings, 40 24th Street, Pittsburgh, Pennsylvania 15222-4656 URL http://www.sspc.org

1.2.25 UL - Underwriters' Laboratories, 333 Pfingsten Road, Northbrook, Illinois, U.S.A. 60062 URL http://www.ul.com

1.2.26 ULC - Underwriters' Laboratories of Canada, 7 Crouse Road, Toronto, Ontario M1R 3A9 URL http://www.ulc.ca

1.3 Reference Standards

1.3.1 Within the text of the specifications, reference may be made to the following standards:

1.3.3.1 ACI:

ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.

1.3.3.2 ANSI:

ANSI B16.1, Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.
ANSI B18.2.1, Square and Hex Bolts and Screws, Inch Series.
ANSI B18.2.2, Square and Hex Nuts (Inch Series).
ANSI B18.6.4 Screws, Tapping and Metallic Drive, Inch Series, Thread Forming and Cutting.

1.3.3.3 ANSI/ACI:

ANSI/ACI 117, Tolerances for Concrete Construction and Materials.
ANSI/ACI 315, Details and Detailing of Concrete Reinforcement.
ANSI/ACI 347, Concrete Formwork.

1.3.3.4 ANSI/ASTM:

ANSI/ASTM D638M, Test Method for Tensile Properties of Plastic (Metric).

1.3.3.5 ANSI/AWWA:

ANSI/AWWA B300, Hypochlorites.
ANSI/AWWA B301, Water Treatment - Liquid Chlorine.
ANSI/AWWA C104/A21.4, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
ANSI/AWWA C105/A21.5, Polyethylene encasement for Ductile-Iron Piping for Water and Other liquids.
ANSI/AWWA C110/A21.10, Ductile-Iron and Gray Iron Fittings, 3 inches through 48 inches for Water and Other Liquids.
ANSI/AWWA C111/A21.11, Rubber Gasket Joints for Ductile-Iron and Gray Iron Pressure Pipe and Fittings.
ANSI/AWWA C150 Thickness Design of Ductile-Iron Pipe.
ANSI/AWWA C151/A21.51, Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand Lined Molds for Water or Other Liquids.
ANSI/AWWA C153/A21.53, Ductile-Iron Compact Fittings, 3 inches through 16 inches, for Water and Other Liquids.
ANSI/AWWA C200, Water Pipe 6 inches and Larger, Steel.
ANSI/AWWA C203, Coal Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape-Hot Applied.

ANSI/AWWA C205, Cement Mortar Protective Lining and Coating for Steel Water Pipe - 4 inches and larger- Shop Applied.
ANSI/AWWA C206, Field Welding of Steel Water Pipe.
ANSI/AWWA C207, Steel Pipe Flanges for Waterworks Service, 4 inches through 144 inches.
ANSI/AWWA C208, Fabricated Steel Water Pipe Fittings, Dimensions for.
ANSI/AWWA C210, Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines.
ANSI/AWWA C301, Prestressed Concrete Pressure Pipe Steel Cylinder Type for Water and Other Liquids.
ANSI/AWWA C303, Reinforced Concrete Pressure Pipe Steel Cylinder Type, Pretensioned for Water and Other Liquids.
ANSI/AWWA C500, Gate Valves for Water and Sewage Systems.
ANSI/AWWA C502, Dry-Barrel Fire Hydrants.
ANSI/AWWA C504, Butterfly Valves.
ANSI/AWWA C509, Resilent-Seated Gate Valves for Water and Sewerage Systems.
ANSI/AWWA C600, Installation of Ductile-Iron Water Mains, and their Appurtenances.
ANSI/AWWA C602, Cement Mortar Lining of Water Pipelines - 100 mm and larger - In Place.
ANSI/AWWA C605, Underground Installation of PolyVinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
ANSI/AWWA C651, Disinfecting Watermains.
ANSI/AWWA C800, Underground Service Line Valves and Fittings.
ANSI/AWWA C900, Pressure Pipe, 4 inches through 12 inches for Water, Polyvinyl Chloride (PVC).
ANSI/AWWA C901, Polyethylene (PE) Pressure Pipe and Tubing, .5 inch through 3 inches for Water Service.
ANSI/AWWA C902, Polybutylene (PB) Pressure Pipe and Tubing, .5 inch through 3 inches for Water Service.
ANSI/AWWA C905, Pressure Pipe, 14 inches through 36 inches for Water, Polyvinyl Chloride (PVC).
ANSI/AWWA C906, Polyethylene (PE) Pressure Pipe and Fittings, 4 inches through 63 inches, for Water Distribution.
ANSI/AWWA C907, Standard for Polyvinyl Chloride (PVC) Pressure Fittings for Water - 4 inches through 8 inches (100mm through 200mm).
ANSI/AWWA E101, Vertical Turbine Pumps - Line Shaft and Submersible Types.

1.3.3.6 Asphalt Institute MS-2, Mix Design Method for Asphalt Concrete.

1.3.3.7 ASTM (A):

ASTM A36, Standard Specification for Structural Steel.
ASTM A48, Specification for Gray Iron Castings.
ASTM A53, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
ASTM A90, Test Method for Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
ASTM A120, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses.

ASTM A167 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
ASTM A283/A283M, Specification for Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars.
ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.
ASTM A313, Specification for Chromium-Nickel Stainless and Heat-Resisting Steel Spring Wire.
ASTM A307, Carbon Steel Bolts and Studs, 60,000 psi Tensile.
ASTM A325, Standard Specification for High-Strength Bolts for Structural Steel Joints.
ASTM A526M Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.
ASTM A585, Specification for Aluminum-Coated Steel Barbed Wire.
ASTM A591 Specification for Steel Sheet, Cold-Rolled, Electrolytic Zinc-Coated.
ASTM A606 Specification for Steel Sheet and Strip, Hot-Rolled and Cold-Rolled, High Strength, Low-Alloy, with Improved Atmospheric Corrosion Resistance.
ASTM A716, Specification for Ductile - Iron Culvert Pipe.
ASTM A746, Specification for Ductile - Iron Gravity Sewer Pipe.
ASTM A764, Specification for Steel Wire, Carbon, Drawn, Galvanized and Galvanized at Size for Mechanical Springs.
ASTM A775/A775M, Specification for Epoxy-Coated Reinforcing Steel Bars.
ASTM A792M Specification for Steel Sheet, Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

1.3.3.8 ASTM (B):

ASTM B32 Specification for Solder Metal.
ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.
ASTM B88M, Specification for Seamless Copper Water Tube.
ASTM B370 Specification for Copper Sheet and Strip for Building Construction.

1.3.3.9 ASTM (C):

ASTM C14M, Specification for Concrete Sewer, Storm Drain and Culvert Pipe.
ASTM C76M, Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.
ASTM C88, Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
ASTM C109, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inches or 50 mm Cube Specimens).
ASTM C117, Test Method for Material Finer than 0.075 mm Sieve in Mineral Aggregates by Washing.
ASTM C123, Test Method for Lightweight Pieces in Aggregate.
ASTM C127, Test Method for Specific Gravity and Absorption of Coarse Aggregate.
ASTM C128, Test Method for Specific Gravity and Absorption of Fine Aggregate.
ASTM C131, Test Method for Resistance to Degradation of Small Size Course Aggregate by Abrasion and Impact in the Los Angeles Machine.

ASTM C136, Method for Sieve Analysis of Fine and Coarse Aggregates.
ASTM C139, Specification for Concrete Masonry Units for Construction of Catchbasins and Manholes.
ASTM C171, Specification for Sheet Materials for Curing Concrete.
ASTM C309, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
ASTM C332, Specification for Lightweight Aggregates for Insulating Concrete.
ASTM C443M,Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
ASTM C478M, Specification for Precast Reinforced Concrete Manhole Sections.
ASTM C506M, Specification for Reinforced Concrete Arch Culvert, Storm Drain and Sewer Pipe.
ASTM C507M, Specification for Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe.
ASTM C827, Test Method for Early Volume Change of Cementitious Mixtures.
ASTM C902, Specification for Pedestrian and Light Traffic Paving Brick.
ASTM C939, Test Method for Flow of Grout for Preplaced-Aggregate Concrete.

1.3.3.10 ASTM (D):

ASTM D140, Method for Sampling Bituminous Materials.
ASTM D412, Test Method for Rubber Properties in Tension.
ASTM D413, Standard Test Methods for Rubber Property-Adhesion to Flexible Substrate.
ASTM D523 Test Method for Specular Gloss.
ASTM D624, Test Method for Rubber Property-Tear Resistance.
ASTM D638, Standard Test Method for Tensile Properties of Plastics.
ASTM D698, Test Method for Moisture Density Relations of Soils and Soil Aggregate Mixtures Using 2.49 kg Rammer and 304.8 mm Drop.
ASTM D746 Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
ASTM D792 Standard Test Method for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
ASTM D822 Recommended Practice for Operating Light - and water - Exposure Apparatus (Carbon-Arc Type) for Testing Paint, Varnish, Lacquer, and Related Products.
ASTM D882 Standard Test Methods for Tensile Properties of Thin Plastic Sheeting.
ASTM D995, Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
ASTM D1004, ASTM D 1004, Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting.
ASTM D1056, Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
ASTM D1203, ASTM D 1203, Standard Test Methods for Volatile Loss from Plastics Using Activated Carbon Methods.
ASTM D1204, Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature.
ASTM D1238, Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.

ASTM D1248, Specification for Polyethylene Plastics Molding and Extrusion Materials.
ASTM D1557, Specification for Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures using 10 lb (4.54 kg) Rammer and 18 inch (457 mm) Drop.
ASTM D1559, Test Method Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.
ASTM D1593, Standard Specification for Nonrigid Vinyl Chloride Plastic Film Sheeting.
ASTM D1603, Standard Test Method for Carbon Black in Olefin Plastics.
ASTM D1693, Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics.
ASTM D1751, Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
ASTM D1752, Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
ASTM D1784, Standard Specification for Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds.
ASTM D1785, Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120.
ASTM D1790, Standard Test Method for Brittleness Temperature of Plastic Sheeting by Impact.
ASTM D1883, Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
ASTM D2241, Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe (SDR-PR).
ASTM D2310, Classification for Machine Made Reinforced Thermosetting Resin Pipe.
ASTM D2412, Standard Test Method for External Loading Properties of Plastic Pipe by Parallel-Plate Loading.
ASTM D2419, Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
ASTM D2466, Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
ASTM D2467, Socket-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
ASTM D2564, Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
ASTM D2657, Practices for Heat Joining Polyethylene Pipe and Fittings.
ASTM D2680, Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Polyvinyl Chloride (PVC) Composite Sewer Piping.
ASTM D2774, Practices for Underground, Installation of Thermosplastic Pressure Piping.
ASTM D2837, Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.
ASTM D2855, Recommended Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
ASTM D2992, Method for Obtaining Hydrostatic Design Basis for Reinforced Thermosetting Resin Pipe and Fittings.

ASTM D2996, Specification for Filament Wound Reinforced Thermosetting Resin Pipe.
ASTM D3034, Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings.
ASTM D3139, Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.
ASTM D3203, Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
ASTM D3212, Specification for Joints for Drain and Sewer Plastic Pipes using Flexible Elastomic Seals.
ASTM D3405, Specification for Joint Sealants, Hot Poured for Concrete and Asphalt Pavements.
ASTM D3803, Standard Specification for Flexible Poly (Vinyl Chloride) Plastic Sheeting for Pond, Canal and Reservoir Lining.
ASTM D4101, Standard Specification for Propylene Plastic Injection and Extrusion Materials.
ASTM D4218, Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique.
ASTM D4318, Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
ASTM D4491, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
ASTM D4595, Test Method for Tensile Properties by the Wide Width Strip Method.
ASTM D4716, Standard Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
ASTM D4751, Test Method for Determining the Apparent Opening Size of a Geotextile.
ASTM D4791, Test Method for Flat and Elongated Particles in Coarse Aggregate.
ASTM D5262, Standard Test Method for Evaluating the Unconfined Tension Creep Behaviour of Geosynthetics.

1.3.3.11 ASTM (E):

ASTM E11, Specification for Wire Cloth Sieves for Testing Purposes.
ASTM E1155M, Test Method for Determining Floor Flatness and Levelness Using the F-Number System.

1.3.3.12 ASTM (F):

ASTM F477, Specification for Elastomeric Seals (Gaskets) for joining Plastic Pipe.
ASTM F679, Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings.
ASTM F714, Polyethylene (PE) Plastic Pipe (SDR-DR) Based on Outside Diameter.
ASTM F794, Specification for Polyvinyl Chloride (PVC) Ribbed Gravity Sewer Pipe and Fittings based on Controlled Inside Diameter.

1.3.3.13 AWWA: (See ANSI/AWWA)

1.3.3.14 BNQ-3624-115, Thermal Plastic Pipe, Flexible Corrugated Tubing and Fittings for Soil Drainage.

1.3.3.15 CAN3 = CAN/CSA:

CAN3-B137.3, Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications.
CAN4-S543, Internal Lug, Quick-Connect Couplings for Fire Hose.
CAN3-B70, Cast Iron Soil Pipe and Fittings, and Means of Joining.
CAN3-G401, Corrugated Steel Pipe Products.

1.3.3.16 CAN4:

CAN4-S543, Internal Lug, Quick-Connect Couplings for Fire Hose.

1.3.3.17 CAN/CGA:

CAN/CGA-B149.1 Natural Gas Installation Code.

1.3.3.18 CAN/CSA = CAN3:

CAN/CSA-A5, Portland Cement.
CAN/CSA-A8, Masonry Cement.
CAN/CSA-A23.1, Concrete Materials and methods for Concrete Construction.
CAN/CSA-A23.2, Methods of Testing for Concrete.
CAN/CSA-23.5, Supplementary Cementing Materials.
CAN/CSA-A231.2, Precast Concrete Pavers.
CAN/CSA-A257 Series, Standards for Concrete Pipe.
CAN/CSA-A266.1, Air-Entraining Admixtures for Concrete.
CAN/CSA-A266.2, Chemical Admixtures for Concrete.
CAN/CSA-A266.4, Guidelines for the use of Admixtures in Concrete.
CAN/CSA-A362, Blending Hydraulic Cement.
CAN/CSA-A363, Cementitious Hydraulic Slag.
CAN/CSA-B182.1, Plastic Drain and Sewer Pipe and Pipe Fittings.
CAN/CSA-G30.18, Billet Steel Bars for Concrete Reinforcement.
CAN/CSA-G40.21, Structural Quality Steels.
CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
CAN/CSA-O80-Series, Wood Preservation.

1.3.3.19 CAN/CGSB:

CAN/CGSB-4.2, Textile Test Methods.
CAN/CGSB-8.1, Sieves Testing, Woven Wire.
CAN/CGSB-8.2, Sieves Testing, Woven Wire, Metric.
CAN/CGSB-16.1, Asphalts, Liquids Petroleum, for Road Purposes.
CAN/CGSB-16.2, Asphalts, Emulsified, Anionic Type, for Road Purposes.
CAN/CGSB-16.3, Asphalt Cements for Road Purposes.
CAN/CGSB-16.5, Asphalt, Emulsified, High Float Type, for Road Purposes.
CAN/CGSB-37.2, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
CAN/CGSB-37.5 Cutback Asphalt Plastic Cement.

CAN/CGSB-51.32 Sheathing, Membrane, Breather Type.
CAN/CGSB-93.1 Sheet, Aluminum Alloy, Prefinished, Residential.
CAN/CGSB-138.1, Fence, Chain Link, Fabric.
CAN/CGSB-138.2, Fence, Chain Link, Framework, Zinc-Coated, Steel.
CAN/CGSB-138.3,Fence, Chain Link - Installation.
CAN/CGSB-138.4, Fence, Chain Link, Gates.
CAN/CGSB-148.1, Methods of Testing Geotextiles and Geomembranes.

1.3.3.20 CAN/ULC-S520, Standard for Fire Hydrants.

1.3.3.21 CGSB:

CGSB 1-GP-12c, Standard Paint Colours.
CGSB 1-GP-59M, Enamel, Exterior Gloss Alkyd Type.
CGSB 1-GP-5M, Thinner, Petroleum Spirits, Low Flash (R/84).
CGSB 1-GP-71, Method of Testing Paints and Pigments.
CGSB 1-GP-74M, Paint, Traffic, Alkyd.
CGSB 1-GP-149M, Paint, Traffic, Reflectorized Alkyd, White and Yellow.
CGSB 1-GP-181M, Coating, Zinc-Rich, Organic, Ready Mixed.
CGSB 15-GP-1M, Calcium Chloride.
CGSB 41-GP-25M, Pipe, Polyethylene, for the Transport of Liquids.
CGSB 41-GP-29Ma, Tubing, Plastic, Corrugated, Drainage.
CGSB 51-GP-51M, Polyethylene Sheet for Using in Building Construction.

1.3.3.22 CSA:

CSA A60.1, Vitrified Clay Pipe.
CSA A60.3, Vitrified Clay Pipe Joints.
CSA A82.5, Structural Clay Non-Load-Bearing Tile.
CSA A82.56, Aggregate for Masonry Mortar.
CSA A257, Standards for Concrete Pipe.
CSA A257, Standards for Concrete Pipe.
CSA B111 Wire Nails, spikes and Staples.
CSA B137.0, Definitions, General Requirements, and Methods of Testing for Thermoplastic Pressure Piping.
CSA B1337.1,Polyethylene Pipe, Tubing and Fittings for cold Water Pressure Services.
CSA B137.2, PVC Injection Moulded Gasketed Fittings for Pressure Applications.
CSA B137.3, Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Application.
CSA B137.6, CPVC Pipe, Tubing and Fittings for Hot and Cold Water Distribution Systems.
CSA B137.7, Polybutylene (PB) Pipe for Cold Water Distribution Systems.
CSA B137.8, Polybutylene (PB) Pipe for Pressure Applications.
CSA B137.9, M91, Polyethylene / Aluminum / Polyethylene Composite Pressure Pipe.
CSA B137.16, Recommended Practice for the Installation of CPVC Piping for Hot and Cold Water Distribution Systems.
CSA B181.12, Recommended Practice for the Installation of PVC Drain, Waste and Vent Pipe Fittings.

CSA B182.1, Plastic Drain and Sewer Pipe and Pipe Fittings.
CSA B182.11, Recommended Practice for the Installation of Plastic Drain and Sewer Pipe and Pipe Fittings.
CSA B182.2, Large Diameter, Type PSM PVC Sewer Pipe and Fittings.
CSA B182.4, Large Diameter Ribbed PVC Sewer Pipe and Fittings.
CSA C22.1, Safety Standard for Electrical Installations.
CSA C22.2, Canadian Electrical Code, General Requirements.
CSA C22.3, Canadian Electrical Code Outside Wiring.
CSA G30.3, Cold Drawn Steel Wire for Concrete Reinforcement.
CSA G30.5, Welded Steel Wire Fabric for Concrete Reinforcement.
CSA G30.12, Billet-Steel Wire for Concrete Reinforcement.
CSA G30.14, Deformed Steel Wire for Concrete Reinforcement.
CSA G30.15, Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
CSA G30.16, Weldable Low Allow Steel Deformed Bars for Concrete Reinforcement.
CSA G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
CAN3-O188.0, Standard Test Methods for Mat-Formed Wood Particleboards and Waferboard.
CSA S157, Strength Design in Aluminum.
CSA S269.1, Falsework for Construction Purposes.
CSA S269.3, Formwork.
CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.
CSA W59, Welded Steel Construction (Metal Arch Welding).
CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.

2 PRODUCTS

(Not Applicable)

3 EXECUTION

(Not Applicable)

END OF SECTION 01420

1 GENERAL

1.1 General

1.1.1 During the progress of THE WORK, perform a sufficient number of tests and inspections to determine and demonstrate to the satisfaction of the Authorized Person that MATERIAL, PRODUCT and installation meet the specified requirements.

1.2 Inspection

1.2.1 Allow Authorized Person access to the Work. If part of the Work is in preparation at locations other than the Place of the Work, provide access to such work whenever it is in progress.

1.2.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by the Authorized Person's instructions, or by the law of the Place of the Work.

1.2.3 If the Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have the inspections or tests satisfactorily completed and make good such Work.

1.2.4 The Authorized Person may order, at the cost of the Contractor, any part of the Work to be examined if the Work is suspected to be not in accordance with the specifications. If, upon examination such work is found not in accordance with specifications, correct such Work and pay cost of examination and correction.

1.3 Independent Inspection Agencies

1.3.1 Unless otherwise directed in the project-specific Contract Documents, retain the services of an Independent Inspection/Testing Agency, acceptable to the Authorized Person, for the purpose of inspecting and/or testing portions of Work.

1.3.2 Provide equipment required for executing inspection and testing by the appointed agencies, unless directed otherwise in the project-specific Contract Documents.

1.3.3 Testing services for quality control include, but are not limited to, the following:

1.3.3.1 Sieve analysis of granular material and aggregates to be supplied to the work.

1.3.3.2 Mix designs for asphalt and concrete.

1.3.3.3 Maximum Dry (Standard Proctor) Density curves for backfill and approved borrow materials.

1.3.3.4 Compaction control tests for backfilling and road construction.

1.3.3.5 Asphalt and concrete testing as required and specified under other sections of the specifications.

1.3.4 The Authorized Person may retain and pay for the services of an independent testing agency for testing for quality assurance, for the City's purposes.

1.3.5 Employment of inspection/testing agencies by the Authorized Person does not relax the responsibility to perform Work in accordance with the Contract Documents.

1.3.6 If defects are revealed during inspection and/or testing, the independent testing agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by the Engineer or Authorized Person.

1.4 Access to Work

1.4.1 Allow inspection/testing agencies access to the Work, off site manufacturing and fabrication plants.

1.4.2 Co-operate to provide reasonable facilities for such access.

1.5 Procedures

1.5.1 Notify the appropriate agency and the Authorized Person in advance of the requirement for tests, in order that attendance arrangements can be made.

1.5.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in the Work.

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

1.6 Rejected Work

1.6.1 Remove defective Work, whether the result of poor workmanship, use of defective products or damage and whether incorporated in the Work or not, which has been rejected by the Authorized Person as failing to conform to the specifications. Replace or re-execute in accordance with the Specifications.

1.6.2 Rectify other Contractor's work damaged by such removals or replacements promptly.

1.7 Reports

1.7.1 Submit three copies of inspection and test reports to the Authorized Person.

1.8 Tests and Mix Designs

1.8.1 Furnish test results and mix designs as may be requested.

1.9 Mill Tests

1.9.1 Submit mill test certificates as required in the specification Sections.

2 PRODUCTS

(Not Applicable)

3 EXECUTION

(Not Applicable)

END OF SECTION 01450

1 GENERAL

1.1 Section 01510 specifies general requirements for temporary and construction facilities not incorporated into the final or permanent work. This section must be referenced to and interpreted in conjunction with other sections pertinent to the works described herein.

1.2 Installation and Removal

1.2.1 Provide temporary utilities and construction facilities in order to execute work expeditiously.

1.2.2 Remove from site all such work after use.

1.3 Dewatering

1.3.1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

1.4 Water Supply

1.4.1 When specified in the Contract Documents, provide continuous supply of potable water for work force use during construction.

1.5 Sanitary Facilities

1.5.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

1.5.2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.6 Temporary Power and Light

1.6.1 Provide temporary power during construction for temporary lighting and operating of power tools as required for constructing the Work.

1.6.2 Arrange for connection with appropriate utility company. Pay all costs for installation, maintenance and removal.

1.6.3 Electrical power and lighting systems installed under the Work may be used for construction requirements only with prior approval of the Authorized Person provided that guarantees are not affected.

1.7 Communication Facilities

1.7.1 When specified in the Contract Documents, provide and pay for temporary telephone and fax hook up necessary for own use and use of the Authorized Person or Engineer.

1.8 Site Storage/Loading

1.8.1 Confine work and operations to limits shown on drawings. Do not unreasonably encumber premises with products.

1.8.2 Do not load or permit to load any part of work with a weight or force that will endanger the work.

1.9 Construction Parking

1.9.1 Provide parking on site to the extent that it does not disrupt performance of Work.

1.9.2 Provide and maintain adequate access to project site.

1.9.3 Build and maintain temporary roads where indicated or directed by the Authorized Person and provide snow removal during period of the Work.

1.9.4 If authorized to use existing City roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

1.10 Security

1.10.1 Contractor is responsible to provide security personnel as required to guard site and contents of site after working hours and during holidays.

1.11 Site Offices

1.11.1 Provide offices for own use and that of the Engineer’s representative as required.

1.11.2 Provide appropriate first-aid personnel, facilities and supplies in accordance with Workers’ Compensation Board requirements.

1.11.3 Subcontractors may provide their own offices as necessary. Direct location of these offices.

1.12 Equipment, Tool and Materials Storage

1.12.1 Contractor to provide and maintain, in a clean and orderly condition, its own lockable weatherproof sheds for storage of tools, equipment and materials.

1.12.2 Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities.

1.13 Public Notice

1.13.1 Advise residents and other parties within the affected area of planned construction activities and schedule. Coordinate with and obtain the Authorized Person's approval before delivery or mailing of public notices.

1.14 Fire Protection

1.14.1 Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.

1.14.2 Comply with requirements of Clean Air Bylaw.

1.14.3 Burning rubbish and construction waste materials is not permitted on site.

2 PRODUCTS

(Not Applicable)

3 EXECUTION

(Not Applicable)

END OF SECTION 01510

1 GENERAL

1.1 Related Sections

1.1.1 Section 01353 – Traffic Control.

1.1.2 Section 01510 – Temporary Construction Facilities.

1.2 Installation and Removal

1.2.1 Provide temporary controls in order to execute the Work expeditiously.

1.2.2 Remove from site all such temporary controls after use.

1.3 Hoarding

1.3.1 Temporary site enclosures where required to be new 1.2 metre high snow fence wired to rolled steel "T" bar fence posts spaced at 2.4 metre on centre. Provide one lockable truck gate. Maintain fence in good repair.

1.3.2 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures

1.4 Guard Rails and Barricades

1.4.1 When excavating trenches in City Roads, walkways, and other City lands, authorization in writing must be given by the Authorized Person, or his designate, to allow excavations to remain open at the end of a day's operation.

1.4.2 All unattended open excavations must be encircled with bright orange plastic snow fencing and barricades with flashing amber lights. Signage, approved by the Authorized Person or his designate, shall be erected to advise the public traveling within the road, walkway , right-of-way or City lands, of the hazard.

1.4.3 Provide secure, rigid guard rails, concrete barriers or barricades around excavations exceeding 3 metres and open shafts.

1.5 Access to Site

1.5.1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to the Work.

1.5.2 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform the Work and protect the public as required under Section 01353 Traffic Control.

1.5.3 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.6 Protection for Off-Site and Public Property

1.6.1 Protect surrounding property from damage during performance of the Work.

1.6.2 Rectify all damage incurred as a result of construction operations.

1.7 Protection of Building Finishes

1.7.1 Provide protection for building finishes and equipment during performance of the Work.

1.7.2 Provide screens, covers, and hoardings as required to protect the buildings.

1.7.3 Rectify damage incurred due to lack of or improper protection.

2 PRODUCTS

(Not Applicable)

3 EXECUTION

(Not Applicable)

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1 GENERAL

1.1 Definitions

1.1.1 Stream is defined as per the Province of British Columbia Water Act *[RSBC 1996] CHAPTER 483*: "**"stream"** includes a natural watercourse or source of water supply, whether usually containing water or not, ground water, and a lake, river, creek, spring, ravine, swamp and gulch."

1.2 Environmental Impact Studies and Environmental Management Plans

1.2.1 When requested by Authorized Person, prepare an Environmental Impact Study. The Environmental Impact Study shall be carried out by a qualified professional as determined by the Authorized Person. The qualified professional, or professionals, may include a Professional Engineer, a Registered Professional Biologist, a Registered Professional Agrologist, Registered Professional Archeologist, or other professional specialist, licensed to practice in the Province of British Columbia.

1.2.2 An Environmental Impact Study may include, but is not limited to, a:
(i) fish and wildlife inventory;
(ii) fish and wildlife habitat inventory;
(iii) riparian vegetation assessment;
(iv) benthic study;
(v) terrestrial habitat study;
(vi) groundwater quality impact study;
(vii) leachate or gas migration study; or
(viii) archeological impact study.

1.2.3 Following review of the Environmental Impact Study, the Authorized Person will determine the requirement or need to prepare an Environmental Management Plan.

1.2.4 Prepare and Environmental Management Plan when work is within 50 metres of a stream.

1.2.5 An Environmental Management Plan:

(i) shall be prepared by a qualified profession(s) as determined by the Authorized Person;
(ii) shall be reviewed by all applicable federal and provincial agencies;
(iii) shall include prescriptive measures to be carried out by the Contractor, Owner or work crews, responsible for the works on-site or within streams.

1.2.6 Complete Works in accordance with the Environmental Work Plan.

1.3 Fires

1.3.1 All works performed under this Section must comply with the requirements of the Clean Air Bylaw No. 7232, 2000.

1.3.2 Comply with all regulations as required under provincial and federal government legislation.

1.3.3 Burning of land clearing debris, paper or wood products, noxious wastes, construction and demolition wastes, plastics, tar, oil, tires, garbage, refuse, rubbish on site is not permitted.

1.4 Disposal of Wastes

1.4.1 All works performed under this Section must comply with the requirements of the Soil Removal and Deposit Bylaw No. 7022, 1999.

1.4.2 Comply with all regulations as required under provincial and federal government legislation.

1.4.3 Do not bury land clearing debris, concrete or asphalt demolition materials, paper or wood products, hydrocarbons, noxious wastes, construction and demolition waste materials, plastics, tar, tires, garbage, sewage, or refuse.

1.4.4 Do not pump or dispose of organic wastes, hydrocarbons, salts, or volatile materials, such as, mineral spirits, oil or paint thinner into streams, drainage channels, storm or sanitary sewers or ditches. Such wastes shall be completely contained onsite and removed for disposal at facilities licensed to receive such wastes.

1.5 Drainage

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

1.5.2 Do not pump water containing silt or clay sediments, deleterious substances, suspended solids materials into streams, sewers or drainage systems. Install the appropriate sediment control systems in accordance with Section 1.5 – Work Adjacent to Streams.

1.5.3 Control disposal or runoff of water containing silt or clay sediments, suspended solid materials or other substances harmful to aquatic life habitat in accordance with all federal, provincial and local government regulations and guidelines.

1.6 Site Clearing and Plant Protection

1.6.1 Clearing and removal of trees is not permitted in areas and zoning districts designated under the Tree Protection Bylaw, City of Prince George Bylaw No. 6343. Perform clearing activity in compliance with the City of Prince George Bylaw No. 6343.

1.6.2 Protect trees and plants, including root structures, on adjacent properties and, where indicated on construction drawings, designated areas onsite.

1.6.3 Protect roots of designated trees to drip line during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

1.6.4 Minimize stripping of topsoil and vegetation.

1.6.5 Restrict tree removal to areas indicated or designated by City's Authorized Person.

1.7 Work Adjacent to Streams

1.7.1 No work within 30 metres of creeks, streams or waterways shall proceed without written authorization from federal and provincial regulatory agencies.

1.7.2 In accordance with the Official Community Plan, City of Prince George Bylaw No. 7281, riparian leave strips shall remain to protect fish and wildlife habitat.

1.7.3 Conduct an Environmental Impact Study as required.

1.7.4 Prepare an Environmental Management Plan as required.

1.7.5 Do not operate construction equipment within 30 metres of streams without approval of federal, provincial and local government authorities.

1.7.6 Do not use stream beds for borrow material or excavate need or in waterway beds without approval from Federal and/or Provincial authorities having jurisdiction.

1.7.7 Do not dump excavated fill, waste material or debris in streams.

1.7.8 Design and construct temporary crossings to minimize erosion to streams.

1.7.9 Do not skid logs or construction materials across streams.

1.7.10 Avoid spawning beds when constructing temporary crossings of streams.

1.7.11 Do not blast under water or within 100 m of indicated spawning beds.

1.8 Release of Chlorinated Water to Environment

1.8.1 Related Section: 02511 Water Mains.

1.8.2 Comply with all Federal and Provincial regulations.

1.8.3 Do not release chlorinated water into streams.

1.8.4 Release of chlorinated water into ditches, drainage channels, storm

sewers or sanitary sewers only when approved by Authorized Person and when supervised by representative of Authorized Person or Engineer. Water shall be de-chlorination in accordance with AWWA C651-99 prior to release.

1.9 Pollution Control

1.9.1 Provide and maintain temporary erosion and pollution control features.

1.9.2 Control emissions from equipment and plant to Provincial emission regulations and Provincial authority requirements.

1.9.3 Prevent sandblasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.

1.9.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

2 PRODUCTS

(Not Applicable)

3 EXECUTION

(Not Applicable)

END OF SECTION 01561

1 GENERAL

1.1 Section includes:

1.1.1 Field engineering survey services to measure and stake the site.

1.1.2 Survey services to establish and confirm invert measurements for the Work.

1.1.3 Recording of subsurface conditions found.

1.2 Qualifications of Construction Layout Surveyor

1.2.1 Qualified Professional Engineer, Engineer in Training, Certified Engineering Technologist or registered Land Surveyor, licensed to practice in British Columbia, unless otherwise approved by the Authorized Person.

1.3 Survey Reference Points

1.3.1 Locate, confirm and protect existing base horizontal and vertical control points prior to starting site work. Preserve permanent reference points during construction.

1.3.2 Make no changes or relocations without prior written notice to Engineer.

1.3.3 Report to Engineer when a reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

1.3.4 Replace lost or damaged control points in accordance with original survey control.

1.4 Integrated Control Survey Monuments and Legal Property Pins

1.4.1 Locate, confirm and protect existing integrated control survey monuments and legal survey property pins prior to starting site work. Preserve such monuments and property pins during construction.

1.4.2 Report to Engineer and Authorized Person when an integrated control survey monument or legal survey property pin is lost or destroyed, or requires temporary removal by a registered Land Surveyor licensed to practice in the Province of British Columbia because of necessary changes in grades or locations.

1.4.3 Reinstate or replace any and all integrated control survey monuments and legal survey property pins that are destroyed, moved or altered during construction of the Work. Reinstatement or replacement must be performed by a registered land surveyor licensed to practice in British Columbia. Make no changes or relocations without prior written notice to Engineer and Authorized Person.

1.5 Construction Layout Survey Requirements

1.5.1 Establish bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.

1.5.2 Establish lines and levels, locate and lay out, by instrumentation.

1.5.3 Stake for grading, fill and topsoil placement and landscaping features.

1.5.4 Stake slopes and berms.

1.5.5 Establish pipe invert elevations.

1.5.6 Stake batter boards for foundations.

1.5.7 Establish lines and levels for mechanical and electrical work.

1.6 Existing Services

1.6.1 Before commencing work, establish location and extent of service lines in area of Work and notify Engineer of findings.

1.6.2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by Engineer.

1.7 Records

1.7.1 Maintain a complete, accurate log of control and survey work as it progresses.

1.7.2 Record locations of maintained, re-routed and abandoned service lines.

1.7.3 On request of the Authorized Person, submit documentation to verify accuracy of field engineering work.

2 PRODUCTS

(Not Applicable)

3 EXECUTION

(Not Applicable)

END OF SECTION 01720

1 GENERAL

1.1 Related Sections

1.1.1 Section 01561 – Environmental Protection.

1.1.2 Section 02225 – Sitework Demolition and Removal.

1.1.3 Section 02721 – Granular Base.

1.1.4 Section 02723 – Granular Sub-base.

1.1.5 Section 02741 – Hot-Mix Asphalt Concrete Paving.

1.2 Special Requirements

1.2.1 All works performed under this Section must comply with the requirements of the Clean Air Bylaw No. 7232, 2000.

1.2.2 All works performed under this Section must comply with the requirements of the Soil Removal and Deposit Bylaw No. 7022, 1999.

1.2.3 Obtain necessary permits as required from Provincial and Federal government regulators and agencies.

1.3 Protection

1.3.1 Protect existing structures and pavement not designated for removal from damage. In event of damage, immediately replace or make repairs to approval of City.

2 PRODUCTS

(Not Applicable)

3 EXECUTION

3.1 Preparation

3.1.1 Prior to commencing removal operation, inspect and verify with City the areas, depths and lines of asphalt pavement to be removed.

3.2 Equipment

3.2.1 Cold milling, planing or grinding equipment with automatic grade controls to be capable of operating from a stringline, and capable of removing part of pavement surface to depths or grades indicated.

3.2.2 Reclaiming equipment to be capable pulverizing and blending of existing pavement and granular material.

3.3 Full Depth Reclamation

3.3.1 Pulverize existing asphalt pavement and underlying granular materials and blend to limits and depths indicated on approved Construction Drawings or established by Engineer in field.

3.3.2 After material has been processed, shape, grade and compact to lines, grades and depths shown on the drawings.

3.3.3 Apply succeeding granular material or asphalt pavement as indicated on the drawings.

3.4 Removal by Milling

3.4.1 Remove existing asphalt pavement to lines and grades indicated on approved Construction Drawings or established by Engineer in field.

3.4.2 Use equipment and methods of removal and hauling that do not damage or disturb underlying pavement.

3.4.3 Prevent contamination of removed asphalt pavement designated for reclamation by topsoil, underlying gravel or other materials.

3.4.4 Provide for suppression of dust generated by removal process. Comply with City of Prince George Clean Air Bylaw No. 7232, 2000.

3.5 Sweeping

3.5.1 Sweep remaining asphalt pavement surfaces clean of debris resulting from removal operations using rotary power brooms and hand brooming as required.

3.6 Finish Tolerances

3.6.1 Milled surfaces in areas where asphalt pavement is to be overlaid to be within +/-5 mm of grade specified but not uniformly high or low.

END OF SECTION 02226

1 GENERAL

1.1 Related Sections

1.1.1 Section 02231 – Clearing and Grubbing.

1.1.2 Section 02315 - Excavating, Trenching and Backfilling.

1.1.3 Section 02317 – Roadway Excavation, Embankment and Compaction.

1.2 Existing Conditions

1.2.1 Known underground and surface utility lines and buried objects as indicated on construction drawings or site plans are provided for guidance only. Follow procedures in Section 02315, Excavation, Trenching and Backfilling, to determine location of existing utility lines and buried objects prior to commencing work.

1.2.2 All works performed under this Section must comply with the requirements of the Soil Removal and Deposit Bylaw.

1.3 Protection

1.3.1 Protect existing fencing, trees, landscaping, natural features, bench marks, buildings, pavement, surface or underground utility lines which are to remain as directed by the Engineer. If damaged, restore to original or better condition unless directed otherwise.

1.3.2 Maintain access roads to prevent accumulation of mud, dirt, sand, gravel or debris on City roads, City lands or Provincial Highways.

2 PRODUCTS

2.1 Materials

2.1.1 Fill material: In accordance with Section 02315 - Excavating, Trenching and Backfilling.

2.1.2 Excavated or graded material existing on site may be suitable to use as fill for grading work if approved by the Engineer.

3 EXECUTION

3.1 Stripping of Topsoil

3.1.1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected as determined by the Engineer.

3.1.2 Commence topsoil stripping of areas as indicated after area has been cleared of brush, weeds and grasses.

3.1.3 Strip topsoil to depths as indicated. Avoid mixing topsoil with subsoil.

3.1.4 Stockpile for reuse as required. Stockpile height not to exceed 2 m unless approved by the Engineer. Separate stockpile from top of excavation in accordance with WCB regulation.

3.2 Grading

3.2.1 Rough grade to levels, profiles, and contours allowing for surface treatment as shown in the lot grading plan.

3.2.2 Rough grade to depths below finish grades as indicated on the drawings.

3.2.3 Rough grade to 1V:50H minimum slope away from existing and proposed buildings.

3.2.4 Grade ditches to depth as indicated on the construction drawings.

3.2.5 Prior to placing fill over existing ground, scarify surface to depth of 150 mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

3.2.6 Unless otherwise indicated on the construction drawings or directed by the Engineer, compact filled and disturbed areas to maximum dry density to ASTM D698, as follows:

3.2.6.1 85% under landscaped areas.

3.2.6.2 95% under paved and walk areas.

3.2.6.3 95% in all areas where fill depth exceeds 500 mm.

3.2.7 Do not disturb soil within branch spread of trees or shrubs to remain.

3.3 Testing

3.3.1 Inspection and testing of soil compaction to be carried out by qualified independent testing laboratory.

3.3.2 Submit testing procedure and frequency of tests to City for review.

3.4 Surplus Material

3.4.1 Remove surplus material and material unsuitable for fill, grading or landscaping off site in conformance with the Soil Removal and Deposit By-Law.

1 GENERAL

1.1 Related Sections

1.1.1 Section 02225 – Sitework Demolition and Removal.

1.1.2 Section 02231 – Clearing and Grubbing.

1.1.3 Section 02311 – Lot and Site Grading.

1.1.4 Section 02316 – Rock Removal.

1.1.5 Section 02317 – Road Excavation, Trenching and Backfilling

1.1.6 Section 02511 – Water Mains.

1.1.7 Section 02530 – Sanitary Sewage.

1.1.8 Section 02531 – Sewage Force Mains.

1.1.9 Section 02630 – Storm Sewer.

1.2 Definitions

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

1.2.1.1 Rock: any solid material in excess of 1.0 m^3 and which cannot be removed by means of heavy duty mechanical excavating equipment having a 0.95 to 1.15 m^3 bucket. Frozen material not classified as rock.

1.2.1.2 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.

1.2.2 Waste material: excavated material unsuitable for use in work

1.2.3 Surplus material: excavated material that is suitable for use but surplus to project requirements.

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

1.2.5 Subgrade elevation: the elevation immediately below the road pavement structure or the topsoil, or the elevation of the base of an excavation for a building foundation or other structure.

1.2.6 Unsuitable Materials:

1.2.6.1 Weak and compressible materials including organics, peat, etc. under excavated areas.

1.2.6.2 Frost susceptible materials under excavated areas.

1.2.7 Unshrinkable fill: weak mixture of Portland cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.3 Protection of Existing Features

1.3.1 Existing buried utilities and structures.

1.3.1.1 Right of way and easement boundaries, and the size, depth and location of existing utilities and structures as shown on Construction Drawings are for guidance only. Completeness and accuracy not guaranteed.

1.3.1.2 Prior to commencing any excavation work, notify the applicable owner or utility authorities, and establish the location and state of use of buried utility works and structures. Retain utility locator consultant as required to assist in locating buried utility works and structures. Clearly mark such locations to prevent disturbance during work.

1.3.1.3 Confirm locations of buried utilities by careful test excavations.

1.3.1.4 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered or shown on Drawings.

1.3.1.5 Where utility lines or structures exist in area of excavation, obtain direction of the applicable utility authority or owner before removing or re-routing.

1.3.1.6 Record location of maintained, re-routed and abandoned underground lines.

1.3.2 Existing buildings and surface features.

1.3.2.1 Prior to beginning the work, conduct, with the Engineer, a condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks and paving, survey bench marks and monuments which may be affected by the work. Notify the Director, or his designate, a minimum of 24 hours in advance to allow the City, at its discretion, to attend the condition survey.

1.3.2.2 Protect existing buildings and surface features which may be affected by work from damage while work is in progress and repair damage resulting from work.

1.4 Shoring, Bracing and Underpinning

1.4.1 Engage services of a qualified professional engineer who is registered or licensed in Province of British Columbia to design and inspect cofferdams, shoring, bracing and underpinning required for work.

1.4.2 Submit design and supporting data at least 2 weeks prior to commencing work.

1.4.3 Trench shoring to be designed and installed in accordance with the regulations of the Workers Compensation Act of British Columbia.

1.4.4 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in province of British Columbia.

1.4.5 Sides of trenches or other excavations to be adequately supported. Trench stability and safety procedures to meet or exceed minimum requirements of "Accident Prevention Regulations" current issue of the Workers' Compensation Board of British Columbia. All works to be carried out in strict compliance with above mentioned regulations.

1.4.6 Professional engineer responsible for design and inspection of temporary structures to submit proof of insurance coverage for professional liability except where engineer is employee of the Contractor, in which case the Contractor shall submit proof that work by the professional engineer is included in the Contractor's insurance coverage.

2 PRODUCTS

2.1 Type 1 and Type 2 Fill: properties to Section 02701 - Aggregates: General and the following requirements:

2.1.1 Crushed, pit run or screened stone, gravel or sand.

2.1.2 Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1.

2.1.3 Type 1 Fill to meet requirements for granular base material described in Section 02701 - Aggregates: General.

2.1.4 Type 2 Fill to meet requirements for granular subbase material described in Section 02701 - Aggregates: General.

2.2 Type 3 Fill: selected material from excavation or other sources, approved by City for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

2.3 Unshrinkable fill: proportioned and mixed to provide:

2.3.1 Maximum compressive strength of 1.0 MPa at 28 days.

2.3.2 Maximum Portland Cement content of 25 kg/ m^3.

2.3.3 Minimum strength of 0.4 MPa at 24 h.

2.3.4 Concrete aggregates: to CAN/CSA-A23.1.

2.3.5 Portland Cement: Type 10.

2.3.6 Slump: 160 to 200 mm.

3 EXECUTION

3.1 Site Preparation

3.1.1 Remove all trees, stumps, brush, weeds, grasses and accumulated debris from site as specified in Section 02231.

3.1.2 Remove obstructions, ice and snow from surfaces to be excavated within limits indicated.

3.1.3 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.1.4 Strip topsoil after area has been cleared and stockpile in locations as shown on Contract Drawings or directed by the Engineer. Stockpile height not to exceed 2 m. Avoid mixing topsoil with subsoil. Dispose of unused topsoil as directed by The Engineer. Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.

3.1.5 Comply with requirements of Soil Removal and Deposit Bylaw.

3.2 Stockpiling

3.2.1 Stockpile fill materials in areas designated by the Engineer. Stockpile granular materials in manner to prevent segregation.

3.2.2 Protect fill materials from contamination.

3.3 Cofferdams, Shoring, Bracing And Underpinning

3.3.1 Obtain permits from federal and provincial government authorities having jurisdiction for temporary diversion of water course.

3.3.2 Construct temporary works to depths, heights and locations as approved by the Engineer.

3.3.3 During backfill operation:

3.3.3.1 Unless otherwise indicated or directed by the Director, or his designate, remove sheeting and shoring from excavations.

3.3.3.2 Do not remove bracing until backfilling has reached respective levels of such bracing.

3.3.3.3 Pull sheeting in increments that will ensure compacted backfill is maintained at an elevation at least 500 mm above toe of sheeting.

3.3.3.4 When sheeting is required to remain in place, cut off tops at elevations as indicated.

3.3.4 Upon completion of substructure construction:

3.3.4.1 Remove cofferdams, shoring and bracing.

3.3.4.2 Remove excess materials from the site to designated areas in accordance with the Soil Removal and Deposit Bylaw and restore water courses as indicated and as directed by the Engineer.

3.4 Dewatering And Heave Prevention

3.4.1 Keep excavations free of water while work is in progress.

3.4.2 Submit for the Engineer's and the City's review details of proposed dewatering or heave prevention methods, such as dikes, well points, and sheet pile cut-offs.

3.4.3 Avoid excavation below groundwater table if quick condition or heave is likely to occur. Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.

3.4.4 Protect open excavations against flooding and damage due to surface run-off.

3.4.5 Dispose of water in a manner not detrimental to the environment, fish habitat, public and private property, or any portion of work completed or under construction.

3.4.6 Surface drainage: Provide suitable temporary ditches or other approved means of handling drainage prior to excavation and during construction to protect construction area, adjacent properties and other affected properties. Provide siltation controls to prevent erosion and to protect natural watercourses or existing municipal drainage facilities.

3.4.7 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, water courses or drainage areas.

3.5 Excavation

3.5.1 Excavation to grade: excavate trenches to allow pipe to be laid to alignment and grades required with allowance for specified pipe bedding.

3.5.2 Excavation must not interfere with normal 45^{o} splay of bearing from bottom of any footing.

3.5.3 Do not disturb soil within branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp axe or saw.

3.5.4 For trench excavation, unless otherwise authorized by the City in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave trench open at the end of a day's operation. Barricade excavated areas in accordance with Section 01560, Temporary Barriers and Enclosures.

3.5.5 Dispose of surplus and unsuitable excavated material in approved location off site in accordance with the Soil Removal and Deposit Bylaw.

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

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

3.5.8 Notify the Engineer when bottom of excavation is reached.

3.5.9 Obtain the Engineer approval of completed excavation.

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

3.5.11 Correct unauthorized over-excavation as follows:

3.5.11.1 Fill under bearing surfaces and footings with fill concrete.

3.5.11.2 Fill under other areas with Type 2 Fill compacted to not less than 95 % of maximum dry density.

3.5.12 Hand trim, make firm and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil. Clean out rock seams and fill with concrete mortar or grout to approval of the Engineer.

3.6 Fill Types and Compaction

3.6.1 Fill types and minimum compaction requirements for fill, trench backfill and backfill of excavations for works within roads, walkways and rights-of-way are provided below. With the approval of the Director, or his designate, recommended fill types and minimum compaction requirements for specific projects within existing and proposed roads, walkways and rights-of-way, provided by a Professional Engineer registered in the Province of British Columbia with expertise in the field of geotechnical engineering, may supercede the requirements listed below. Compaction densities are percentages of maximum densities obtained from ASTM D698.

3.6.1.1 Boulevards, rights-of-way and easements: Type 3 Fill to a minimum 90% to subgrade level.

3.6.1.2 Roads, lanes, driveway restorations, shoulders, re-shaped ditches, sidewalks and walkways : Type 3 Fill or Type 2 Fill to a minimum 95% to subgrade level.

3.6.1.3 Use caution in pipe zone to ensure no damage to pipe.

3.6.2 Fill types and minimum compaction requirements are specified below for various works and structures in the absence of site specific recommendations provided by a Professional Engineer registered in the Province of British Columbia with expertise in geotechnical engineering. Compaction densities are percentages of maximum densities obtained from ASTM D698:

3.6.2.1 Exterior side of perimeter building walls: unless otherwise indicated on construction drawings, use Type 3 Fill to subgrade level. Compact to 95%.

3.6.2.2 Within chamber or structure area: use Type 2 Fill to underside of base course for floor slabs. Compact to 98%.

3.6.2.3 Under concrete slabs: provide 150 mm compacted thickness of Type 1 Fill. Compact base course to 100%.

3.6.2.4 Retaining walls: unless indicated otherwise, use Type 2 Fill to subgrade level on high side for minimum 500 mm from wall and compact to 95%. For remaining portion, use Type 3 Fill compacted to 95%.

3.6.2.5 Place unshrinkable fill in areas as indicated on construction drawings.

3.7 Bedding and Surround of Underground Services

3.7.1 See applicable sections under clause 1.1 for bedding, pipe laying, and granular surround requirements.

3.7.2 Place bedding and surround material in unfrozen condition.

3.7.3 Concrete thrust blocks, encasement or protection: where specified or required by the Engineer, City or utility authority, provide concrete encasement of pipe or slab protection as shown on Contract Drawings. Do not place backfill material until concrete has taken its initial set and in no case less than 1 hour.

3.7.4 Anchor blocks: where specified or required by the Engineer provide anchor blocks as shown on Contract Drawings. All concrete anchor blocks to be installed at least 150 mm into undisturbed ground on bottom and sides of trench.

3.8 Backfilling

3.8.1 Do not proceed with backfilling operations until the Engineer has inspected and approved installations.

3.8.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

3.8.3 Do not use backfill material that is frozen or contains ice, snow or debris.

3.8.4 Place backfill material above excavation bottom or pipe surround zone in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

3.8.5 Backfill around manhole, catchbasin and valve chamber installations.

3.8.6 Place unshrinkable fill in areas as indicated. Consolidate and level unshrinkable fill with internal vibrators.

3.8.7 Do not backfill around or cover cast-in-place concrete within 24 hours after placing of concrete. If concrete is for structural purposes, ensure by means of compressive strength testing, that concrete meets the design strength requirements as specified by the structural engineer responsible for the design of the structure prior to backfilling. If trenching cannot be left open in emergency situations, backfill may be placed under the direction of the Engineer or Authorized Person.

3.9 Restoration

3.9.1 Upon completion of work, remove waste materials and debris, trim slopes, and correct defects as directed by the Engineer and to the satisfaction of the Director, or his designate.

3.9.2 Provide for sediment and erosion control on surface of backfilling. In non-road surface areas prepare surface to receive vegetation and re-vegetate surface using seeding, hydro-seeding or sod.

3.9.3 Replace topsoil as indicated or as directed by the Engineer and to the satisfaction of the Director or his designate.

3.9.4 Reinstate lawns, boulevards, concrete curbs and gutters, asphalt and concrete pavement surfaces and sidewalks to the elevation, dimensions and material type which existed before excavation.

3.9.5 Clean and reinstate areas affected by work as directed by the Engineer and to the satisfaction of the Director or his designate.

3.9.6 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.

1 GENERAL

1.1 Related Sections

1.1.1 Section 01353 – Traffic Control.

1.1.2 Section 02071 – Geogrid Soil Reinforcement.

1.1.3 Section 02072 - Geotextiles.

1.1.4 Section 02315 – Excavation, Trenching and Backfilling

1.1.5 Section 02316 – Rock Removal.

1.1.6 Section 02311 – Lot and Site Grading.

1.1.7 Section 02721 – Granular Base.

1.1.8 Section 02723 – Granular Sub-base.

1.2 Special Requirements

1.2.1 All works performed under this Section must comply with the requirements of the Soil Removal and Deposit Bylaw.

1.3 Definitions

1.3.1 Common Excavation: excavation of materials that are not Rock Excavation or Stripping.

1.3.2 Rock Excavation: rock is any solid material in excess of 1.0 m^3 and which cannot be removed by means of heavy duty mechanical excavating equipment having a 0.95 to 1.15 m^3 bucket. Frozen material not classified as rock.

1.3.3 Stripping: excavation of organic material covering original ground.

1.3.4 Embankment: material derived from usable excavation and placed above original ground or stripped surface up to subgrade elevation.

1.3.5 Waste Material: material such as organics, peat, etc. unsuitable for use in embankment, and embankment foundation

1.3.6 Surplus Material: excess excavated material surplus to project volume requirements.

1.3.7 Borrow Material: material obtained from areas outside right-of-way or project site and required for construction of embankments or for other portions of work.

1.3.8 Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

1.3.9 Pavement structure: combination of layers of unbound or stabilized granular sub-base, base, and asphalt or concrete surfacing.

1.3.10 Subgrade elevation: elevation immediately below pavement structure.

1.4 Requirements of Regulatory Agencies

1.4.1 Adhere to regulations of authority having jurisdiction if blasting is required.

1.4.2 Adhere to Provincial and National Environmental requirements if potentially toxic materials are involved.

2 PRODUCTS

2.1 Embankment materials require approval by the Engineer.

2.2 Material used for embankment not to contain more than 3% organic matter by mass, frozen lumps, weeds, sod, roots, logs, stumps or any other unsuitable material.

2.3 Borrow material:

2.3.1 Type 3 Fill as specified under Section 02315 - Excavation, Trenching and Backfilling.

2.3.2 All borrow areas to comply with requirements of Soil Removal and Deposit Bylaw.

3 EXECUTION

3.1 Compaction Equipment

3.1.1 Compaction equipment must be capable of obtaining required densities in materials on project. Equipment that does not achieve specified densities must be replaced or supplemented.

3.2 Water Distributors

3.2.1 Apply water with equipment capable of uniform distribution.

3.3 Excavating

3.3.1 General:

3.3.1.1 Notify Engineer whenever waste materials are encountered and remove to depth and extent directed.

3.3.1.2 Subcut 500 mm below subgrade in cut sections unless otherwise directed. Compact top 150 mm below subcut to minimum 95% maximum dry density, ASTM D 698 (AASHTO T99). Replace with approved embankment material and compact.

3.3.1.3 Where subgrade is on transition from excavation to embankment treat ground slopes at grade points as directed by the Engineer.

3.3.2 Drainage:

3.3.2.1 Maintain profiles, crowns and cross slopes to provide good surface drainage.

3.3.2.2 Control sediment and erosion in areas where runoff may enter streams, storm or sanitary sewer systems, ditches or drainage channels.

3.3.2.3 Provide ditches as work progresses to provide drainage.

3.3.2.4 Construct interceptor ditches as shown on plans or as directed before excavating or placing embankment in adjacent area.

3.3.3 Borrow Excavation:

3.3.3.1 Borrow areas shall be identified by the Developer, Owner or the Engineer on the construction drawings. The necessary designations, permits, etc. shall be in place and fees paid as required by the Soil Removal and Deposit Bylaw prior to beginning removal of material from the borrow area.

3.3.3.2 Suitable materials removed from right-of-way excavations shall be completely used in embankments before taking material from borrow areas.

3.3.3.3 Borrow areas shall be managed and maintained to prohibit any release of sediment or deleterious substances into water courses, ditches, groundwater, roads, storm sewers or culverts. The Developer, Owner, or Soil Permitee may be required, at the Director's discretion, to retain a qualified biologist or other qualified environmental consultant to ensure that water runoff from borrow areas is managed to the City's satisfaction and to the satisfaction of provincial and federal government agencies having jurisdiction.

3.3.3.4 Leave borrow pits in safe condition complying with requirements of Soil Removal and Deposit Bylaw.

3.4 Embankments

3.4.1 Where indicated or as directed by Engineer, scarify or bench existing slopes in side hill or sloping sections to ensure proper bond between new materials and existing surfaces. Obtain prior approval from Engineer of method to be used.

3.4.2 Break up or scarify existing road surface prior to placing embankment material.

3.4.3 Do not place material which is frozen nor place material on frozen surfaces except in areas authorized.

3.4.4 Maintain a crowned surface during construction to ensure ready run-off of surface water.

3.4.5 Drain low areas before placing materials

3.4.5.1 Place and compact to full width in layers not exceeding 200 mm loose thickness. Engineer may authorize thicker lifts if specified compaction can be achieved and if material contains more than 25% by volume stone and rock fragments larger than 100 mm.

3.4.6 Where material consists of rock:

3.4.6.1 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.

3.4.6.2 Carefully distribute rock material to fill voids with smaller fragments to form compact mass.

3.4.6.3 Fill surface voids at subgrade level with rock spalls or selected material to form an earth-tight surface.

3.4.6.4 Do not place boulders and rock fragments with dimensions exceeding 150 mm within 300 mm of subgrade elevation.

3.5 Subgrade Compaction

3.5.1 Break material down to sizes suitable for compaction and mix for uniform moisture to full depth of layer.

3.5.2 Compact each layer to minimum 95% maximum dry density, ASTM D 698 (AASHTO T99).

3.5.3 Add water or dry as required to bring moisture content of materials to level required to achieve specified compaction.

3.6 Finishing

3.6.1 Shape and compact entire roadbed to within 30 mm of design elevations but not uniformly high or low.

3.6.2 Finish back and side slopes of rock material to a neat and safe condition, true to line and grade. For cut slopes in bedrock steeper than 1:1, scale slope by removing loose fragments.

3.6.3 Remove rocks over 150 mm in any dimension from slopes and ditch bottoms.

3.6.4 Hand finish slopes that cannot be finished satisfactorily by machine.

3.6.5 Round top of backslope 1.5 m both sides of top of slope.

3.6.6 Trim and smooth, free of humps, sags and ruts, between constructed slopes and edge of clearing to provide drainage.

3.7 Protection

3.7.1 Maintain finished surfaces in condition conforming to this section until acceptance by Authorized Person.

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1 GENERAL

1.1 Related Sections

1.1.1 Section 02315 - Excavating, Trenching and Backfilling.

1.1.2 Section 02581 – Concrete Encased Duct Banks and Manholes.

2 PRODUCTS

2.1 PVC Ducts and Fittings

2.1.1 Rigid PVC duct: to CSA C22.2 No. 211.1, Type DB2/ES2, with moulded fittings, for direct burial, expanded flange ends. Nominal length: 6 m plus or minus 12 mm.

2.1.2 Rigid PVC split ducts

2.1.3 Rigid PVC bends, reducers, bell end fittings, plugs, caps, adaptors same product material as duct, to make complete installation.

2.1.4 Rigid PVC 90° and 45° bends.

2.1.5 Rigid PVC 5° angle couplings.

2.1.6 Expansion joints as required.

2.2 Solvent Weld Compound

2.2.1 Solvent cement for PVC duct joints.

2.3 Fibreglass Ducts

2.3.1 Fibreglass reinforced thermoset duct: to CSA C22.2, No. 211.3, type AG, watertight, underwater type.

2.3.2 Couplings, reducers, plugs, caps, adaptors, and supports to make a complete installation.

2.3.3 Expansion joints as required.

2.4 Plastic Polyethylene Pipe

2.4.1 Rigid plastic polyethylene pipe with approved couplings and fittings required to make a complete installation.

2.5 Cable Pulling Equipment

2.5.1 6 mm stranded nylon pull rope, tensile strength 5 kN.

2.6 Markers

2.6.1 Concrete type cable markers: with words: "cable", "joint" or "conduit" impressed in top surface, with arrows to indicate change in direction of duct runs.

3 EXECUTION

3.1 Installation

3.1.1 Install duct in accordance with manufacturer's instructions.

3.1.2 Clean inside of ducts before laying.

3.1.3 Ensure full, even support every 1.5 m throughout duct length.

3.1.4 Slope ducts with 1 to 400 minimum slope.

3.1.5 During construction, cap ends of ducts to prevent entrance of foreign materials.

3.1.6 Pull through each duct steel mandrel not less than 300 mm long and of diameter 6 mm less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign matter. Pull stiff bristle brush through each duct immediately before pulling-in cables.

3.1.7 In each duct install pull rope continuous throughout each duct run with 3 m spare rope at each end.

3.1.8 Install markers as required.

END OF SECTION 02582

1 GENERAL

1.1 Related Sections

1.1.1 Section 02315 – Excavating, Trenching and Backfilling.

1.1.2 Section 02631 – Manholes and Catch Basins.

1.2 Material Certification

1.2.1 Certification to be marked on pipe.

1.3 Scheduling Of Work

1.3.1 Schedule work to minimize interruptions to existing services and to maintain existing flow during construction.

1.3.2 Submit schedule of expected interruptions to City for approval and adhere to interruption schedule as approved by City.

2 PRODUCTS

2.1 Concrete Pipe

2.1.1 Non-reinforced circular concrete pipe and fittings: to CAN/CSA-A257, ASTM C14M, Class as indicated, designed for flexible rubber gasket joints to ASTM C443M.

2.1.2 Reinforced circular concrete pipe and fittings: to CAN/CSA-A257, ASTM C76M, strength classification as indicated, designed for flexible rubber gasket joints to ASTM C443M.

2.1.3 Lifting holes:

2.1.3.1 Pipe 900 mm and less diameter: no lift holes.

2.1.3.2 Pipe greater than 900 mm diameter: lift holes not to exceed two in piece of pipe.

2.1.3.3 Provide pre-fabricated plugs to effectively seal lift holes watertight after installation of pipe.

2.2 Corrugated Steel Pipe

2.2.1 Asphalt-coated corrugated steel pipe and couplers: to CAN3-G401.

2.3 Spiral Rib Steel Pipe

2.3.1 Acceptable product: Armtec Ultra Flo.

2.4 Plastic Pipe

2.4.1 Type PSM Poly Vinyl Chloride (PVC): to ASTM D3034, CAN/CSA-B182.2.

2.4.1.1 Standard Dimensional Ratio (SDR): 35 unless noted otherwise.

2.4.1.2 Locked-in gasket and integral bell system.

2.4.1.3 Nominal lengths: 4 m.

2.4.2 Large diameter, ribbed PVC sewer pipe and fittings: to CAN/CSA B182.4, ASTM F794.

2.5 Service Connections and Catch Basin Leads

2.5.1 Catch Basin Leads: Asphalt-coated corrugated steel pipe and couplers to CAN3-G401.

2.5.2 Service Connections: (Allowed only when used with corrugated steel pipe mains) asphalt-coated corrugated steel pipe and couplers to CAN3-G401.

2.5.3 Service Connections: Type PSM Poly Vinyl Chloride: to CAN/CSA-B182.2.

2.5.3.1 Standard Dimensional Ratio (SDR): 35 for pipe 150 mm diameter and smaller.

2.5.3.2 Pipe larger than 150mm diameter to conform to requirements for mainline pipe.

2.6 Pipe Bedding and Surround Material

2.6.1 Granular material to Section 02701 – Aggregates: General.

2.6.2 Concrete mixes and materials for bedding, cradles, encasement, supports: to Section 03300 - Cast-in-Place Concrete.

2.7 Backfill Material

2.7.1 As specified in Section 02315 – Excavation, Trenching and Backfilling.

2.8 Joint Mortar

2.8.1 Portland cement: to CAN/CSA-A5, type 10.

2.8.2 Mortar: one part Portland cement to two parts clean sharp sand mixed with minimum amount of water to obtain optimum consistency for use intended. Do not use additives.

3 EXECUTION

3.1 Preparation

3.1.1 Clean pipes and fittings of debris and water before installation, and remove defective materials from site to approval of City.

3.2 Trenching

3.2.1 Do trenching work in accordance with Section 02223 - Excavating, Trenching and Backfilling.

3.2.2 Do not allow contents of any sewer or sewer connection to flow into trench.

3.2.3 Trench alignment and depth to approval of City prior to placing bedding material and pipe.

3.2.4 Water jetting of backfill under haunches of corrugated steel pipe may be permitted if recommended by manufacturer and approved by City.

3.3 Concrete Bedding and Encasement

3.3.1 Do concrete work in accordance with Section 03300 - Cast-in-Place Concrete. Place concrete to details as indicated or directed by City.

3.3.2 Position pipe on concrete blocks to facilitate placing of concrete. When necessary, rigidly anchor or weight pipe to prevent flotation when concrete is placed.

3.3.3 Do not backfill over concrete within 24 h after placing.

3.4 Granular Bedding

3.4.1 Place bedding in unfrozen condition.

3.4.2 Place granular bedding material in uniform layer[s] not exceeding 150 mm compacted thickness to depth as indicated.

3.4.3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe. Do not use blocks when bedding pipes.

3.4.4 Shape transverse depressions as required to suit joints.

3.4.5 Compact each layer full width of bed to at least 95% maximum density to ASTM D698.

3.4.6 Fill excavation below bottom of specified bedding adjacent to manholes or catch basins with compacted bedding material.

3.5 Installation

3.5.1 Lay and join pipe in accordance with manufacturer's recommendations and to approval of City.

3.5.2 Handle pipe using methods approved by City. Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.

3.5.3 Lay pipes on prepared bed, true to line and grade with pipe inverts smooth and free of sags or high points. Ensure barrel of each pipe is in contact with shaped bed throughout its full length.

3.5.4 Commence laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.

3.5.5 Do not exceed one half maximum joint deflection recommended by pipe manufacturer, unless otherwise approved by the Authorized Person.

3.5.6 Do not allow water to flow through pipes during construction except as may be permitted by City.

3.5.7 Whenever work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.

3.5.8 Install plastic pipe and fittings in accordance with CSA B182.11.

3.5.9 Joints:

3.5.9.1 Corrugated steel pipe:

i) Install gaskets on both sides of joints.
ii) Match corrugations or indentations of coupler band with pipe sections before tightening.
iii) Tap coupler firmly while tightening, to take up slack and ensure snug fit.
iv) Ensure bolts are inserted and tightened.

3.5.9.2 Concrete Pipe:

i) Install gaskets as recommended by manufacturer.
ii) Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
iii) Align pipes before joining.
iv) Maintain pipe joints free from mud, silt, gravel and other foreign material.
v) Avoid displacing gasket or contaminating with dirt or other foreign material. Remove disturbed or dirty gaskets; clean, lubricate and replace before joining is attempted.
vi) Complete each joint before laying next length of pipe.

vii) Minimize joint deflection after joint has been made to avoid joint damage.

viii) Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.

ix) Mortared joints:

a) Pipe interior: circular pipes 700 mm diameter and larger, and arch or elliptical pipe equivalent to 900 mm diameter or larger shall have interior gap between ends of adjacent pipes filled with mortar. Apply mortar minimum 7 days after backfilling has been completed to allow pipe settlement to occur. Finish interior surface of joints smooth.

b) Pipe exterior: for bell and spigot pipe, use mortar to seal outside of joints. Press and bed mortar into place. Allow mortar to set minimum of 1 h before backfilling.

3.5.9.3 Shrink wrap joints that have less than 3 m separation from existing or proposed water mains.

3.5.10 When any stoppage of work occurs, restrain pipes as directed by Engineer to prevent "creep" during down time.

3.5.11 Plug lifting holes with prefabricated plugs approved by Engineer, set in shrinkage compensating grout.

3.5.12 Cut pipes as required for special inserts, fittings or closure pieces, as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.

3.5.13 Make watertight connections to manholes and catch basins. Use shrinkage compensating grout when suitable gaskets are not available.

3.5.14 Use prefabricated saddles or approved field connections for connecting pipes to existing sewer pipes. Joint to be structurally sound and watertight.

3.5.15 Temporarily plug open upstream ends of pipes with removable watertight concrete, steel or plastic bulkheads.

3.6 Pipe Surround and Backfill

3.6.1 Place surround material in unfrozen condition.

3.6.2 Upon completion of pipe laying, and after Engineer has inspected pipe joints, surround and cover pipes as indicated.

3.6.3 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated. Do not dump material within 1 m of pipe.

3.6.4 Place layers uniformly and simultaneously on each side of pipe.

3.6.5 Compact each layer from pipe invert to mid height of pipe to at least 95% maximum density to ASTM D698.

3.6.6 Compact each layer from mid height of pipe to underside of backfill to at least 90% maximum density to ASTM D698.

3.6.7 Backfill above pipe zone to requirements of Section 02315 – Excavating, Trenching and Backfilling.

3.7 Undercrossing

3.7.1 Excavate working pit outside right-of-way to be crossed.

3.7.2 Excavate working pit to minimum of 0.5 m below lowest invert of encasing pipe.

3.7.3 Dewater excavation.

3.7.4 Dewater area of undercrossing.

3.7.5 Place encasing pipe to exact line and grade as indicated.

3.7.6 Install encasing pipe by jacking, boring or tunneling as indicated.

3.7.7 Ensure encasing pipe is not in tension.

3.7.8 Provide shop drawings showing proposed method of installation for sanitary sewer in undercrossing.

3.7.9 Insert sanitary sewer pipe into encasement pipe, in end with largest excavation opening after placement of leveling pad.

3.7.10 Use approved blocking method to guide sanitary sewer pipe in true alignment.

3.7.11 Join sanitary sewer pipe one length at time outside encasement pipe.

3.7.12 Couplings of sanitary sewer pipe: not to rest on levelling pad when carrier pipe is in position.

3.7.13 Install casing spacers and rubber end seals as indicated on construction drawings or directed by Engineer.

3.7.14 When directed by Engineer, place 20 MPa concrete cradle around sanitary sewer pipe after it is positioned. Cradle to be minimum of 225 mm and maximum of 300 mm above levelling pad.

3.7.15 When directed by Engineer, pressure grout remaining void with grout consisting of one part Portland cement and two parts clean washed sand with only sufficient amount of water added to allow placement. Do not install pressure grout until sanitary sewer pipe is secure against flotation. Do not use additives.

3.7.16 Do field testing before placing concrete cradle and grouting.

3.8 Service Connections and Catch Basin Leads

3.8.1 Service connections to main sewer: standard Tee or Wye fittings or approved saddles. Do not use break-in and mortar patch-type joints. Connection pipe not to extend into interior of main sewer.

3.8.2 Catch basin leads to be connected directly to manholes. Cement-mortar grout on interior and exterior of manhole and catchbasins to Section 02631.

3.8.3 Provide cleanout on service line at location indicated.

3.8.4 Plug service laterals with water tight caps or plugs as approved by City.

3.8.5 Place location marker at capped ends of unconnected service lines as shown on Standard Drawing S10. Each marker shall consist of 50 x 100 (nomimal) mm stake, 3.0 metres long, extending from pipe end at pipe level to 0.6 m above grade. Paint exposed portion of stake green with designation "D" in black.

3.9 Field Testing

3.9.1 Repair or replace pipe, pipe joint or bedding found defective.

3.9.2 When directed by City, draw tapered wooden plug with diameter of 50 mm less than nominal pipe diameter through sewer to ensure that pipe is free of obstruction.

3.9.3 Remove foreign material from sewers and related appurtenances by flushing with water.

3.10 Closed Circuit Television Inspections (CCTV)

3.10.1 Flush and clean debris form sanitary sewer gravity mains prior to CCTV inspections.

3.10.2 Perform inspection of installed sewers by CCTV camera and recording devices.

3.10.3 All units provided in records shall be in SI (metric) units.

3.10.4 Prepare CCTV recordings in DVD-R format using Water Resources Centre (WRc) inspection standards. CCTV technician to be WRc certified.

3.10.5 Recording shall be continuous for full length on section between manholes. Date of recording and stationing to be shown on the video image.

3.10.6 Repair all deficiencies in sewer and repeat television inspection.

3.10.7 Provide copy of sewer main testing video, in DVD-R format, to City after all deficiencies are corrected.

3.10.8 Provide CCTV report to City.

END OF SECTION 02630

1 GENERAL

1.1 Related Work

1.1.1 Section 02315 – Excavating, Trenching and Backfilling.

1.1.2 Section 02530 – Sanitary Sewage.

1.1.3 Section 02630 – Storm Sewer.

1.1.4 Section 03200 – Concrete Reinforcement

1.1.5 Section 03300 – Cast-in-Place Concrete.

1.2 Scheduling of Work

1.2.1 Schedule work to minimize interruptions to existing services and to maintain existing flow during construction.

1.2.2 Submit schedule of expected interruptions for approval and adhere to approved schedule.

2 PRODUCTS

2.1 Materials

2.1.1 Cement: to CAN/CSA-A5, type10.

2.1.2 Concrete to be minimum 21 MPa or as specified otherwise on Contract Drawings.

2.1.3 Concrete reinforcement: to Section 03200 - Concrete Reinforcement.

2.1.4 Precast manhole units: to ASTM C 478M, circular, complete with ladder rungs. Top sections flat slab top type with opening offset for vertical ladder installation.

2.1.5 Precast catch basin sections: to ASTM C 139.

2.1.6 Asphalt-coated corrugated steel pipe and couplers: to CAN3-G401

2.1.7 Joints: to be made watertight using rubber rings or bituminous compound.

2.1.8 Mortar:

2.1.8.1 Aggregate: to CSA A82.56.

2.1.8.2 Cement: to CAN/CSA-A8.

2.1.9 Ladder rungs: to CAN/CSA-G30.18, No. 25M billet steel deformed bars, hot dipped galvanized to CAN/CSA G164. Rungs to be safety pattern (drop step type).

2.1.10 Adjusting rings: to ASTM C478.

2.1.11 Concrete Brick: to CAN3-A165 Series.

2.1.12 Drop manhole pipe: to be same as sewer pipe.

2.1.13 Manhole lids: to be precast reinforced concrete designed to withstand H20 loading.

2.1.14 Frames, gratings, covers to details and dimensions as indicated on Detail Drawing.

3 EXECUTION

3.1 Excavation and Backfill

3.1.1 Excavate and backfill in accordance with Section 02315 - Excavating, Trenching and Backfilling.

3.1.2 Obtain approval of Engineer before installing manholes, catchbasins or other specified structures.

3.2 Concrete Work

3.2.1 Place concrete reinforcement in accordance with Section 03200 - Concrete Reinforcement.

3.2.2 Do concrete work in accordance with Section 03300 - Cast-in-Place Concrete.

3.2.3 Position metal inserts in accordance with dimensions and details as indicated.

3.3 Installation

3.3.1 Install units in accordance with details indicated, plumb and true to alignment and grade, concurrently with pipe laying.

3.3.2 Complete units as pipe laying progresses. Maximum of three units behind point of pipe laying will be allowed.

3.3.3 Dewater excavation to approval of Engineer and remove soft and foreign material before placing concrete base.

3.3.4 Set precast concrete base on 150 mm minimum of granular bedding compacted to 100% maximum density to ASTM D 698,

3.3.5 Precast Units:

3.3.5.1 Set bottom section of precast unit in bed of cement mortar and bond to concrete slab or base. Make each successive joint watertight with City approved rubber ring gaskets, bituminous compound, cement mortar, epoxy resin cement, or combination thereof.

3.3.5.2 Clean surplus mortar and joint compounds from interior surface of unit as work progresses.

3.3.5.3 Plug lifting holes with concrete plugs set in cement mortar or mastic compound

3.3.6 For sewers:

3.3.6.1 Place stub outlets and bulkheads at elevations and in positions indicated.

3.3.6.2 Provide for a 25 mm smooth drop for piping through manhole barrels and a 50 mm smooth drop for piping entering and leaving manhole between 45 and 90 degrees.

3.3.6.3 When pipe changes diameter size, match pipe crowns to same elevation, unless otherwise approved by Authorized Person.

3.3.6.4 Bench to provide a smooth U-shaped channel. Side height of channel to be 0.75 times diameter of sewer. Slope adjacent floor at 1 in 20. Curve channels smoothly. Slope invert to establish sewer grade. For pipes smaller than 250 mm use standard fittings, breaking out upper half of fitting upon completion of manhole.

3.3.7 Compact granular backfill to 95% maximum density to ASTM D 698.

3.3.8 Place unshrinkable backfill in accordance with Section 02315 - Excavating, Trenching and Backfill.

3.3.9 Installing units in existing systems:

3.3.9.1 Where new unit is to be installed in existing run of pipe, ensure full support of existing pipe during installation and carefully remove that portion of existing pipe to dimensions required. Install new unit as specified.

3.3.9.2 Make joints watertight between new unit and existing pipe.

3.3.9.3 Where deemed expedient to maintain service around existing pipes and when systems constructed under this project are ready to be put in operation, complete installation with appropriate break-outs, removals, redirection of flows, blocking unused pipes or other necessary work.

3.3.10 Set frame and cover to required elevation on no more than 4 courses of brick. Make brick joints and join brick to frame with cement mortar. Parge and make smooth and watertight.

3.3.11 Place frame and cover on top section to elevation as indicated. If adjustment required use concrete ring.

3.3.12 Clean units of debris and foreign materials. Remove fins and sharp projections. Prevent debris from entering system.

3.4 Adjusting Tops of Existing Units

3.4.1 Remove existing gratings and frames and store for re-use at locations designated by City.

3.4.2 Sectional units:

3.4.2.1 Raise or lower straight walled sectional units by adding or removing precast sections as required.

3.4.2.2 Raise or lower tapered units by removing cone section, adding, removing, or substituting riser sections to obtain required elevation. Do not replace cone section. Replace with flat slab top type lid. When amount of raise is less than 600 mm use standard manhole brick to adjust elevation.

3.4.3 Monolithic units:

3.4.3.1 Raise monolithic units by roughening existing top to ensure proper bond and extend to required elevation with cast-in-place concrete.

3.4.3.2 Lower monolithic units with straight wall by removing concrete to elevation indicated for rebuilding.

3.4.3.3 When monolithic units with tapered upper section are to be lowered more than 150 mm, remove concrete for entire depth of taper plus as much straight wall as necessary, then rebuild upper section to required elevation with cast-in-place concrete.

3.4.3.4 Install additional manhole ladder rungs in adjusted portion of units as required.

3.4.3.5 Re-use existing gratings, frames etc.

3.4.4 Re-set gratings and frames to required elevation on not more than 4 courses of brick. Make brick joints and joint brick to frame with cement mortar, parge and trowel smooth. Place cement mortar between bricks and around bricks.

3.5 Sealing over Existing Units

3.5.1 Cut galvanized iron sheet to extend 50 mm beyond opening of existing manhole or catch basin grating. Center iron sheet over existing grating and spot or stitchweld to grating.

3.5.2 Fill with cast-in-place concrete.

3.6 Leakage Test

3.6.1 When required by Engineer or Authorized Person, install watertight plugs or seals on inlets and outlets of each new manhole and fill manhole with water. Leakage not to exceed 0.3% per hour of volume of manhole.

3.6.2 If permissible leakage is exceeded, correct defects. Repeat until acceptable to Engineer.

3.6.3 Engineer will issue Test Certificate for each manhole passing test.

END OF SECTION 02631

1 GENERAL

1.1 Related Sections

1.1.1 Section 02721 – Granular Base.

1.1.2 Section 02723 – Granular Sub-base.

1.1.3 Section 02741 – Hot Mix Asphalt Concrete Paving

1.2 Samples

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

1.2.2 Install sampling facilities at discharge end of production conveyor, to allow City to obtain representative samples of items being produced. Stop conveyor belt when requested by the City to permit full cross section sampling.

1.2.3 If, in opinion of the City, materials from proposed source do not meet, or cannot reasonably be processed to meet specified requirements, locate alternative source or demonstrate that material from source in question can be processed to meet specified requirements.

1.2.4 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, or if its field performance is found to be unsatisfactory.

1.3 Special Requirements

1.3.1 All works performed under this Section must comply with the requirements of the Soil Removal and Deposit Bylaw.

2 PRODUCTS

2.1 Materials General

2.1.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.

2.1.2 In absence of satisfactory performance records over a five year period for a particular source of material, soundness to be tested according to ASTM C88.

2.1.3 Flat and elongated particles of coarse aggregate: to ASTM D 4791.

2.1.3.1 Greatest dimension to exceed five times least dimension.

2.1.4 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:

2.1.4.1 Natural sand.

2.1.4.2 Manufactured sand.

2.1.4.3 Screenings produced in crushing of quarried rock, boulders, gravel or slag.

2.1.5 Coarse aggregates satisfying requirements of applicable section to be one, or blend of following:

2.1.5.1 Crushed rock.

2.1.5.2 Gravel and crushed gravel composed of naturally formed particles of stone.

2.1.5.3 Light weight aggregate, including slag and expanded shale.

2.1.6 Native Material or Type 3 Fill:

2.1.6.1 To be any workable soil free of organic or foreign matter. Any native material obtained within limits of Contract may be deemed granular material for purposes of payment if it meets specifications of granular material. Native material not acceptable if it is impracticable to control its water content or to compact to specified density.

2.2 Granular Sub-base

2.2.1 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. Conform to following gradations:

Sieve Designation		Percent Passing
75	mm	100
25	mm	50 - 90
0.300	mm	0 - 15
0.075	mm	0 – 6

2.3 Drain Rock

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

Sieve Designation		Coarse %Passing	Fine (Torpedo Gravel) % Passing
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
0.60	mm		0 - 8
0.30	mm		0 - 5
0.15	mm		0 - 2
0.075	mm		0

2.3.2 Drain rock to be used only where specified. Use of drain rock other than as specified requires approval of City after examination of soils against which drain rock will be placed.

2.4 Granular Pipe Bedding and Surround Material

2.4.1 Crushed or graded gravels: to conform to following graduations:

Sieve Designation		Type 1 % Passing	Type 2 % Passing
25.0	mm	100	100
19.0	mm	90 - 100	90 - 100
12.5	mm	65 - 85	70 - 100
9.5	mm	50 - 75	
4.75	mm	25 - 50	40 - 70
2.36	mm	10 - 35	
0.85	mm	5 - 20	8 - 30
0.425	mm	0 - 15	
0.300	mm		3 - 20
0.180	mm	0 - 8	
0.075	mm	0 - 5	0 - 8

Type 1: standard gradation
Type 2: to be used only in dry trench conditions and with the City's prior approval

2.4.2 Other permissible materials: where shown on Contract Drawings or directed by City, drain rock, pit run sand or approved native material may be used for bedding and pipe surround.

2.5 Granular Base

2.5.1 Use crushed and screened material, conforming to following gradation.

Sieve Designation		Percent Passing
19	mm	100
4.75	mm	40 - 80
2.36	mm	27 - 65
1.18	mm	18 – 50
0.600	mm	12 - 35
0.300	mm	8 – 25
0.150	mm	4 – 17
0.075	mm	2 - 8

2.5.2 Not less than 10% is to be retained between each pair of successive sieves.

2.5.3 Crushed particles: at least 60% of particles by mass within each of the following designation ranges to have at least one freshly fractured face. Material to be divided into ranges using methods of ASTM C 136:

Passing	Retained on	
50 mm	to	25 mm
25 mm	to	19 mm
19 mm	to	4.75 mm

3 EXECUTION

3.1 Aggregate Source Preparation

3.1.1 Comply with requirements of Soil Removal and Deposit Bylaw.

3.1.2 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials..

3.1.3 Where clearing is required, leave screen of trees between cleared area and roadways as directed.

3.1.4 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.

3.1.5 When excavation is completed dress sides of excavation to nominal 1.5H:1V slope, and provide drains or ditches as required to prevent surface standing water.

3.1.6 Trim off and dress slopes of waste material piles and leave site in neat condition.

3.2 Processing

3.2.1 Process aggregate uniformly, using methods that prevent contamination, segregation and degradation.

3.2.2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by City.

3.2.3 Wash aggregates, if required to meet specifications. Use only equipment approved by City. Dispose of wash water in accordance with all Federal and Provincial regulations.

3.2.4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.

3.3 Handling

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

3.3.2 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by City within 48 h of rejection.

3.4 Stockpiling

3.4.1 Stockpile aggregates on site in locations as approved by City. Do not stockpile on completed pavement surfaces.

3.4.2 Stockpile aggregates in sufficient quantities to meet project schedules.

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

3.4.4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into work.

3.4.5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.

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

3.4.7 Stockpile materials in uniform layers of thickness as follows:

3.4.7.1 Max 1.5m for coarse aggregate and base course materials.

3.4.7.2 Max 1.5m for fine aggregate and sub-base materials.

3.4.7.3 Max 1.5m for other materials.

3.4.8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.

3.4.9 Do not cone piles or spill material over edges of piles.

3.4.10 Do not use conveying stackers.

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

3.5 Cleaning

3.5.1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.

3.5.2 Leave any unused aggregates in neat compact stockpiles as directed by City.

3.5.3 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of Soil Removal and Deposit Bylaw.

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1 GENERAL

1.1 Summary

1.1.1 This method covers measurement of loss of Marshall Stability resulting from action of water on compacted asphalt paving mixtures containing penetration grade asphalt cement.

1.1.2 Numerical index of retained stability is obtained by comparing stability of specimens determined in accordance with usual Marshall procedures with stability of specimens that have been immersed in water for prescribed period.

1.2 References

1.2.1 ASTM D1559, Test Method for Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.

2 PRODUCTS

2.1 Equipment

2.1.1 One or more water baths with automatic controls for immersing specimens. Baths normally used for Marshall test are suitable for test.

2.1.2 Scale and water bath with suitable accessory equipment for weighing test specimens in air and in water to determine their densities.

2.1.3 Flat transfer plates of glass or metal. Keep one plate under each specimen during immersion period and during subsequent handling, except when weighing and testing, to prevent breakage or distortion of specimens.

2.1.4 Apparatus required to conduct Marshall test.

3 EXECUTION

3.1 Preparation of Test Specimens

3.1.1 Prepare at least 8 specimens for each test in accordance with ASTM D1559, except where specified otherwise.

3.2 Test Procedure

3.2.1 Do Marshall testing in accordance with ASTM D1559, except where specified otherwise.

3.2.2 Weigh each specimen in air and in water. Weigh in water as rapidly as possible to minimize absorption.

3.2.3 Calculate specific gravity of each specimen as follows:

$$\text{Specific Gravity} = \frac{A}{A - B}$$

Where A = weight of specimen in air in grams
B = weight of specimen in water in grams.

3.2.4 Sort each set of 8 specimens into 2 groups of 4 specimens each so that average specific gravity of specimens in group 1 is essentially same as that of group 2.

3.2.5 Test group 1 specimens for Marshall stability. Calculate S1 = Marshall stability of group 1 (average).

3.2.6 Immerse group 2 specimens in water for 24 h at 60 °C, then test immediately for Marshall stability. Calculate S2 = Marshall stability of group 2 (average).

3.3 Test Report

3.3.1 Report all test results to City.

3.3.2 Report numerical index of retained stability as resistance of asphaltic paving mixtures to detrimental effect of water, expressed as percentage of original stability retained after immersion period.

3.3.3 Calculate index as follows: Index of Retained Stability = $\frac{S2 \times 100}{S1}$

END OF SECTION 02703

1 GENERAL

1.1 Related Sections

1.1.1 Section 02701 – Aggregates: General.

1.1.2 Section 02723 – Granular Sub-base.

1.1.3 Section 02741 – Hot-Mix Asphalt Concrete Paving.

1.1.4 Section 02770 – Concrete Walks, Curbs and Gutters.

1.2 Delivery, Storage and Handling

1.2.1 Deliver and stockpile aggregates in accordance with Section 02701 - Aggregates General. Stockpile minimum 50% of total aggregate required prior to commencing operation.

2 PRODUCTS

2.1 Materials

2.1.1 Refer to Section 02701 - Aggregates General for material specifications.

3 EXECUTION

3.1 Sequence of Operation

3.1.1 Underlying granular sub-base surface to be true to cross-section and grade, and of the specified material compacted to 98% Maximum Dry Density (Standard Proctor Density) in compliance with ASTM D698. Do not place granular base until finished sub-base surface is inspected and approved by Engineer.

3.1.2 Placing

3.1.2.1 Construct granular base to depth and grade in areas indicated.

3.1.2.2 Ensure no frozen material is placed.

3.1.2.3 Place material only on clean unfrozen surface, free from snow and ice.

3.1.2.4 Place base material using methods that do not lead to segregation or degradation of aggregate.

3.1.2.5 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Engineer may authorize thicker layers if specified compaction can be achieved.

3.1.2.6 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

3.1.2.7 Remove and replace portion of any layer in which material has become segregated during spreading.

3.1.3 Compaction Equipment

3.1.3.1 Compaction equipment to be capable of obtaining required material densities on project.

3.1.4 Compacting

3.1.4.1 Compact to density not less than 100% Maximum Dry Density (Standard Proctor Density) to ASTM D698.

3.1.4.2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.

3.1.4.3 Apply water as necessary during compacting to obtain specified density.

3.1.4.4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Engineer.

3.1.4.5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.2 Site Placement Tolerances

3.2.1 Granular Base surfaces intended to receive Hot Mix Asphalt pavement or Portland Cement Concrete pavement on roads where curbs are installed, shall not be finished more than one millimetre (1mm) above the specified grade and cross section as governed by the constructed curb elevation. Minimum thickness of Hot Mix Asphalt Concrete and Granular Base materials, placed above the Granular Subbase finished surface, shall be in accordance with the City of Prince George Standard Drawings contained within this Bylaw.

3.2.2 Granular Base surfaces of open shouldered roads intended to receive Hot Mix Asphalt Concrete Paving are not to be finished greater than 6 mm above the specified grade.

3.2.3 Finished granular road surfaces to be within plus or minus 10 mm of specified grade and cross-section but not uniformly high or low.

3.3 Protection

3.3.1 Maintain finished granular base in condition conforming to this section until succeeding material is applied or until granular base is accepted by the Engineer

when application of hot mix asphalt concrete paving is the responsibility of another Contractor under separate Contract.

END OF SECTION 02721

1 GENERAL

1.1 Related Work

1.1.1 Section 02741 – Hot Mix Asphalt Concrete Paving.

1.2 Conduct pavement surface cleaning is accordance with City of Prince George Clean Air Bylaw No. 7232, 2000 and all applicable Provincial and Federal legislation.

1.3 All works performed under this section must comply with the City of Prince George Highways Bylaw No. 6114.

2 PRODUCTS

2.1 Materials

2.1.1 Abrasives and solvents used for removal of paint, oil, grease, rubber deposits: proprietary products specially designed for pavement cleaning, subject to approval by City.

3 EXECUTION

3.1 Pavement Surface Cleaning

3.1.1 Where directed by City, remove sealing compound which has protruded excessively. Dispose of removed material as directed by City.

3.1.2 Remove dust, contaminants, loose and foreign materials, oil and grease, in areas designated and by method approved by City.

3.1.3 Use rotary power brooms or vacuum sweepers supplemented by hand brooming.

END OF SECTION 02722

1 GENERAL

1.1 Related Sections

1.1.1 Section 02317 – Roadway Excavation, Embankment and Compaction.

1.1.2 Section 02701 – Aggregates: General.

1.1.3 Section 02721 – Granular Base.

2 PRODUCTS

2.1 Materials

2.1.1 Refer to Section 02701 – Aggregates: General for material specifications.

3 EXECUTION

3.1 Placing

3.1.1 Underlying subgrade surface to be true to cross-section and grade. Where constructed of imported material, subgrade to be compacted to 95% Maximum Dry Density in compliance with ASTM D698. Engineer may accept satisfactory proof rolling as evidence of acceptable compaction of undisturbed native subgrade. Do not place granular sub-base until subgrade is inspected and approved by Engineer.

3.1.2 Construct granular sub-base to depth and grade in areas indicated.

3.1.3 Ensure no frozen material is placed.

3.1.4 Place material only on clean unfrozen surface, free from snow and ice.

3.1.5 Place sub-base material using methods that do not lead to segregation or degradation of aggregate.

3.1.6 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Engineer may authorize thicker layers if specified compaction can be achieved.

3.1.7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

3.1.8 Remove and replace portion of any layer in which material has become segregated during spreading.

3.2 Compaction

3.2.1 Compaction equipment to be capable of obtaining required densities in materials on project.

3.2.2 Compact to density not less than 98% Maximum Dry Density (Standard Proctor Density) in accordance with ASTM D698.

3.2.3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.

3.2.4 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.

3.2.5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by the Engineer.

3.2.6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.3 Proof Rolling

3.3.1 For proof rolling use fully loaded single or dual axle dump truck. Weigh scale ticket indicating Gross Vehicle Weight to be submitted to Engineer at time of proof rolling.

3.3.2 Engineer may authorize use of other acceptable proof rolling equipment.

3.3.3 Proof roll at level in sub-base as required. If alternative proof rolling equipment is authorized, Engineer to determine level of proof rolling.

3.3.4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.

3.3.5 Where proof rolling reveals areas of defective subgrade:

3.3.5.1 Remove sub-base and subgrade material to depth and extent directed by Engineer.

3.3.5.2 Backfill excavated subgrade with approved embankment material and compact in accordance with this Section.

3.3.5.3 Replace sub-base material and compact.

3.3.6 Where proof rolling reveals areas of defective sub-base, remove defective materials to depth and extent directed by Engineer and replace with new materials in accordance with this section at no extra cost.

3.4 Finished Tolerances

3.4.1 Sub-base surfaces intended to receive granular base material and hot mix asphalt pavement or Portland cement concrete pavement on roads where curbs are installed, shall not be finished more than one millimetre (1mm) above the specified grade and cross section as governed by the constructed curb elevation. Minimum thickness of

Hot Mix Asphalt Concrete and Granular Base materials, placed above the Granular Subbase finished surface, shall be provided in accordance with the City of Prince George Standard Drawings contained within this Bylaw.

3.4.2 Finished sub-base surface of asphalt –surfaced open shoulder roads and granular-surface roads shall be within plus or minus 15 millimetres (15mm) of specified grade and cross-section but not uniformly high of low.

3.4.3 Ensure finished subbase surface has no irregularities exceeding 15 mm when checked with a 3 m straight edge placed in any direction.

3.4.4 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.5 Protection

3.5.1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by the Engineer when granular base and hot mix asphalt concrete paving is the responsibility of another Contractor under separate Contract.

END OF SECTION 02723

1 GENERAL

1.1 Related Sections

1.1.1 Section 02226 – Removal of Existing Asphalt Pavement

1.1.2 Section 02701 – Aggregates: General.

1.1.3 Section 02703 – Marshall Immersion Test.

1.1.4 Section 02721 – Granular Base.

1.1.5 Section 02722 – Pavement Surface Cleaning.

1.1.6 Section 02745 – Asphalt Prime

1.1.7 Section 02746 – Asphalt Tack

1.1.8 Section 02761 – Painted Traffic Lines and Markings.

1.2 Product Data

1.2.1 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175°Celsius at least 2 weeks prior to commencing work

1.2.2 Submit asphalt concrete mix design and trial mix test results to Engineer for review at least 2 weeks prior to commencing work.

2 PRODUCTS

2.1 Asphalt Materials

2.1.1 Asphalt cement: to CGSB-16.3-M90, Grade 150-200.

2.1.2 Reclaimed asphalt pavement: Crush and screen so that 100% of reclaimed asphalt pavement (RAP) material passes 19.5 mm screen before mixing.

2.1.3 Aggregates: to Section 02701 – Aggregates: General 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 and ASTM C117.

Sieve Designation	Percent Passing		
	Mix A Base Course	Mix B Overlay	Mix C Surface Course
20.0 mm	90-100	--	--
16.0 mm	--	100	100
12.5 mm	55-75	80-95	--
9.5 mm	--	70-85	73-90
4.75 mm	30-50	55-67	50-75
2.36 mm	25-40	43-53	35-57
1.18 mm	--	31-43	26-45
0.600 mm	12-27	22-35	18-34
0.300 mm	--	12-15	10-26
0.150 mm	3-13	5-15	6-17
0.075 mm	2-7	3-7	3-7

.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.

.4 When dryer drum plant or plant without hot screening is used, process fine aggregate through 4.75 mm sieve and stockpile separately from course aggregate.

.5 Do not use aggregates having known polishing characteristics in mixes for surface courses.

.6 Sand equivalent: to ASTM D2419 Min: 40

.7 Magnesium Sulphate soundness: to ASTM C88. Max % loss by mass:
i) Coarse aggregate: 15
ii) Fine aggregate: 18

.8 Los Angeles abrasion: Grading B, to ASTM C131. Max % loss by mass:
i) Coarse aggregate, surface course: 25
ii) Coarse aggregate, base course: 35

.9 Absorption: to ASTM C127. Max % by mass:
i) Coarse aggregate, surface course: 1.75
ii) Coarse aggregate, base course: 2.00

.10 Loss by washing: to ASTM C117. Max % passing 0.075 mm sieve:
i) Coarse aggregate, surface course: 1.5
ii) Coarse aggregate, lower course: 2.0

.11 Flat and elongated particles: (with length to thickness ratio greater than 3): Max % by mass:
i) Coarse aggregate, surface course: 10
ii) Coarse aggregate, lower course: 10

.12 Crushed fragments: at least 80% of particles by mass within each of following sieve designation ranges, to have at least 2 freshly fractured faces. Material to be divided into ranges, using methods of ASTM C136.

Passing		Retained On
25 mm	to	12.5 mm
12.5 mm	to	4.75 mm

.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.

2.1.5 Anti-stripping agent: hydrated lime to ASTM C 207 type N. Add lime at rate of approximately 2-3% of dry weight of aggregate.

2.1.6 Water: to approval of Engineer.

2.2 Asphalt Mix Design

2.2.1 Mix design to be developed by testing laboratory approved by City.

2.2.2 Mix may contain up to a maximum 15% by mass of reclaimed asphalt pavement (RAP) without a special mix design. City may approve higher proportion of RAP if Contractor demonstrates ability to produce mix meeting the requirements of specification.

2.2.3 Design of mix: by Marshall method to requirements below.

.1 Compaction blows on each face of test specimens:

i) Mix A – 75
ii) Mix B – 50
iii) Mix C – 75

.2 Mix physical requirements:

Properties of Laboratory
Compacted Paving Mixtures

Property	Mix A Base Course	Mix B Surface Course	Mix C
Marshall Stability at 60^0C kN minimum	6.0	4.5	6.0
*Air Voids in compacted mixture, %	3-5	3-5	3-5
Flow index in 0.25 mm	6-12	8-16	8-14
**Voids in Mineral Aggregate, % min.	13	14.5	14.5
Index of Retained Stability, % minimum	75	75	85

*Portion of asphalt cement absorbed into aggregates to be allowed for when calculating percentage air voids.

**Percentage voids in mineral aggregate to be calculated on the basis of ASTM bulk specific gravity for the aggregates.

.3 Measure physical requirements as follows:

i) Marshall load and flow value: to ASTM D1559.

ii) Air voids: to ASTM D3203.

iii) Index of Retained Stability: measure in accordance with Marshall Immersion Test (ASTM D1559).

iv) Do not change job-mix without prior approval of City. Should change in material source be proposed, new job-mix formula shall be submitted to City for review and approval.

2.3 Granular Surface Shouldering

2.3.1 Aggregates: to Section 02701

2.4 Asphalt Tack Coat

2.4.1 Materials: to Section 02746

2.5 Asphalt Prime Coat

2.5.1 Materials: to Section 02745

3 EXECUTION

3.1 Plant and Mixing Requirements

3.1.1 Batch and continuous mixing plants:

.1 To ASTM D995.

.2 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders.

.3 Feed cold aggregates to plant in proportions that will ensure continuous operations.

.4 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.

.5 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. Heat to temperature required to meet mixing temperature as directed by the City after combining with RAP.

.6 Immediately after drying, screen aggregates into hot storage bins in sizes to permit recombining into gradation meeting job-mix requirements.

.7 Store hot screened aggregates in manner to minimize segregation and temperature loss.

.8 Heat asphalt cement and aggregate to mixing temperature directed by City. Do not heat asphalt cement above 160 degrees Celsius.

.9 Make available current asphalt cement viscosity data at plant. With information relative to viscosity of asphalt being used, City to approve temperature of completed mix at plant and at paver after considering hauling and placing conditions.

.10 Maintain temperature of materials within plus or minus 5 degrees Celsius of specified mix temperature during mixing.

.11 Mixing time:

i) In batch plants, dry mix for not less than 10 seconds. Continue wet mixing as long as necessary to obtain a thoroughly blended mix but not less than 30 seconds or more than 75 seconds.

ii) In continuous mixing plants, mixing time as directed by City but not less than 45 seconds.

iii) Do not alter mixing time unless directed by City.

.12 Where RAP is to be incorporated into mix:

i) 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.

ii) 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.

iii) Combine RAP and new aggregates in proportions as specified. Dry mix thoroughly, until uniform temperature within plus or minus 5 degrees Celsius of mix temperature, as directed by City, is achieved prior to adding new asphalt cement. Do not add new asphalt cement where temperature of dry mix material is above 160 degrees Celsius.

3.1.2 Dryer drum mixing plants:

.1 To ASTM D 995.

.2 Load aggregates from individual stockpiles to separate cold feed bins. Do not load frozen materials into bins.

.3 Feed aggregates to burner end of dryer drum by means of multi-bin cold feed unit and blend to meet job-mix requirements by adjustments of variable speed feed belts and gates on each bin.

.4 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 degrees Celsius.

.5 Feed RAP from separate cold feed bin designed to minimize reconsolidation of material.

.6 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, RAP and asphalt entering mixer remain constant.

.7 Provide for easy calibration of weighing systems for aggregates and RAP without having material enter mixer.

.8 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved. Calibrate weigh bridge on charging conveyor by weighing amount of aggregate passing over weigh bridge in set amount of time. Difference between this value and amount shown by plant computer system to differ by not more than plus or minus 2 %.

.9 Make provision for conveniently sampling full flow of materials from the cold feed.

.10 Provide screens or other suitable devices to reject oversize particles or lumps of aggregate and RAP from cold feed prior to entering drum.

.11 Provide a system interlock that will stop all feed components if either asphalt or aggregate from any bin stops flowing.

.12 Accomplish heating and mixing of asphalt mix in approved parallel flow dryer-mixer in which aggregate enters drum at burner end and travels parallel to flame and exhaust gas stream. 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 printing recorder that can be monitored by plant operator. Submit printed record of mix temperatures at end of each week.

.13 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 3 hours.

3.1.4 Mixing tolerances:

.1 Permissible variation in aggregate gradation from job mix (percent of total mass):

i)	4.75 mm sieve and larger	5.5
ii)	2.36 mm sieve	4.5
iii)	0.600 mm sieve	3.5
iv)	0.150 mm sieve	2.5
v)	0.075 mm sieve	1.5

.2 Permissible variation of asphalt cement from job mix: 0.25%.

.3 Permissible variation of mix temperature at discharge from plant: 5 degrees Celsius.

3.1.5 Addition of anti-stripping agent:

.1 Plant to be equipped with pugmill to thoroughly mix aggregates and lime prior to entering the plant.

.2 Plant to be equipped with suitable conveyor systems capable of supplying aggregates and lime at constant rate.

.3 Plant and equipment used for addition of lime to be equipped with covers to control loss of lime.

.4 Plant to be equipped to control rate of lime incorporation to within 0.25%.

.5 Add water to aggregate prior to entering pugmill.

.6 Add water to lime sufficiently in advance to permit time to slake prior to entering pugmill.

3.2 Equipment

3.2.1 Pavers: either crawler of pneumatic tire mounted, mechanical grade-controlled self-powered asphalt surface finishers capable of spreading mix within specified

tolerances, true to line, grade and crown indicated. Pavers to be operated by competent personnel and maintained in good working order, such that the mat is laid of uniform consistency true to line and grade, free from segregation or leaving tamper marks. Pavers shall be adjustable to lay a mat in one pass between 2.5metres wide and 3.5 metres or more wide in increments of 300 millimetres (mm) and to a depth of between 25mm to 75mm. The screed shall be adjustable such that transitions in elevation are gradual and free of ripples and humps. Paving speed should not exceed 13 metres per minute.

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: sufficient number and 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 Use only trucks that can be weighed in a single operation on scales supplied.

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 310 cm^2 for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by City, may be used instead of tamping irons.

.3 Straight edges, 4.5 m in length, to test finished surface.

3.3 Preparation

3.3.1 Reshape granular roadbed or asphalt pavement if required. Perform work in accordance with Sections 02226, 02317, 02721, 02722 and 02723 as required.

3.3.2 When paving over existing asphalt surface, clean pavement surface and remove old markings. Perform surface cleaning in accordance with Section 02722 – Pavement Surface Cleaning. When leveling course is not required, patch and correct depressions and other irregularities to approval of City before beginning paving operations. Apply asphalt tack coat in accordance with Section 02746 – Asphalt Tack Coat.

3.3.3 Vertical faces of existing pavement, curbs, gutters, drainage gratings, manholes, valve boxes and other contact surfaces shall be painted with a uniform coating of asphalt emulsion Type RS-1 or RS-2, or asphalt cutback Type RC-2 or RC-3, to provide closely bonded watertight joints. Castings having asphalt surfaces need not be further coated.

3.3.4 When placing Hot Mix Asphalt Concrete over granular base, the requirement for the application of asphalt prime over the granular base will be at the discretion of the Engineer. When asphalt prime is required, application to be made in accordance to Section 02745 – Asphalt Prime.

3.3.5 Prior to laying asphalt concrete, 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 limewater, soap or detergent solution, or non-petroleum based commercial product at least daily 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 City approves artificial light.

3.4.4 Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation. Do not dribble mix into trucks.

3.4.5 Deliver material to paver at a uniform rate and in an amount within capacity of paving and compacting equipment.

3.4.6 Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place mixes at temperature within range as directed by City but not less than 135 degrees Celsius.

3.5 Placing

3.5.1 Obtain Engineer's approval of base or existing surface prior to placing asphalt.

3.5.2 Place asphalt concrete to the applicable thickness, grades and dimensions as specified on City of Prince George Standard Drawings and directed by the Engineer, or, as indicated on Contract Drawings approved by the City of Prince George.

3.5.3 Placing conditions:

.1 Place asphalt mixtures only when air temperature is above 5 degrees Celsius.

.2 When temperature of surface on which material is to be placed falls below 10 degrees Celsius, 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 follows:

.1 Leveling course(s) to thickness required but not exceeding 50 mm each.

.2 No single lift of asphaltic concrete shall be placed at a depth of 75mm or greater. In the event that any area is to receive 75mm or more of any one type of asphaltic concrete, such areas shall be laid in two or more lifts of approximately equal depths. Under no circumstances shall a surface course be placed to a compacted thickness less than 30mm.

3.5.5 Where possible, do the necessary tapering and leveling when paving the lower lifts. Overlap joints as specified under Clause 3.7 Joints of this Section.

3.5.6 No course shall be placed upon a previously laid course less than twelve hours after final compaction of the latter.

3.5.7 Commence spreading at high side of pavement or at crown and span crowned centerlines with initial strip.

3.5.8 Spread and strike off mixture with self-propelled mechanical asphalt finisher (paver).

.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 Maintain constant head of mix in auger chamber of paver during placing.

.4 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.

.5 Correct irregularities in alignment left by paver by trimming directly behind machine.

.6 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.

.7 Do not throw surplus material on freshly screened surfaces.

3.5.9 When hand spreading is used:

.1 Use approved wood or steel forms, rigidly supported to assure correct grade and cross section. Use measuring blocks and intermediate strips to aid in obtaining required cross-sections.

.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. Control temperatures to avoid burning material. Do not use tools at a higher temperature than temperature of mix being placed.

3.6 Compacting

3.6.1 Do not change rolling pattern unless mix changes or lift thickness changes. Change rolling pattern only as directed by Engineer.

3.6.2 Roll asphalt continuously to average density not less than 98% of 75-blow Marshall density in accordance with ASTM D1559.

3.6.3 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. Do not exceed 5 km/h for breakdown and intermediate rolling for static steel-wheeled and pneumatic tired rollers. Do not exceed 9 km/h for finish rolling.

.4 Use static compaction for leveling coarse less than 25mm thick.

.5 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.

.6 Overlap successive passes of roller by minimum of 200 mm and vary pass lengths.

.7 Keep wheels of roller slightly moistened with water to prevent pick-up of material but do not over-water.

.8 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.

.9 Do not permit heavy equipment or rollers to stand on finished surface before if has been compacted and has thoroughly cooled.

.10 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side. Ensure that all points across width of pavement receive essentially equal numbers of passes of compactors.

.11 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.

.12 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.

3.6.4 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. When working on steep slopes or super-elevated sections use operation approved by City.

.4 Use only experienced roller operators for this work.

3.6.5 Intermediate 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.

3.6.6 Finish rolling:

.1 Accomplish finish rolling with two-axle or three-axle steel wheel rollers while material is still warm enough for removal of roller marks. If necessary to obtain desired surface finish, use pneumatic-tired rollers as directed by City.

.2 Conduct rolling operations in close sequence.

3.6.7 Dust entire area of sheet asphalt pavements with hydrated lime immediately after rolling to eliminate tendency to pick-up under traffic.

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 as specified under Clause 3.3 of this Section.

3.7.2 Transverse joints:

.1 Offset transverse joint in succeeding lifts by at least 600 mm.

.2 Transverse joints shall be made by the matching of two straight and vertical surfaces. Asphalt placement shall begin from a properly prepared vertical face either by cutting back the previously placed mat to a full depth face or by 50mm thick boards placed at the end previously laid mat.

.3 Tack face with thin coat of hot asphalt prior to continuing paving.

.4 Compact transverse joints to provide a smooth riding surface. Use methods to prevent rounding of compacted surface at joints.

3.7.3 Longitudinal joints:

.1 Offset longitudinal joints in succeeding lifts by at least 300 mm.

.2 Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100 degrees Celsius prior to paving of adjacent lane. If cold joint can not be avoided, cut back by saw cutting previously laid lane, by at least 150mm, to full depth vertical face and tack coat face of the cold joint prior to placement of the adjoining asphalt mat.

.3 Overlap previously laid strip with spreader by 100 mm. The joint on the surface course shall, where possible, be situated under the lane lines.

.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 course aggregate in mix. Place and compact joint so that joint is smooth and without visible breaks in grade. Locate feather joint as specified.

3.7.5 Construct butt joints and saw cut joints at locations and to details as shown on Contract Drawings.

3.8 Finish Tolerances

3.8.1 The asphalt thickness indicated on City of Prince George Standard Drawings in all cases is the minimum thickness. Where coring or other procedures determines that pavement thickness does not meet the minimum required, such pavement will be considered defective.

3.8.2 On roads where curbs are installed, the finished asphalt surface adjacent to the curb shall not be less than the minimum dimension of 10mm above the curb face indicated on City of Prince George Standard Drawing Nos. C1 and C2, and shall not exceed 16 mm.

3.8.3 Finished asphalt surface to be within 6 mm of design elevation but not uniformly high or low.

3.8.4 Finished asphalt surface not to have irregularities exceeding 6 mm when checked with a 4.5 m straight edge placed in any direction.

3.9 Defective Work

3.9.1 Correct irregularities that develop before completion of rolling by loosening surface mix and removing or adding material as required.

3.9.2 If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form a true and even surface and compact immediately to the specified density.

3.9.3 Repair areas showing checking, rippling, or segregation.

3.9.4 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

3.10 Rejection of Asphalt Materials

3.10.1 Notwithstanding reasons for rejection specified elsewhere, any load of asphalt concrete may be rejected, if in the opinion of the Engineer, the asphalt concrete is:

.1 Above the specified mix temperature;
.2 Below 135 degrees Celsius;
.3 Outside plus or minus 0.3% of the design asphalt concrete content;
.4 Containing excessive coarse or fine aggregate;
.5 Containing excessive moisture in the aggregate.

or, in any other way does not comply with these specifications.

3.11 Intersection Ramps

3.11.1 At intersecting streets not having curbs and gutters, asphaltic concrete pavement shall be ramped to the existing traveled area over a distance of approximately ten (10) metres radius.

3.12 Granular Surface Shouldering for Open Shoulder Roads

3.12.1 Where directed by the Engineer or as indicated on the Contract Drawings, a surface of 19 mm crushed granular material shall be placed on the shoulder to the dimensions shown on the City of Prince George Standard Drawings.

3.12.2 Provide granular surface shouldering material as specified under Section 2.3, above.

3.12.3 The area to receive the granular surface shouldering shall first be graded, leveled and compacted. The material shall then be placed on the shoulder and compacted by vibratory compactor to 98% Standard Proctor Density.

3.12.4 To spread shouldering material, a shouldering machine shall be used rather that a grader. The machine shall have an adjustable strike-off and cut-off plate to regulate the depth, width and cross-slope of the deposited shoulder aggregate.

3.12.5 The Contractor shall minimize the amount of granular shouldering material that is deposited into adjacent ditches during the shouldering operation. Payment will not be made for shoulder material deposited into the ditches. The Contractor during the operation shall remove shouldering material deposited into ditches at its expense.

3.12.6 Costs for damage to adjacent asphalt pavement or curbs caused by the Contractor during the shouldering operation shall be borne by the Contractor.

END OF SECTION 02741

1 GENERAL

1.1 Related Work

1.1.1 Section 02722 –Pavement Surface Cleaning.

1.1.2 Section 02741 – Hot-Mix Asphalt Concrete Paving.

2 PRODUCTS

2.1 Materials

2.1.1 Paint:

2.1.1.1 To CGSB 1-GP-74M, alkyd traffic paint.

2.1.1.2 Colour: to CGSB 1-GP-12C, yellow 505-308, black 512-301, white 513-301.

2.1.1.3 Upon request, City will supply a qualified product list of paints applicable to work. Qualified paints may be used but City reserves right to perform further tests.

2.1.2 Thinner: to CAN/CGSB-1.5.

2.1.3 Glass beads:

2.1.3.1 Overlay type: to CGSB 1-GP-74M.

3 EXECUTION

3.1 Equipment Requirements

3.1.1 Paint applicator to be an approved pressure type mobile distributor capable of applying paint in single, double and dashed lines. Applicator to be capable of applying marking components uniformly, at rates specified, and to dimensions as indicated, and to have positive shut-off.

3.1.2 Distributor to be capable of applying reflective glass beads, if required, as an overlay on freshly applied paint.

3.2 Condition of Surfaces

3.2.1 Pavement surface to be dry, free from ponded water, frost, ice, dust, oil, grease and other foreign materials.

3.3 Application

3.3.1 Lay out pavement markings.

3.3.2 Unless otherwise approved by City, apply paint only when air temperature is above 10°C, wind speed is less than 60km/h and no rain is forecast within next 4 h.

3.3.3 Apply traffic paint evenly at rate of 3 m^2/L.

3.3.4 Do not thin paint unless approved by City.

3.3.5 Symbols and letters to conform to dimensions indicated.

3.3.6 Paint lines to be of uniform colour and density with sharp edges.

3.3.7 Thoroughly clean distributor tank before refilling with paint of different colour.

3.3.8 Apply glass beads at rate of 200g/m² of painted area on road centerlines, cross walks and other areas designated immediately after application of paint.

3.4 Tolerance

3.4.1 Paint markings to be within plus or minus 12 mm of dimensions indicated.

3.4.2 Remove incorrect markings in accordance with Section 02722 - Pavement Surface Cleaning.

3.5 Protection of Completed Work

3.5.1 Protect pavement markings until dry.

END OF SECTION 02761

1 GENERAL

1.1 Related Work

1.1.1 Section 02315 – Excavating, Trenching and Backfilling.

1.1.2 Section 02701 – Aggregates: General.

1.1.3 Section 03100 – Concrete Forms and Accessories

1.1.4 Section 03200 –Concrete Reinforcement.

1.1.5 Section 03300 – Cast-in-Place Concrete.

2 PRODUCTS

2.1 Materials

2.1.1 Reinforcing steel: to Section 03200 - Concrete Reinforcement.

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

2.1.3 Fill material: to Section 02315 - Excavating, Trenching and Backfilling.

2.1.4 Boiled linseed oil: toCAN/CGSB-1.2.

2.1.5 Kerosene: to CAN/CGSB-3.3.

2.2 Concrete

2.2.1 Concrete mixes and materials: to Section 03300 - Cast-in-Place Concrete.

2.2.2 Hand formed and hand placed concrete to meet the following criteria.

i) Slump: 50 mm – 90 mm.
ii) Air Entrainment: 5% - 8%.
iii) Maximum aggregate size: 20 mm.
iv) Minimum 28 day compressive strength: 32 MPa.

2.2.3 Extruded concrete to meet the following criteria.

v) Slump: 30 mm – 40 mm.
vi) Air Entrainment: 5% - 8%.
vii) Maximum aggregate size: 20 mm.
viii) M
inimum 28 day compressive strength: 32 MPa.

3 EXECUTION

3.1 Grade Preparation

3.1.1 Do grade preparation work in accordance with Section 02315 - Excavating, Trenching and Backfilling.

3.1.2 Construct embankments using excavated material free from organic matter or other objectionable materials. Dispose of surplus and unsuitable excavated material off site.

3.1.3 When constructing embankment provide for minimum 0.5 m shoulders, where applicable, outside of neat lines of concrete.

3.1.4 Place fill in maximum 150 mm layers and compact in accordance with Section 02315 - Excavating, Trenching and Backfilling.

3.2 Granular Subbase

3.2.1 Obtain Engineer's approval of subgrade before placing granular subbase.

3.2.2 Place granular subbase material to lines, widths, and depths as indicated on Standard Drawings or approved Construction Drawings.

3.2.3 Compact granular subbase to specifications outlined in Section 02723.

3.3 Granular Base

3.3.1 Obtain Engineer’s approval of subbase before placing granular base.

3.3.2 Place granular base material to lines, widths, and depths as indicated on Standard Drawings or approved Construction Drawings.

3.3.3 Compact granular base to specifications outlined in Section 02721.

3.4 Concrete

3.4.1 Obtain City’s approval of granular base and reinforcing steel prior to placing concrete.

3.4.2 Do concrete work in accordance with Section 03300 - Cast-in-Place Concrete.

3.4.3 Immediately after floating, give sidewalk surface uniform broom finish to produce regular corrugations not exceeding 2 mm deep, by drawing broom in direction normal to center line.

3.4.4 Provide edging as indicated with radius edging tool. as shown on Standard Drawings C1 and C5.

3.4.5 Slip-form pavers equipped with string line system for line and grade control may be used if quality of work acceptable to Engineer can be demonstrated. Hand finish surfaces when directed by Engineer.

3.4.6 Prepare one set of three test cylinders for each 100 m length of curb and gutter placed.

3.4.7 Prepare one set of three test cylinders for each 100 m^2 area of concrete sidewalk.

3.4.8 Refer to Section 03300 - Cast-in-Place Concrete for field quality control requirements.

3.5 Tolerances

3.5.1 Finish surfaces to within 3 mm in 3 m as measured with a 3 m straight edge placed on surface.

3.6 Control Joints

3.6.1 Install tooled transverse contraction joints after floating, when concrete is stiff, but still plastic, at intervals as shown on Standard Drawings C1 and C5.

3.6.2 Install expansion joints as indicated on Standard Drawings C1 and C5.

3.6.3 Install isolation joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.

3.6.4 When sidewalk is adjacent to curb, make joints of curb, gutters and sidewalk coincide.

3.6.5 Install joint filler in expansion joints as indicated.

3.6.6 Seal expansion joints with sealant approved by Engineer.

3.7 Curing

3.7.1 Cure concrete by adding moisture continuously in accordance with CAN/CSA-A23.1 to exposed finished surfaces for at least 7 days after placing, or by sealing moisture in with curing compound approved by Engineer.

3.7.2 Where burlap is used for moist curing, place two prewetted layers on concrete surface and keep continuously wet during curing period.

3.7.3 Apply curing compound evenly to form continuous film in accordance with manufacturer's requirements.

3.7.4 When outside air temperature is expected to be below 4^{o} C during placement or during curing period, cover concrete and provide heating as required in accordance with CAN/CSA-A23.1 to maintain concrete at a minimum temperature of 10^{o} C for a minimum of 72 hours after placement. Protect concrete from freezing for an additional 72 hours thereafter or such time as to ensure proper curing of concrete.

3.8 Backfill

3.8.1 Allow concrete to cure for 7 days or when concrete has achieved 75% of specified design strength, prior to backfilling.

3.8.2 Backfill to designated elevations with material approved by the Engineer. Compact and shape to required contours as indicated or as directed by the Engineer.

END OF SECTION 02770

1 GENERAL

1.1 Related Work

1.1.1 Section 03300 – Cast-in-Place Concrete.

2 PRODUCTS

2.1 Materials

2.1.1 Lockable Access Gates: Gates shall be painted yellow to the following code specification: General Paint, urethane enamel 16-202 or equivalent approved by Authorized Person.

2.1.2 Concrete mixes and materials: to Section 03300 - Cast-in-Place Concrete.

2.1.2.1 Nominal coarse aggregate size: 20-50 mm.

2.1.2.2 Compressive strength: 20MPa minimum at 28days.

2.1.3 Chain-link fence fabric: to CAN/CGSB-138.1.

2.1.3.1 Type 1, Class A, medium style unless indicated otherwise on approved Construction Drawings.

2.1.3.2 Height of fabric: 1.8m unless indicated otherwise on approved Construction Drawings.

2.1.4 Posts, braces and rails: to CAN/CGSB-138.2, Schedule 40 galvanized steel pipe. Dimensions as indicated.

2.1.5 Bottom tension wire: to CAN/CGSB-138.1, Table 2, single strand, galvanized or vinyl coated as indicated, steel wire, 5mm diameter.

2.1.6 Tie wire fasteners: to CAN/CGSB-138.1, Table 2 steel wire single strand, vinyl coated where indicated.

2.1.7 Tension bar: to ASTM A 525M, 5x20mm minimum galvanized steel.

2.1.8 Gates: to CAN/CGSB-138.4.

2.1.9 Fittings and hardware: to CAN/CGSB-138.2, cast aluminum alloy, galvanized steel or malleable or ductile cast iron. Tension bar bands: 3x20mm minimum galvanized steel or 5x20mm minimum aluminum. Post caps to provide waterproof fit, to fasten securely over posts and to carry top rail. Overhang tops to provide waterproof fit, to hold top rails and a projection as indicated to hold barbed wire overhang. Provide projection with clips or recesses to hold 3 strands of barbed wire spaced 100 mm apart. Projection of approximately 300 mm long to project from fence at 45° above horizontal. Turnbuckles to be drop forged.

2.1.10 Organic zinc rich coating: to CAN/CGSB-1.181.

2.1.11 Barbed wire: 2mm diameter galvanized steel wire to ASTM A 121 or aluminum coated steel wire to ASTM A 585, 4 point barbs 125 mm spacing.

2.1.12 Grounding rod where indicated: 16 mm diameter copperwell rod, 3 m long.

2.2 Finishes

2.2.1 Galvanizing:

2.2.1.1 For chain link fabric: to CAN/CGSB-138.1 Grade 2.

2.2.1.2 For pipe: 550 g/m² minimum to ASTM A 90.

2.2.1.3 For barbed wire: to ASTM A 121, Class 2 CAN/CGSB-138.2.

2.2.1.4 For other fittings: to CAN/CSA-G164.

2.2.2 Aluminum coating:

2.2.2.1 For barbed wire: to ASTM A 585, Class 2.

2.2.3 Vinyl coating:

2.2.3.1 0.045 mm dry film thickness minimum.

3 EXECUTION

3.1 Grading

3.1.1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts. Provide clearance between bottom of fence and ground surface of 30 mm to 50 mm.

3.2 Erection on Fence

3.2.1 Erect fence along lines as indicated and in accordance with CAN/CGSB-138.3.

3.2.2 Excavate post holes to dimensions indicated by methods approved by Engineer.

3.2.3 Space line posts 3 m apart, measured parallel to ground surface.

3.2.4 Space straining posts at equal intervals not exceeding 150 m if distance between end or corner posts on straight continuous lengths of fence over reasonably smooth grade is greater than 150 m.

3.2.5 Install additional straining posts at sharp changes in grade and where directed by Engineer.

3.2.6 Install corner post where change in alignment exceeds 10°.

3.2.7 Install end posts at end of fence and at buildings. Install gate posts on both sides of gate openings.

3.2.8 Place concrete in post holes then embed posts into concrete to depths indicated. Extend concrete 50 mm above ground level and slope to drain away from posts. Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.

3.2.9 Do not install fence fabric until concrete has cured a minimum of 5 days.

3.2.10 Install brace between end and gate posts and nearest line post, placed in centre of panel and parallel to ground surface. Install braces on both sides of corner and straining posts in similar manner.

3.2.11 Install overhang tops and caps.

3.2.12 Install top rail between posts and fasten securely to posts and secure waterproof caps and overhang tops.

3.2.13 Install bottom tension wire, stretch tightly and fasten securely to end, corner, gate and straining posts with turnbuckles and tension bar bands.

3.2.14 Lay out fence fabric. Stretch tightly to tension recommended by manufacturer and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands spaced at 300 mm intervals. Knuckled selvedge at bottom. Twisted selvedge at top.

3.2.15 Secure fabric to top rails, line posts and bottom tension wire with tie wires at 450 mm intervals. Give tie wires minimum two twists.

3.2.16 Install barbed wire strands and clip securely to lugs of each projection.

3.2.17 Install grounding rods as indicated

3.3 Installation of Gates

3.3.1 Install gates in locations as indicated.

3.3.2 Level ground between gate posts and set gate bottom approximately 40 mm above ground surface.

3.3.3 Determine position of centre gate rest for double gate where required. Cast gate rest in concrete as directed. Dome concrete above ground level to shed water.

3.3.4 Install gate stops where indicated

3.4 Touch up

3.4.1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to damaged areas. Pre-treat damaged surfaces according to manufacturers' instructions for zinc-rich paint.

3.5 Cleaning

3.5.1 Clean and trim areas disturbed by operations. Dispose of surplus material and replace damaged turf with sod as directed by Engineer.

END OF SECTION 02821

1 GENERAL

1.1 Related Work

1.1.1 Section 02231 – Clearing and Grubbing.

1.1.2 Section 02311 – Site Grading.

1.2 Standards

1.2.1 Unless otherwise approved or directed by the Authorized Person, supply materials and install works to BC Landscape Standard, 6th Edition – British Columbia Society of Landscape Architects and BC Landscape and Nursery Association.

1.3 Definitions

1.3.1 COMPOST: A mixture of soil and decomposing organic matter used as a fertilizer, mulch, or soil conditioner. Compost is processed organic matter containing 40% or more organic matter as determined by the Walkley-Black or LOI test. Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below 50, and contain no toxic or growth inhibiting contaminates. Composed bio-solids must meet the requirements of the Guidelines for Compost Quality, Category A produced by the Canadian Council of the Ministers of the Environment (CCME), January 1996.

2 PRODUCTS

2.1 Topsoil

2.1.1 Topsoil for seeded areas: mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.

2.1.2 Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70 % sand, minimum 7 % clay, and contain 2 to 10 % organic matter by weight.

2.1.3 Contain no toxic elements or growth inhibiting materials.

2.1.4 Finished surface free from:

2.1.4.1 Debris and stones over 50 mm diameter.

2.1.4.2 Coarse vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.

2.1.4.3 Consistence: friable when moist.

2.2 Soil Amendments

2.2.1 Fertilizer: industry accepted standard medium containing nitrogen, phosphorous, potassium and any other micro-nutrients suitable to the specific plant species or application or defined by the soil test.

2.2.1.1 Fertility: major soil nutrients present in following amounts:

i) Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.
ii) Phosphorus (P): 40 to 50 micrograms of phosphate per gram of topsoil.
iii) Potassium (K): 75 to 110 micrograms of potassium per gram of topsoil.
iv) Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
v) Ph value: 6.5 to 8.

2.2.2 Peat Moss:

2.2.2.1 Derived from partially decomposed species of Sphagnum Mosses.

2.2.2.2 Elastic and homogeneous, brown in colour.

2.2.2.3 Free of wood and deleterious material which could prohibit growth.

2.2.2.4 Shredded particle minimum size: 5 mm.

2.2.3 Sand: washed coarse silica sand, medium to course textured.

2.2.4 Organic matter: compost Category A, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.

2.2.5 Use composts meeting Category B requirements for land fill reclamation and large scale industrial applications.

2.2.6 Limestone:

2.2.6.1 Ground agricultural limestone.

2.2.6.2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

2.3 Source Quality Control

2.3.1 Advise Engineer of sources of topsoil to be utilized with sufficient lead time for testing.

2.3.2 Contractor is responsible for amendments to supply topsoil as specified.

2.3.3 Soil testing by recognized testing facility for PH, P and K, and organic matter.

2.3.4 Soil sampling, testing and analysis to be in accordance with Provincial standards.

3 EXECUTION

3.1 Preparation of Existing Grade

3.1.1 Verify that grades are correct. If discrepancies occur, notify Engineer and do not commence work until instructed by Engineer.

3.1.2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.

3.1.3 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 off site.

3.1.4 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm. Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.2 Placing and Spreading of Topsoil

3.2.1 Place topsoil after Engineer has accepted subgrade.

3.2.2 Spread topsoil in uniform layers not exceeding 150 mm.

3.2.3 For sodded areas keep topsoil 15 mm below finished grade.

3.2.4 Spread topsoil to the minimum depths (after settlement) indicated.

3.2.5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.3 Soil Amendments

3.3.1 Where required, apply and thoroughly mix soil amendments to the depths and concentrations indicated.

3.4 Finish Grading

3.4.1 Grade to eliminate rough spots and low areas and ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.

3.4.2 Consolidate topsoil to required bulk density using equipment approved by Engineer. Leave surfaces smooth, uniform and firm against deep footprinting.

3.5 Acceptance

3.5.1 Test topsoil for Nitrogen-Phosphorous-Potassium (NPK) fertility to verify fertilizer requirements and application rates.

3.5.2 Apply fertilizer as required per test results.

END OF SECTION 02911