City of Coquitlam

Contract Documents
87419

Nelson Street Watermain and PRV Installation

Table of Contents

Contract No. 87419

Nelson Street Watermain and PRV Installation

Project Construction Documents

Table of Contents

The complete **Project Construction Documents** consist of the following parts:

1. Standard Documents – supplied **Page**

Table of Contents

2. Standard Documents – not supplied

i) (available in the "MMCD – General Conditions, Specifications and Standard Detail Drawings")

- Instructions to Tenderers
- General Conditions
  - Schedule 17.5.3 – Letter Agreement with Referee
  - Flow Chart – Changes and Extra Work
  - Flow Chart – Dispute Resolution
- Specifications
- Standard Detail Drawings

ii) City of Coquitlam Supplementary Specifications for Contract Documents

Invitation to Tender

INVITATION TO TENDER

DATE OF ISSUE: **June 10, 2026**

We acknowledge with gratitude and respect that the name Coquitlam was derived from the hən̓q̓əmiń əm̓ word kʷikʷəƛ̓əm (kwee-kwuh-tlum) meaning "Red Fish Up the River". The City is honoured to be located on the kʷikʷəƛ̓əm (Kwikwetlem) traditional and ancestral lands, including those parts that were historically shared with the sq̓əc̓iy̓aʔɬ təməxʷ (Katzie), and other Coast Salish Peoples.

Tender No. 87419

Nelson Street Watermain and PRV Installation

The City of Coquitlam invites tenders for **Contract 87419 – Nelson Street Watermain and PRV Installation**, generally consisting of the following, but not limited to:

- Supply and installation of a PRV station;
- Approximately 500 meters of new DI watermain;
- Other miscellaneous and incidental works as further described in the Contract Documents.

Tender Documents and Drawings are available for downloading from the City of Coquitlam website: www.coquitlam.ca/BidOpportunities

Printing of Tender documents and drawings is the sole responsibility of the Tenderers.

Tenders submitted must be accompanied by a copy of the original specified 10% Bid Bond and will be received:

On or Before 2:00 pm local time
July 6, 2026
("Closing Date and Time")

Addenda

Tenderers are required to check the City's website for any updated information, issued before the Closing Date at: www.coquitlam.ca/BidOpportunities. **Where in its sole discretion it considers it to be necessary or desirable, the City may issue Addenda to amend any portion of the Contract Documents.**

Any changes to the Tender documentation will be issued by means of written Addenda and posted on the City's website and will form part of the Tender. No amendment of any kind to the Tender is effective unless it is posted in a formal written Addendum on the City website. Upon submitting a Tender, Tenderers will be deemed to have received notice of all Addenda that are posted on the City's website and deemed to have considered the information for inclusion in the Tender submitted.

The City does not retain a bidder's list or bidder's registry. Tenderers are encouraged to register as plan takers and may view the Tender Documents and Drawings by contacting the Vancouver Regional Construction Association (VRCA), website: www.my.vrca.ca, ph: 604-294-3766, or email at vrca@vrca.ca, quoting the Coquitlam Tender Reference Number.

Should there be any discrepancy in the documentation provided, the City's original file copy shall prevail.

Tenders shall remain open for acceptance for 60 days following the submission Closing Date.

The City reserves the right to accept or reject any or all Tenders and the lowest or any Tender may not necessarily be accepted. The City also reserves the right to cancel any request for Tender at any time without recourse by the Tenderer.

The City, prior to award of any Tender, may negotiate with the Tenderer presenting the lowest price compliant Tender, for changes in the Work, materials, specifications or conditions without having any duty or obligation to advise any other Tenderers or to allow them to modify their Tenders, and the City will have no liability to any Tenderer as a result of such negotiations or modifications.

The City will not be responsible for any costs incurred by the Tenderer in preparing the Tender.

Procurement of goods and services is conducted in accordance with Chapter 5 of the Canadian Free Trade Agreement (CFTA) and the New West Partnership Trade Agreement (NWPTA).

M. Pain
Manager Procurement

Instructions to Tenderers

Tender 87419

Nelson Street Watermain and PRV Installation

INSTRUCTIONS TO TENDERERS

TABLE OF CONTENTS **Page**

INSTRUCTIONS TO TENDERERS

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

The City of Coquitlam

Contract: **Nelson Street Watermain and PRV Installation**

Reference No. **87419**

1.0 Introduction

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

- Supply and installation of a PRV station;
- Approximately 500 meters of new DI watermain;
- Other miscellaneous and incidental works as further described in the Contract Documents.

1.2 All inquiries regarding this Tender are to be submitted in writing referencing the **Tender Name and Number** sent to:

E-mail **bid@coquitlam.ca**

The deadline for inquiries is **12:00 PM** local time, **Tuesday, June 30 2026.**

INQUIRIES RECEIVED AFTER THIS DATE AND TIME MAY NOT RECEIVE A RESPONSE.

2.0 Tender Documents

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

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

2.3 Any additional information made available to Tenderers prior to the Tender Closing Time by the Owner or representative of the Owner,

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

3.0 Submission of Tenders

3.1 Tenders must be submitted on the Tender Form provided, accompanied by a copy of the original 10% Bid Bond quoting the Tender Name and Number, and be uploaded to the City's file transfer website.

Tenders must be received on or before:

Tender Closing Time: **2:00 p.m. local time**
Tender Closing Date: **July 6, 2026**

For the purpose of the Tender submission, digital copies of original documents and signatures sent electronically are accepted. Original documents are required upon request by the City.

Instructions for Tender Submission

3.2 **Tender submissions are to be** consolidated into one (1) .pdf file and **uploaded electronically through QFile, the City's file transfer service accessed at website:** https://qfile.coquitlam.ca/filedrop/purchasing

1. **In the "From" field enter:** Tenderers email address
2. **In the "Subject" field enter:** Tender Name
3. **In the "BID Number" field enter:** Tender Number
4. **In the "Type" field enter: New** if this is a new submission or **Update** if this is an updated submission
5. **Add consolidated Tender files in Adobe PDF format, and Appendix 1 in Microsoft Excel XLS format, and Send** (ensure your web browser remains open until you receive a files sent message. You will also receive an email from QFile confirming the submission)

Tenderers are responsible to allow ample time to complete the Tender submission process. If assistance is required, phone 604-927-3037.

3.3 Tenders submitted shall be deemed to be received when displayed as a new email in the in-box of the above email address. The City will not be responsible for any delay or for any Tenders not received for any reason, including technological delays or issues by either party's network or email program, and the City will not be liable for any damages associated with Tenders not received.

3.4 The City reserves the right to accept late Tenders to allow for technological delays. The City also reserves the right to accept Tenders by email: bid@coquitlam.ca.

BIDS RECEIVED IN-PERSON, BY COURIER, OR BY FAX WILL NOT BE ACCEPTED.

3.5 Tenders will not be opened in public. The unevaluated results will be forwarded to participants by email.

3.6 Tender submissions are subject to the Freedom of Information and Protection of Privacy Act and contents may be disclosed if required to do so, pursuant to the Act.

4.0 Additional Instructions to Tenderers

Additional Instructions to Tenderers

Obtaining Documents

4.1 The following documents which are referred to and form part of the Contract Document package may be obtained as follows:

- Copies of the Master Municipal Construction Documents Volume II (2009), General Conditions, Specifications and Standard Detail Drawings are available separately from:

  Support Services Unlimited
  Suite 102
  211 Columbia Street
  Vancouver, B.C. V6A 2R5
  Tel: 604-681-0295
  Fax: 604-305-0424

- Copies of the City of Coquitlam Supplementary Specifications and Detailed Drawings to the MMCD 2009 Edition are available for viewing and downloading off the City of Coquitlam website: Supplementary Specifications and Detailed Drawings to MMCD

Test Excavations

4.2 Prior to the excavation of test holes on road allowances or privately owned property the Tenderer shall obtain permission from the Municipality or Owner of the property and comply with their requirements for restoration of disturbed surfaces and utilities. Failure to comply with Municipal by-laws restricting this practice may result in prosecution of the offending party.

Business License

4.3 The successful Tenderer shall provide evidence of a City of Coquitlam Business License or Tri-Cities Inter-Municipal Business License prior to commencement of work or supply of materials. For more information, contact Business License Division Ph: 604-927-3085 or apply online at website: City of Coquitlam Business License

No Claim

4.4 Except as expressly and specifically permitted in these Instructions to Tenderers, no Tenderer shall have any claim for any compensation of any kind whatsoever, as a result of participating in

this Tender, including accepting a non-compliant bid and by submitting a Tender, each Tenderer shall be deemed to have agreed that it has no claim.

No Cost 4.5 The City will not under any circumstances be responsible for any costs incurred by the Tenderer in preparing the Tender.

Right to Accept or Reject any Tender 4.6 The City reserves the right to accept or reject any or all Tenders and the lowest or any Tender may not necessarily be accepted. In its sole discretion, the City may reject or retain for its 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 set out in these instructions to tenderers.

The City specifically reserves the right to reject all Tenders if none is considered to be satisfactory and, in that event, at its option, to call for additional Tenders.

Negotiation 4.7 The City, prior to award of any Tender, may negotiate with the Tenderer presenting the lowest price compliant Tender, for changes in the Work, materials, specifications or conditions without having any duty or obligation to advise any other Tenderers or to allow them to modify their Tenders, and the City will have no liability to any Tenderer as a result of such negotiations or modifications.

Cancellation of Tender 4.8 The City reserves the right to cancel any request for Tender at any time without recourse by the Tenderer. The City has the right to not award this work for any reason including choosing to complete the work with the City's own forces.

Conflict of Interest 4.9 Tenderers shall disclose any actual or potential conflicts of interest and existing business relationships it may have with the City, their elected or appointed officials or employees.

Collusion 4.10 Tenderers will not discuss or communicate with one another in regards to the preparation of their Tenders. Each Tenderer will ensure that its participation in the Tender process and that of its team members is conducted without collusion or fraud. Failure to comply with this requirement may lead to disqualification without further notice or warning.

Instruction to Tenderers – Part II Delete Instructions to Tenderers – Part II Contained in the Edition of the Publication "Master Municipal Construction Documents 2009" and replace with the following:

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

5.1.1 if the tenderer is a partnership or joint venture then the name of the partnership or joint venturer

should be included, and each partner or joint venturer should sign personally; if a partner of joint venture is a corporation then such corporation should sign as indicated in paragraph 5.1.3 below; and

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

5.1.3 For the purpose of the Tender submission, digital copies of original documents and electronic signatures are accepted. Original documents are required upon request by the City.

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

5.2.1 a copy (digital or Electronic copy is acceptable) of the original bid bond in an amount equal to 10% of the Tender Price, issued by a surety licensed to carry on the business of suretyship in British Columbia in a form reasonably satisfactory to the *Owner*;

5.3 Tenderer should be competent and capable of performing the various items of work. Tenderer shall complete the following statement sheets appended to the Form of Tender:

5.3.1 Appendix 1 – the Schedule of Quantities and Prices;

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

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

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

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

5.3.6 Appendix 7 – is provided for information only, to indicate the Contract Insurance is to be submitted by the successful Tenderer upon Notice of Award.

5.4 The successful tenderer will, within 15 *Days* of receipt of the written *Notice of Award*, be required to deliver to the *Owner* the items listed in FT 5.1.1, including a Performance Bond and a Labour and Material Payment Bond as described in FT 5.1.1(a), failing which the provisions of FT 6.1 will apply.

6.0 Qualifications, Modifications, Alternative Tenders

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

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

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

7.0 Approved Equals

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

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

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

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

8.0 Inspection of the *Place of the Work*

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

Place of the Work which were reasonably foreseeable by a contractor qualified to undertake the *Work*.

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

9.0 Interpretation of *Contract Documents*

9.1 If a tenderer is in doubt as to the correct meaning of any provision of the *Contract Documents*, the tenderer may request clarification as instructed in paragraph 1.2 of the Instructions to Tenderers.

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

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

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

10.0 Prices

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

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

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

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

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

11.0 Taxes

11.1 The tendered prices shall cover all taxes and assessments of any kind payable with respect to the *Work*, but shall not include *GST*. *GST* shall be listed as a separate line item as required by GC 19.3.

12.0 Amendment of Tenders

12.1 A tenderer may amend or revoke a tender by giving written notice, delivered by Email, to the office referred to in paragraph 3.4 of the Instructions to Tenderers at any time up until the *Tender Closing Date and Time*. An amendment or revocation that is received after the *Tender Closing Date and Time* shall not be considered and shall not affect a tender as submitted.

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

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

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

"Contract: _____
(TITLE OF CONTRACT)

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

TO: _____
(NAME OF OWNER)

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

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

and substituting the following revised tendered prices or items:

_____
_____
_____
(REVISED TENDERED PRICES OR TENDER ITEMS)

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

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

13.0 Duration of Tenders

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

14.0 Qualifications of Tenderers

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

15.0 Award

15.1 In exercising its discretion, the *Owner* will have regard to the information provided in the Appendices to the Form of Tender as described under IT 5.3 including the proven experience of the tenderer, and any listed subcontractors, to do the *Work*.

Tenders received will be evaluated to provide the City with greatest value based on quality, service, price and experience. Evaluation Criteria will include but is not limited to:

1. Ability to meet specifications and required completion date
2. Contractor's past experience, references, reputation and compliance to specifications
3. Demonstrated successful experience on similar projects and specific equipment installation
4. Price: purchase price, maintenance costs, availability of parts and service, warranty and compatibility with existing equipment and/or conditions
5. Any other criteria, the City deems, at its sole discretion, necessary to evaluate Tenders;
6. Lowest price will not necessarily be accepted.

The City may, in its absolute discretion, not award to a Tenderer if the Tenderer, or any officer or director of a corporate Tenderer, is or has been engaged, either directly or indirectly through another corporation or legal entity, in a legal action against the City and its elected and appointed officers and employees or any of them in relation to:

a) any other contract or services; or

b) any matter arising from the City's exercise of its powers, duties or functions under the *Local Government Act,* the *Community Charter* or any other enactments; within five years of this Tender Offer.

For purposes of this section, the words "legal action" includes, without limitation, mediation, arbitration, hearing before an administrative tribunal or lawsuit filed in any court.

Without limiting the City's sole discretion, in determining whether or not to award to a Tenderer pursuant to this clause, the City will consider such factors as whether the legal action is likely to affect the Tenderer's ability to work with the City and its employees, agents, consultants and representatives or any of them and whether the City's past experience with the Tenderer in the matter that resulted in the legal action indicates that the City is likely to incur increased staff and legal costs or either of them in the administration of this contract if it is awarded to the Tenderer.

In the event that the lowest total Tender Price by two or more Tenderers is the same amount, the City will select a Tenderer with an overall satisfactory performance record in having completed work on previous relevant projects that are provided as references, and on City projects. Information obtained from references will not be disclosed or discussed with any Tenderer. If all references are equal, selection will be determined by a coin toss in a manner to be directed by the City.

Where only one Tender is received the City may reject such and re-tender on a selected basis.

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

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

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

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

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

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

(ii) if the test extended total for the tender item exceeds 1% of the revised total *Tender Price*,

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

(iii) if the tender is not rejected under subparagraph (ii) of this IT 15.3 (c), then the unit price and the extended total for that tender item shall both be deemed to be, and the costs for that tender item shall be zero deemed to be included in other tender items prices;

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

16.0 Subcontractors

16.1 The *Owner* reserves the right to object to any of the subcontractors listed in a tender. If the *Owner* objects to any of the subcontractor(s) then the *Owner* will permit a tenderer to, within 5 days, propose a substitute subcontractor(s) acceptable to the *Owner* provided that there is not resulting adjustment in the *Tender Price* or the completion date set out in paragraph 2.2 of the Form of Tender. A tenderer will not be required to make such substitution and, if the *Owner* objects to a listed *Subcontractor(s)*, the tenderer may, rather than propose a substitute subcontractor(s), consider its tender rejected by the *Owner* and by written notice withdraw it tender. The *Owner* shall, in the event, return the tenderer's bid security

17.0 Optional Work

17.1 If the *Schedule of Quantities and Prices* includes any tender prices for *Optional or Provisional Work*, as defined in GC 7.4.1, the tenderers must complete all the unit prices for such *Optional or Provisional Work*. Such tender prices shall not include any general overhead costs, or other costs, or profit, not directly related to the *Optional or Provisional Work*.

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

Form of Tender

Form of Tender

Tender No. 87419

Nelson Street Watermain and PRV Installation

Summary

Name of ***Contractor***: _____

Tender Price *(*exclude GST): $ _____
(FROM APPENDIX 1 OF FORM OF TENDER)

Tender submitted must be accompanied by a copy of the original 10% Bid Bond and will be received

On or before 2:00 pm (local time)
Monday, July 6, 2026

Instructions for Tender Submission

Tender submissions are to be consolidated into one (1) .pdf file and **uploaded electronically through QFile, the City's file transfer service accessed at website:**
https://qfile.coquitlam.ca/filedrop/purchasing

1. **In the "From" field enter:** Tenderers email address
2. **In the "Subject" field enter:** Tender Name
3. **In the "BID Number" field enter:** Tender Number
4. **In the "Type" field enter: New** if this is a new submission or **Update** if this is an updated submission
5. **Add consolidated Tender files in Adobe PDF format, and Appendix 1 in Microsoft Excel XLS format, and Send** (ensure your web browser remains open until you receive a files sent message. You will also receive an email from QFile confirming the submission)

Tenderers are responsible to allow ample time to complete the Tender submission process. If assistance is required, phone 604-927-3037.

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

Contract Name: **Nelson Street Watermain and PRV Installation**
Reference No.: **87419**

TO OWNER:

1 WE, THE UNDERSIGNED:

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

_____
_____
_____;
(ADDENDA, IF ANY)

1.2 shall fully disclose any actual or potential conflicts of interest and existing business relationships we may have with the City, their elected or appointed officials or employees:

_____

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

1.4 have complied with the Instructions to Tenderers; and

2 ACCORDINGLY WE HEREBY OFFER:

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

2.2 to achieve *Substantial Performance* of the *Work* on or before **October 30, 2026**; and

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

3 WE CONFIRM:

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

3.2 that we understand and agree that the owner is in no way obliged to accept this Tender.

4 WE CONFIRM:

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

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

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

4.1.3 the Certificate of Compliance on the form provided in Appendix 7 of this Form of Tender.

5 WE AGREE:

5.1 that this tender will be irrevocable and open for acceptance by the *Owner* for a period of **60** calendar days from the day following the *Tender Closing Date and Time*, even if the tender of another Tenderer is accepted by the *Owner*. If within this period the *Owner* delivers a written notice ("*Notice of Award*") by which the *Owner* accepts our tender we will:

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

a) a Performance Bond and a Labour and Material Payment Bond, each in the amount of 50% of the *Contract Price*, issued by a surety licensed to carry on the business of suretyship in the province of British Columbia, and in a form acceptable to the *Owner*;

b) a "clearance letter" indicating that the Tenderer is in WCB compliance; and

c) a copy of the insurance policies as specified in SGC Section 24 indicating that all such insurance coverage is in place and;

d) a letter confirming the *Contractor* as “Prime Contractor” for the Contract as specified in SGC Section 21.2.1.

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

5.1.3 sign the Contract Documents as required by GC 2.1.

6 WE AGREE:

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

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

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

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

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

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

7 OUR ADDRESS is as follows:

_____

_____

_____

Phone: _____ - _____ - _____

Email: _____

Attention: _____

This Tender is executed this_____day of_____, 20_____.

Contractor:

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

_____
(AUTHORIZED SIGNATORY)

_____
(AUTHORIZED SIGNATORY)

8 WE CONFIRM:

8.1 our Goods and Services Tax (GST) registration status is as follows:

8.1.1 for information purposes, our GST Registration Number is:

_____
(GST REGISTRATION NUMBER)

or;

8.1.2 by signature hereunder, we certify we are **not required** to provide a registration number:

_____
(AUTHORIZED SIGNATORY)

_____
(AUTHORIZED SIGNATORY)

Appendix 1
FORM OF TENDER

Contract 87419
Nelson Street Watermain and PRV Installation

SCHEDULE OF QUANTITIES AND PRICES

(see paragraph 5.3.1 of the Instruction to Tenderers)
(All prices and quotations including the Contract Prices shall Exclude GST)
(Should there be any discrepancy in the information provided, the City's original file copy shall prevail)

ITEM NO.	MMCD Ref./ (Supplementary Specifications)	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	EXTENDED AMOUNT
1.00	**01 20 00S**	**PRICE AND PAYMENT PROCEDURES (PACKAGED PRV STATION)**				
1.01	(1.2.4)	Supply and Install of Packaged PRV Station (including excavation, backfill, testing and commissioning and and all items on bill of quantities)	l.s	1		
2.00	**01 58 01S**	**PROJECT IDENTIFICATION**				
2.01	(1.3.1)	Construction Information Signs	ea.	4		
3.00	**03 30 20S**	**CONCRETE WALKS, CURBS AND GUTTERS**				
3.01	(1.4)	Concrete Sidewalk, Connector Walkway & Wheelchair Letdown - 100mm thick – Broom Finished c/w 100mm granular base; and as shown and described in the Contract Documents	sq.m	66		
4.00	**03 40 01**	**PRECAST CONCRETE**				
4.01	1.4.2	Concrete Retaining Wall >1.2m - Allan Block, Reinforced (Includes drainage, gravel footing, geotextile, excavation & backfill), and as shown in Contract Drawings	sq.m	38		
4.02	1.4.3	Concrete Allan Block Stairs and Handrail to 307 Nelson Street	l.s	1		
5.00	**26 05 00S / 01 20 00S**	**COMMON WORK RESULTS - ELECTRICAL / PRICE AND PAYMENT PROCEDURES**				
5.01	(1.13.1) - 26 05 00S (1.2.1) - 01 20 00S	Electrical Kiosk and Associated Equipment and Concrete Slab	l.s	1		
5.02	(1.13.1) - 26 05 00S (1.2.2) - 01 20 00S	PRV Chamber Electrical	l.s	1		
5.03	(1.13.1) - 26 05 00S (1.2.3) - 01 20 00S	BC Hydro Connection	l.s	1		
6.00	**31 11 01**	**CLEARING AND GRUBBING**				
6.01	1.4.2	Tree Removals	ea.	1		
7.00	**31 23 01S**	**EXCAVATION, TRENCHING AND BACKFILL**				
7.01	(1.10.3)	Over Excavation (Provisional)	cu.m	10		
7.02	(1.10.9)	Import Backfill, 25mm crushed granular base (Provisional)	cu.m	350		
8.00	**31 24 13S**	**ROADWAY EXCAVATION, EMBANKMENT & COMPACTION**				
8.01	(1.8.5)	Common Excavation Including Offsite Disposal (Includes Retaining Walls)	cu.m	50		
8.02	(1.8.5)	Remove Existing Sidewalks (All Depths) (sawcut, removal, offsite disposal)	sq.m	56		
8.03	1.8.7	Imported Embankment Fill	tonne	30		
9.00	**32 31 13**	**CHAINLINK FENCES AND GATES**				
9.01	1.5.4	1.2 m Handrails (MMCD C14)	l.m.	23		
10.00	**32 91 21S**	**TOP SOIL AND FINISH GRADING**				
10.01	(1.4.1)	Imported Topsoil - 150mm Thick for Sod	cu.m	25		
11.00	**32 92 23S**	**SODDING**				
11.01	(1.8.1)	Sodding	sq.m	140		
12.00	**33 11 01S**	**WATERWORKS**				
12.01	(1.8.2)	150 mm Class 50 DI Watermain c/w Temporary Pavement Restoration	l.m	95		
12.02	(1.8.2)	200 mm Class 50 DI Watermain c/w Temporary Pavement Restoration	l.m	21		
12.03	(1.8.2)	250 mm Class 50 DI Watermain c/w Temporary Pavement Restoration	l.m	429		
12.04	(1.8.4)	Transfer ex 19mm Service Connections - COQ-W2I or COQ-W2k as shown in Contract Drawings	ea.	10		
12.05	(1.8.4)	Proposed 19mm Service Connections - COQ-W2I or COQ-W2k as shown in Contract Drawings	ea.	5		
12.06	(1.8.4)	Proposed 50mm Service Connections - COQ-W2E as shown in Contract Drawings	ea.	2		
12.07	(1.8.4)	Water Service Meter Box and Assembly (Excludes Meter)	ea.	7		
12.08	(1.8.4)	Relocate 19mm Service Connections at 307 Nelson Street - COQ-W2I or COQ-W2k as shown in Contract Drawings (Provisional)	ea.	2		
12.09	(1.8.4)	100mm Service Connections at 1025 Brunette Avenue (not including mainline tee or mainline branch gate valve)	ea.	1		
12.10	(1.8.3)	250 mm Gate Valve	ea.	11		
12.11	(1.8.3)	200 mm Gate Valve	ea.	1		
12.12	(1.8.3)	150 mm Gate Valve	ea.	7		
12.13	(1.8.3)	250 mm 45 deg Bend	ea.	4		

ITEM NO.	MMCD Ref./ (Supplementary Specifications)	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	EXTENDED AMOUNT
12.14	(1.8.3)	250 mm 22.5 deg Bend - Vertical (Provisional)	ea.	5		
12.15	(1.8.3)	250 mm 45 deg Bend - Vertical (Provisional)	ea.	5		
12.16	(1.8.3)	250 mm 90 deg Bend	ea.	2		
12.17	(1.8.3)	200 mm 45 deg Bend	ea.	2		
12.18	(1.8.3)	150 mm 45 deg Bend	ea.	14		
12.19	(1.8.3)	250 mm x 200 mm Reducer	ea.	1		
12.20	(1.8.3)	250 mm x 150 mm Reducer	ea.	4		
12.21	(1.8.3)	250 mm x 250mm x 250mm x 250 mm Cross	ea.	2		
12.22	(1.8.3)	250 mm Tee	ea.	1		
12.23	(1.8.3)	250 mm x 150 mm Tee	ea.	6		
12.24	(1.8.3)	250 mm x 100 mm Tee	ea.	1		
12.25	(1.8.14)	Hydrant Assembly	ea.	3		
12.26	(1.8.13)	Watermain Tie-in complete with cap & abandon existing (Brunette @ Nelson)	ea.	1		
12.27	(1.8.13)	Watermain Tie-in complete with cap & abandon existing (James @ Nelson - East)	ea.	1		
12.28	(1.8.13)	Watermain Tie-in complete with cap & abandon existing (James @ Nelson - North)	ea.	1		
12.29	(1.8.13)	Cap & Abandon Existing (Delestre @ Nelson - West)	ea.	1		
12.30	(1.8.13)	Watermain Tie-in complete with cap & abandon existing (Delestre @ Nelson - East of PRV)	ea.	1		
12.31	(1.8.13)	Watermain Tie-in complete with cap & abandon existing (Thomas @ Nelson - East)	ea.	1		
12.32	(1.8.13)	Watermain Tie-in complete with cap & abandon existing (Thomas @ Nelson - West)	ea.	1		
12.33	(1.8.13)	Watermain Tie-in complete with cap & abandon existing (Stewart @ Nelson - East)	ea.	1		
12.34	(1.8.13)	Watermain Tie-in complete with cap & abandon existing (Stewart @ Nelson - West)	ea.	1		
12.35	(1.8.13)	Watermain Tie-in complete with cap & abandon existing (Walls @ Nelson - North)	ea.	1		
12.36	(1.8.13)	Watermain Tie-in complete with cap & abandon existing (Walls @ Nelson - West)	ea.	1		
12.37	(1.8.13)	Watermain Tie-in complete with cap & abandon existing (Walls @ Nelson - East)	ea.	1		
13.00	**33 40 01 / 01 20 00S**	**STORM SEWERS / PRICE AND PAYMENT PROCEDURES**				
13.01	1.6.5 - 33 40 01 (1.2.4) - 01 20 00S	100mm DR28 PVC Storm Sewer c/w cleanouts, Imported Trench Backfill, tie-in to existing lawnbasin and as shown in Contract Drawings	l.s	1		

Total Tendered Price (exclude GST): _____
(Transfer the amount to Form of Tender Summary Page 1)

Name of Contractor: _____

APPENDIX 2

FORM OF TENDER

Contract 87419
Nelson Street Watermain and PRV Installation

PRELIMINARY CONSTRUCTION SCHEDULE
(See paragraph 5.3.2 of the Instructions to Tenderers)

INDICATE SCHEDULE WITH BAR CHART WITH CONSTRUCTION DURATION

CONSTRUCTION ACTIVITY	JULY		AUGUST				SEPTEMBER				OCTOBER			
	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Substantial Completion Date: **October 30, 2026**

Proposed Disposal Site: _____

APPENDIX 3

FORM OF TENDER

Contract 87419
Nelson Street Watermain and PRV Installation

EXPERIENCE OF SUPERINTENDENT
(See paragraph 5.3.3 of the Instructions to Tenderers)

Proposed Project Superintendent _____

List of Project Experience

PROJECT:		**Dates:**	
Work Description:			
Responsibility:			
Owner/Reference:		**Phone No.:**	

PROJECT:		**Dates:**	
Work Description:			
Responsibility:			
Owner/Reference:		**Phone No.:**	

PROJECT:		**Dates:**	
Work Description:			
Responsibility:			
Owner/Reference:		**Phone No.:**	

APPENDIX 4

FORM OF TENDER

Contract 87419
Nelson Street Watermain and PRV Installation

CONTRACTOR'S COMPARABLE WORK EXPERIENCE
(See paragraph 5.3.4 of the Instructions to Tenderers)

PROJECT:		**VALUE ($):**	
OWNER:		**Phone No.:**	
Work Description:			

PROJECT:		**VALUE ($):**	
OWNER:		**Phone No.:**	
Work Description:			

PROJECT:		**VALUE ($):**	
OWNER:		**Phone No.:**	
Work Description:			

PROJECT:		**VALUE ($):**	
OWNER:		**Phone No.:**	
Work Description:			

APPENDIX 5

FORM OF TENDER

Contract 87419
Nelson Street Watermain and PRV Installation

SUBCONTRACTORS
(See paragraph 5.3.5 of the Instructions to Tenderers)

Trade:		**Tender Item:**	
Work Description:			
Subcontractor:		**Phone No.:**	

Trade:		**Tender Item:**	
Work Description:			
Subcontractor:		**Phone No.:**	

Trade:		**Tender Item:**	
Work Description:			
Subcontractor:		**Phone No.:**	

Trade:		**Tender Item:**	
Work Description:			
Subcontractor:		**Phone No.:**	

Trade:		**Tender Item:**	
Work Description:			
Subcontractor:		**Phone No:**	

APPENDIX 6

FORM OF TENDER

Contract 87419
Nelson Street Watermain and PRV Installation

Bid Bond

NO. _____ $ _____

KNOW ALL MEN BY THESE PRESENTS THAT

_____

As Principal, hereinafter called the Principal, and

_____

As Surety, hereinafter called the Surety, are held and firmly bound unto

_____

As Obligee, hereinafter called the Obligee, in the amount of

_____ Dollars ($_____) lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a written Tender to the Obligee, dated the _____day of _____, 2026, for Contract _____.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the aforesaid Principal shall have the Tender accepted within sixty (60) days from the Closing Date of Tender and the said Principal will, within the time required, enter into a formal contract and give good and sufficient bonds to secure the performance of the terms and conditions of the Contract, then this obligation shall be null and void; otherwise the Principal and Surety will pay unto the Obligee the difference in money between the amount of the bid of the said Principal and the amount for which the Obligee legally contracts with another party to perform the work if the latter amount be in excess of the former.

The Surety shall not be liable for a greater sum than the specified penalty of this Bond.

Any suit under this Bond must be instituted before the expiration of six (6) months from the date of this Bond.

IN TESTIMONY WHEREOF, the Principal has hereto set its hand and affixed its seal, and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its Attorney-In-Fact, this _____ day of _____, 2026.

SIGNED, SEALED AND DELIVERED
In the presence of:

)
)
)
)
_____)

_____
PRINCIPAL

_____
SURETY

APPENDIX 7

FORM OF TENDER

Contract 87419
Nelson Street Watermain and PRV Installation

CERTIFICATE OF COMPLIANCE for CONTRACT INSURANCE

This is provided for information to certify that the Tenderer does hereby undertake and agree to supply to the City of Coquitlam, upon award, contract insurance listed below for the project requirements indicated:

Contract Number: **87419**

Contract Name: **Nelson Street Watermain and PRV Installation**

Description of Work:

- Supply and installation of a PRV station;
- Approximately 500 meters of new DI watermain;
- Other miscellaneous and incidental work as contained in the Contract Documents.

Commercial General Liability: **$5,000,000 limit**

Special Coverage Required:

YES	NO	Special Coverage Description
( )	(X)	Shoring and Underpinning Hazard
( )	(X)	Pile Driving and Vibrations
(X)	( )	Excavation Hazard
( )	(X)	Demolition
( )	(X)	Blasting

We also certify that the insurance coverage will meet the requirements of the Supplementary General Conditions Section 24 – Insurance, included as part of the Contract Documents, and that the proof of insurance will be provided on the City of Coquitlam Certificate of Insurance form, without amendments, except for the exclusions noted above.

_____ _____

Name of Tenderer (printed) *Authorized Signature*

_____

Date

Agreement

AGREEMENT

Between Owner and Contractor

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

THIS AGREEMENT made in duplicate this ____ day of _____ 2026.

Contract: **Nelson Street Watermain and PRV Installation**

***Reference No*. 87419**

BETWEEN:

The City of Coquitlam
3000 Guildford Way
Coquitlam, B.C. V3B 7N2

(the "*Owner*")

AND:

(the "*Contractor*")

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

1 THE WORK - START/COMPLETION DATES

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

1.2 The *Contractor* will commence the *Work* in accordance with the *Notice to Proceed*. The *Contractor* will proceed with the *Work* diligently, will perform the *Work* generally in accordance with the construction schedules as required by the *Contract Documents* and will achieve *Substantial Performance* of the *Work* on or before **October 30, 2026,** subject to the provisions of the *Contract Documents* for adjustments to the *Contract Time*.

1.3 Time shall be the essence of the Contract.

2 CONTRACT DOCUMENTS

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

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

3 CONTRACT PRICE

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

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

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

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

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

4 PAYMENT

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

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

5 RIGHTS AND REMEDIES

5.1 The duties and obligations imposed by the *Contract Documents* and the rights and remedies available hereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.

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

6 NOTICES

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

The *Owner:*

The City of Coquitlam
3000 Guildford Way
Coquitlam, B.C. V3B 7N2

Tel: 604-927-3500

The *Contractor:*

Tel:
Email:
Attention:

The *Contract Administrator*:

The City of Coquitlam
3000 Guildford Way
Coquitlam, B.C. V3B 7N2

Tel:
Email:
Attention:

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

a) immediately upon delivery, if delivered by hand; or
b) immediately upon transmission if sent or received by email; or
c) after 5 days from date of posting if sent by registered mail.

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

7 GENERAL

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

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

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

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

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

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

Contractor:

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

_____
(AUTHORIZED SIGNATORY)

_____
(AUTHORIZED SIGNATORY AND POSITION - PRINT)

Owner:

The City of Coquitlam

_____
Edwin Dela Rosa, AScT
(MANAGER, CAPITAL PROJECTS AND INSPECTIONS)
Representative as Per G.C. 17

_____
Chad Braley, AScT
(SENIOR MANAGER, DESIGN AND CONSTRUCTION)

Nelson Street Watermain and PRV Installation
Reference No: 87419

Schedule 1

Schedule of Contract Documents

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

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

NOTE: The documents noted with "*" are contained in the "Master Municipal Construction Documents – General Conditions, Specifications and Standard Detail Drawings", edition dated 2009. All sections of this publication are included in the *Contract Documents*.

1. Agreement, including all Schedules;
2. The following Addenda:
    - As issued
3. Supplementary General Conditions, if any;
4. General Conditions*;
5. Supplementary Specifications, if any;
6. Detail Specifications, if any;
7. Specifications*;
8. Supplementary Detail Drawings, if any;
9. Standard Detail Drawings*;
10. Executed Form of Tender, including all Appendices;
11. Drawings listed in Schedule 2 to the Agreement –"List of Drawings", if any;
12. Instructions to Tenderers;
13. COQUITLAM "Supplementary Specifications Master Municipal Construction Documents" March 2022

Nelson Street Watermain and PRV Installation

Reference No: 87419

Schedule 2

LIST OF DRAWINGS

(Complete Listing of All Drawings, Plans and Sketches That Are Part of the Contract Documents)

Bound in this Document:

Appendix A: Traffic Management Detail Specifications

Appendix B: Archaeological Chance Find Procedures

Bound Separately: Contract Drawings

TITLE	SHEET NO.	REVISION NO.	DATE
Delestre Avenue PRV and Watermain – Cover Page			
Nelson Street – Watermain - Notes and Key Plan	1 of 12	5	2026-06-05
Nelson Street – Brunette to James - Watermain – Plan and Profie	2 of 12	7	2026-06-05
Nelson Street – Delestre to Walls - Watermain – Plan and Profie	3 of 12	7	2026-06-05
Nelson Street – Delestre – PRV – Site Plan	4 of 12	5	2026-06-05
Nelson Street – Delestre – PRV – Chamber Plan and Sections	5 of 12	5	2026-06-05
Nelson Street – Delestre Ave – PRV Details 1 of 2	6 of 12	5	2026-06-05
Nelson Street – Delestre Ave – PRV Details 1 of 2	7 of 12	1	2026-06-05
Nelson Street – Delestre – Grading – Plan and Sections	8 of 12	4	2026-06-05
Nelson Street – Delestre – Grading – Cross Section – Sheet 1 of 4	9 of 12	4	2026-06-05
Nelson Street – Delestre – Grading – Cross Section – Sheet 2 of 4	10 of 12	4	2026-06-05
Nelson Street – Delestre – Grading – Cross Section – Sheet 3 of 4	11 of 12	4	2026-06-05
Nelson Street – Delestre – Grading – Cross Section – Sheet 4 of 4	12 of 12	4	2026-06-05
Delestre PRV Station – Electrical Design – Title Sheet	1 of 1		01-APR-2025
Delestre PRV Station – General Notes	2 of 13		01-APR-2025
Delestre PRV Station – Symbols and Abbreviations	3 of 13		01-APR-2025
Delestre PRV Station – Site Plan	4 of 13		01-APR-2025
Delestre PRV Station – Area Enlargement	5 of 13		01-APR-2025
Delestre PRV Station – Single Line and Control Block Diagram	6 of 13		01-APR-2025
Delestre PRV Station – Elevations - Kiosk	7 of 13		01-APR-2025
Delestre PRV Station – Details – FM and PRV Chamber Layout	8 of 13		01-APR-2025
Delestre PRV Station – Details – Communication Panel Layout	9 of 13		01-APR-2025
Delestre PRV Station – Details – IO Wiring	10 of 13		01-APR-2025
Delestre PRV Station – Details – Radio Antenna	11 of 13		01-APR-2025
Delestre PRV Station – Typical Electrical Wiring Terminations	12 of 13		01-APR-2025
Delestre PRV Station – Typical Electrical Wiring Terminations	13 of 13		01-APR-2025

Supplementary General Conditions

SUPPLEMENTARY GENERAL CONDITIONS

TABLE OF CONTENTS

1.0 DEFINITIONS

1.1 Abnormal Weather 1.1.1 **(Replace clause 1.1.1 as follows):**
Abnormal Weather" means temperature, precipitation, wind or other weather conditions in which the monthly average, differs from the statistical average for that condition in that period by more than one standard deviation, calculated based on data available from Environment Canada. Coquitlam's Burke Mountain Rain Gauge will be used to compare the rainfall summary versus the available data from Environment Canada.
City of Coquitlam Rainfall

2.0 DOCUMENTS

2.2 Interpretation 2.2.4 (1) **(Replace clause 2.2.4 (1) as follows):**
The Contract Documents shall govern and take precedence in the following order as listed in Schedule 1 of the Agreement, taking precedence over all Contract Documents.

4.0 CONTRACTOR

4.1 Control of the Work 4.1.1 ***(Add to clause 4.1.1 as follows):***
The *Contractor* is responsible for all survey layout for the construction of the Work to the design specifications and/or elevations as shown on the contract drawings or as amended on site by the Contract Administrator, unless otherwise described in the Contract Document.

4.1.2 ***(Add to clause 4.1.2 as follows):***
The Contractor shall not deposit any material upon any street, sidewalk, boulevard or other property, without the Contract Administrator's or the Owner's permission, nor shall they allow the same to remain longer than necessary. All surplus spoil and rubbish and other waste material shall be removed from the site so that the area of work is cleaned up and restored to as clean a condition as it was before the Contract started, within four days of the Contract Administrator's written request to do so, failing which the Owner may carry out the work or have the work carried out by others and recover the costs from the Contractor or may deduct the cost from any monies due or that may become due to the Contractor.

4.1.3 ***(Add new clause 4.1.3 as follows):***
Work can be performed during the normal weekday working hours of 0700h to 1900h, unless specified otherwise in Supplementary Specifications - Appendix A:

Traffic Management Detail Specifications. Written permission from the Contract Administrator will be required for any works to be performed outside of the normal working days of Monday to Friday.

No Sunday work will be permitted, except in case of emergency and then only with the written permission of the Contract Administrator and to such extent as he deems necessary.

In case the Contractor decides to work on a day which is a Statutory Holiday, they shall provide the Contract Administrator in writing at least (4) days in advance of such holiday, stating those places where said work is to be conducted. In case the Contractor fails to give such notice in advance of any Statutory Holiday, no work within the terms of the contract shall be done on such holiday.

The cost of inspections on a Sunday or on a Statutory Holiday by City staff/s will be at Contractor's expense.

4.2 Safety

4.2.2 ***(Add new clause 4.2.2 as follows):***
In an emergency, gas pipeline rupture or leak, Contact FortisBC's 24 Hour Emergency Line (1-800-663-9911) and Coquitlam Fire (911) immediately and then City of Coquitlam's Utility Control Centre (604-927-6287).

4.3 Protection of Work, Property and the Public

4.3.1 ***(Replace clause 4.3.1 as follows):***
In performing the Work, the Contractor shall protect the Work and the Owner's property and other person's property from damage. The Contractor shall at the Contractor's own expense make good any such damage which arises as the result of the Contractor's operations. If the Contractor causes damage to private property, the Contractor must obtain a written release from the owner of the damaged property.

4.3.5.1 ***(Add clause 4.3.5.1 as follows):***
The Contractor shall notify the Contract Administrator immediately if damage occurs to any City or third party utility or structure.

4.3.7 ***(Add new clause 4.3.7 as follows):***
Any lands other than those upon which the work is to be performed, which may be required for temporary facilities, storage purposes or access to the work site, other than those provided by the *Owner*, shall be provided by the *Contractor* at their own cost, with no liability to the *Owner*.

4.6 Construction Schedule

4.6.1 ***(Replace clause 4.6.1 as follows):***
The Contractor shall within the time set out in the Form of Tender prepare and submit to the Contract Administrator for their approval a construction schedule (the Baseline Construction Schedule) indicating the planned start and completion dates of major activities of the Work. The Baseline Construction Schedule shall be in more detail than the Preliminary Construction Schedule and shall indicate completion of the Work in compliance with any specified Milestone Dates, including Substantial Performance.

4.6.6 ***(Replace clause 4.6.6 as follows):***
The time for the performance of the Work shall commence on the date specified in the Notice to Proceed, or if not so specified, on the date the Notice to Proceed is issued. The Notice to Proceed will not be issued until the documentation required under paragraph 5.1.1 of the Form of Tender has been submitted and the construction schedule has been approved.

4.6.8 ***(Add new clause 4.6.8 as follows):***
Any requests to lengthen the work schedule shall be made in writing by the Contractor within five working days of knowledge of the reason for the extension. The Contract Administrator will adjust the schedule at their discretion upon receipt of a written request.

4.7 Superintendent

4.7.4 ***(Add new clause 4.7.4 as follows):***
The key personnel named in the Contractor's Tender response, shall remain in these key positions throughout the project. In the event that key personnel leave the Contractor's firm, or for any unknown reason are unable to continue fulfilling their role, the Contractor must propose a suitable replacement, and obtain written consent from the Owner. Acceptance of the proposed replacement is at the sole discretion of the Contract Administrator and the Owner.

4.8 Workers

4.8.2 ***(Add new clause 4.8.2 as follows):***
The Contractor shall, upon the request of the Contract Administrator, remove any person employed by them for the purposes of the Contract who, in the opinion of the Contract Administrator, is incompetent or has conducted themselves improperly, and the Contractor shall not permit a person who has been removed to return to the Place of Work.

4.9 Materials

4.9.3 ***(Add new clause 4.9.3 as follows):***

The Contractor shall, at their cost,

a) Be responsible for storing all of the materials supplied for the Work either by themselves or the Owner, until it has been incorporated into the completed Work;
b) Store all materials in a manner which will prevent damage from the weather, dirt, foreign matter, vandalism and theft;
c) Arrange for and/or verify the time of delivery of all materials to be supplied by themselves or the Owner to ensure that delivery will coincide with their work schedules.
d) Examine with the Contract Administrator the quantities and details of all materials supplied by the Owner at the time and place of delivery or those materials already at the Place of Work, and prepare and sign a Statement of Materials Acceptance, specifically noting and rejecting any defective material;
e) Replace all materials supplied by themselves or the Owner which are found to be stolen, missing or damaged while under their care;
f) Replace all materials found to be defective in manufacture which have been supplied by themselves.

4.11 Subcontractors

4.11.3 ***(Replace clause 4.11.3 as follows):***

The Contractor shall, upon notice of the Contract Administrator, remove any Subcontractor employed by them for the purposes of the Contract who, in the opinion of the Contract Administrator, is incompetent or has conducted themselves improperly, and the Contractor shall not permit the Subcontractor who has been removed to return to the Place of Work. The removal of a Subcontractor under this clause shall not be considered a Change and the Contract Price and the Contract Time shall not be adjusted.

4.12 Test and Inspections

4.12.1 ***(Replace clause 4.12.1 as follows):***

The Contractor shall perform or cause to be performed all tests, inspections and approvals of the Work as described in the Contract Documents or a required by the Contract Administrator as part of Quality Control. The Contractor shall complete all the necessary testing at the frequencies described in the Contract Document unless otherwise approved by the Contract Administrator.

Acceptable test and inspection results will not relieve the Contractor of its obligations under the Contract to correct defects or deficiencies in the Work.

4.12.11 ***(Add clause 4.12.11 as follows):***

Failure to follow DFO/FLNRO BMPs and the approved permit for Instream Works or as instructed by Contract Administrator will result in shut-down of the work. The Contractor must take all steps to mitigate impacts to aquatic resources, environment and habitats before work can re-start on site. No claim will be accepted by the Owner for costs associated with this work shut-down.

4.14 Final Clean-up 4.14.1 ***(Replace clause 4.14.1 as follows):***

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

4.16 Notice of Disruption 4.16.2 ***(Add new clause 4.16.2 as follows):***

Written notice must be provided to all properties which may be physically affected by the construction not less than one week and not more than two weeks prior to construction.

Notify occupants directly affected by the work 48 hours in advance of commencement of construction. Cost of notifying area occupants of ensuing construction and delivery of the notices is incidental to the Contract.

7.0 CHANGES

7.1 Changes 7.1.3 ***(Replace clause 7.1.3 as follows):***

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

7.4 Optional Work 7.4.2 ***(Add new clause 7.4.2 as follows):***

If there are Optional items or Provisional items included in the *Schedule of Quantities and Prices*, those items shall be used only as directed and at the sole discretion of the Contract Administrator through the issue of a Change Order. These items will be paid at the contract unit price as part of regular progress payments. Only quantities used will be eligible for payment. No claim will be accepted for

unused Optional or Provisional quantities. Clause 9.4 Quantity Variations will not be applicable for these items.

9.0 VALUATION OF CHANGES AND EXTRA WORK

9.2 Valuation Method

9.2.4 ***(Replace clause 9.2.4 as follows):***
Once a quotation is accepted by the Contract Administrator, or other agreement reached between the Contract Administrator and the Contractor regarding adjustments to the Contract Price or Contract Time on account of a Change or Extra Work, the Contractor shall not be entitled to claim or receive additional payment, or adjustment to the Contract Time on account of a Change or Extra Work.

9.4 Quantity Variation

9.4.1 ***(Replace clause 9.4.1 as follows):***
If for any reason, including an addition or deletion under GC 7.1.1(1) or 7.1.1(2) respectively, the actual quantity of a unit price item varies by more than plus or minus the Variance Threshold Percentage from the estimated quantity for that unit price item listed in the Schedule of Quantities and Prices (the "Tender Quantity") or as otherwise agreed to pursuant to these Contract Documents, then either the Owner or the Contractor may by written notice request the other party to agree to a revised unit price, considering the change in quantities. A party shall make a request for a revised unit price as soon as reasonably possible after the party concerned becomes aware of the quantity variation.

9.4.2 ***(Delete clause 9.4.2 (2)***

10.0 FORCE ACCOUNTS

10.1 Force Account Costs

10.1.1(1) ***(Add to clause 10.1.1(1) as follows):***
Costs for the Contractor's Superintendent, Project Managers, Health and Safety Personnel, and Office/Administration Staff are not eligible for labour costs as those costs are considered incidental to the mark up owing for overhead and labour.

10.1.1(4) ***(Replace clause 10.1.1(4) as follows):***
Force Account Work performed by a subcontractor shall be paid for in the lesser of: (i) the amount provided by subparagraphs (1), (2) and (3) of this GC, plus a mark-up of 5%, or (ii) the actual amount the Contractor pays the subcontractor including a mark-up of 10% on such actual costs to cover all overhead and profit.

12.0 HAZARDOUS MATERIALS

12.2 Discovery of Hazardous Materials 12.2.2

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

13.0 DELAYS

13.1 Delay by Owner or Contract Administrator 13.1.2

(Add new clause 13.1.2 as follows):
The Owner may at any time suspend the work or any portion thereof provided they give the Contractor five (5) days' written notice of delay. The Contractor shall resume work upon written notice from the Owner. The Contractor shall be entitled to:

a) An extension of the Contract time equivalent to the length of suspension of work.
b) Reimbursement by the Owner for directly related out-of-pocket additional costs, reasonably and necessarily incurred by the Contractor as a result of such suspension. No additional payment will be made to the Contractor for any loss of profits or overhead.

13.3 Unavoidable Delay 13.3.1

(Add to clause 13.3.1 as follows):
Beyond the reasonable control of the Contractor also includes pandemic or community outbreak

13.8 Direction to Stop or Delay 13.8.3

(Add new clause 13.8.3 as follows):
The Contract Administrator may order the Contractor to stop work if at any time the Contract Administrator is of the opinion that there exists a danger to life or property.

13.9 Liquidated Damages for Late Completion 13.9.1

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

(1) An amount of $1,000.00 for each calendar day the actual *Substantial Performance* is achieved after the Substantial Performance Milestone Date; plus

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

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

18.0 PAYMENT

18.1 Preparation of Payment Certificate

18.1.1 ***(Replace clause 18.1.1 as follows):***
The Contract Administrator shall prepare and issue a certificate for the period ending the last calendar day of the month.

18.4 Holdbacks

18.4.2 ***(Add to clause 18.4.2 as follows):***
At the sole discretion of the Contract Administrator, an amount equivalent to 10% of the contract award value or 200% of a reasonable estimate, whichever is higher, may be held without interest until all deficiencies have been remedied and accepted by the Contract Administrator.

18.6 Substantial Performance

18.6.5 ***(Replace clause 18.6.5 as follows):***
The Owner may release any builders lien holdback on the 56th day following the date of Substantial Performance, or other date as required by law, but the Owner may hold back the amounts for any deficiencies or filed builders liens as provided in GC 18.4.2, 18.4.3 and 18.4.4.

18.6.6 ***(Replace clause 18.6.6 as follows):***
The *Contract Administrator*, as defined herein, shall be the *Payment Certifier* responsible under Section 7 of the *Builders Lien Act* for certifying *Substantial Performance* of the *Work* of the *Contractor*, but not the *Work* of *Subcontractors*. The *Contractor* shall cooperate with and assist the *Contract Administrator* by providing information and assistance in a timely manner as the *Contract Administrator* considers necessary to carry out the duties of the *Payment Certifier* for the *Contract*.

The *Contractor* shall be the *Payment Certifier* responsible under Section 7 of the *Builders Lien Act* for certifying *Substantial Performance* of the *Work* of each *Subcontractor*. Prior to certifying completion for a *Subcontractor*, the *Contractor* shall consult the *Contract Administrator* and obtain the *Contract Administrator's* comments on the status of completion by the *Subcontractor*, including any deficiencies or defects in the *Subcontractor's Work* noted by

the *Contract Administrator*. The *Contractor* will indemnify and save the *Owner* harmless from any and all liability the *Owner* may have to anyone arising out of the certification by the *Contractor* of *Substantial Performance* for that *Subcontractor*.

Notwithstanding any other provision of the *Contract*, no payments will be due or owing to the *Contractor* so long as a Lien filed by anyone claiming under or through the *Contractor* remains registered against the Project of any lands, or interest therein, on which *Work* for the project was performed. Failure of the *Contractor* to remove all Liens promptly will entitle the *Owner* to damages.

19.0 TAXES, DUTIES AND GST

19.4 Tariffs or Duties

19.4.1 Tariffs or Duties refer to taxes, levies, or charges imposed by any level of government (including foreign governments) on imported or domestic goods, materials, or equipment used in the performance of the Work. The Contract Price is based on the tariffs and duties in effect as of the date of the Tender Closing. If, after the Tender Closing Date, any new Tariffs or Duties are imposed, or existing rates are materially increased, and such changes directly and demonstrably affect the cost of materials or equipment required for the performance of the Work, the Contractor shall notify the Contract Administrator in writing within ten (10) Working Days of becoming aware of such change, providing supporting documentation, including but not limited to:

(1) Affected materials
(2) Quantity and cost impact
(3) Evidence of original and new tariff rates
(4) Reasonable efforts made to mitigate the cost impact (e.g., sourcing alternatives)

19.4.2 If the Contract Administrator is satisfied that the Contractor has incurred additional direct costs solely due to the change in Tariffs or Duties, the Owner will issue a Change Order to adjust the Contract Price accordingly. No adjustment shall be made for Tariffs or Duties that were publicly announced or reasonably foreseeable before the Tender Closing Date.

19.4.3 This clause does not apply to costs incurred due to delays caused by the Contractor's procurement or supply chain management. It also does not apply if the Contractor fails

to take reasonable steps to mitigate the impact of the change.

19.4.4 If the imposition of new Tariffs or Duties causes unavoidable delays in material delivery, the Contractor may request an extension of the Contract Time under GC 13.3, subject to approval by the Contract Administrator.

21.0 WORKERS COMPENSATION REGULATIONS

21.2 Contractor is "Prime Contractor"

21.2.1 ***(Add to clause 21.2.1 as follows):***
Prior to the issuance of the "Notice to Proceed" the Contractor must provide a signed "Prime Contractor Designation" form as provided in Appendix IV of these Supplementary General Conditions.

24.0 INSURANCE ***(Replace section 24.0 as follows):***

24.1 General

24.1.1 **Importance of Prompt Attention to Insurance Requirements:**
The Contractor shall provide the Owner with satisfactory evidence that the insurance required to be provided under this GC is in full force and effect.

24.1.2 **Acceptable Insurance Carriers:**
The insurer issuing any policy, or other document which is evidence of insurance to the Contractor, shall be an insurer licensed by the Superintendent of Insurance in the Province of British Columbia and registered with the Department of Insurance for Canada in Ottawa, except the Insurance Corporation of British Columbia, which is not subject to this condition.

24.1.3 **Owner's Right to Change Terms:**
Notwithstanding anything contained in the Contract Documents, the Owner will have the right to request a change to the specified terms and conditions respecting insurance at the sole option of the Owner. The Contractor will be notified in writing of any changes required by the Owner and will provide a quotation for such work.

24.1.4 **Delivery of Insurance Documents:**
All insurance policies or other acceptable specified documents shall be delivered to, and accepted by, the Owner before the Contract Documents are signed. No work shall be commenced by the Contractor or by anyone acting on the instructions of the Contractor, until the required Insurance Documents have been accepted by the Owner

and the Contract Documents have been duly signed by the Owner and the Contractor.

24.1.5 **Owner's Right to Insure:**
Should the Contractor for any reason not comply with the specified requirements with respect to the insurance, the Owner will, at the Owner's option, have the right to purchase all or any part of such insurance which, in the opinion of the Owner, may be required to provide the specified insurance, and, in the event of so doing, the Owner will have the right to pay the premiums for such insurance and to withhold the amount of premiums so paid from any amount due and payable to the Contractor under the Contract.

24.2 Required Insurance

24.2.1 **General**
Damage to work (excluding Building Contracts where Section 24.3, Paragraph 24.3.1, Further Responsibilities of Contractor, applies).

The Contractor shall be responsible for any and all loss, or damage, whatsoever which may occur on or to the works, completed or otherwise, until such time as the entire works have been completed and the Notice of Acceptance has been issued by the Owner, except that loss or damage caused solely by an act of the Owner. In the event of any loss or damage occurring, the Contractor shall, on notice from the Contract Administrator, immediately put the works into the condition it was immediately prior to such loss or damage, all at the

Contractor's expense, except where such loss or damage was caused solely by an act of the Owner.

The Contractor shall be responsible for any and all loss or damage whatsoever which may occur on or to the works, completed or otherwise, arising out of the negligence of the Contractor, any subcontractors, and the employees or agents of any of them.

24.2.2 **Public Liability Insurance:**
(Other than Automobile Third Party Liability Insurance):

Evidence of Insurance:
The Contractor shall deposit with the Owner, before the work commences, a Certificate of Insurance, signed by an

authorized representative of the insurer, such certificate to be as shown in Appendix III.

Effective Dates and Terms:
The effective date of the Certificate of Insurance shall be the date of the execution of the Contract Agreement and the term of this policy shall be from such effective date until a date not less than twelve (12) months after the date of Substantial Performance completion of all work under the Contract.

Limits of Liability:
For bodily injury and for property damage shall be inclusive limits not less than $5,000,000.

24.2.3 **Public Liability Insurance (Automobile):**
The Contractor shall deposit with the Owner before the work commences a Certificate of Insurance with respect to owned automobiles on ICBC Form No. APV 47 entitled "Confirmation of Insurance Coverage" and with respect to Non-Owned Automobiles including hired automobiles and Contractual Liability on ICBC non-owned automobile policy Form APV 29 (if non-owned automobile coverage is not included under the comprehensive general liability coverage) each signed by an authorized representative of the Insurance Corporation of British Columbia.

24.3 Physical Loss or Damage With Respect to New Buildings under Construction and/or Major Additions to Existing Structures

24.3.1 **Responsibility for Placing Insurance:**
The types of insurance required under this section will be provided and maintained at the expense of the City of Coquitlam during the term of the Contract and will be as follows unless otherwise changed by specific endorsement to these Insurance Specifications.

24.3.2 **Insurance Coverage Required:**
Builders Risk Completed Value "All Risks" Course of Construction Insurance. This policy will be written in the names of the City of Coquitlam and the Contractor with loss payable as their respective interests may appear.

24.3.3 **Responsibility of Contractor – Limitations of cover and deductibles:**
The insurance provided by the City of Coquitlam as described herein will not provide the Contractor with full protection against any and all kinds of loss or damage which may arise out of the Contract. It is, therefore, the

responsibility of the Contractor to fully understand the scope of the cover provided with particular attention to the exclusions, limitations of cover and deductible provisions contained in the Insuring Agreements of the policies and it is further the responsibility of the Contractor to take out at the Contractor's expense, whatever other additional insurance the Contractor may consider necessary or desirable for his protection subject as hereinafter provided. The Contractor shall act in the same manner on insurance made available through the City of Coquitlam as he would if he had arranged such insurance himself.

24.3.4 **Responsibility of Contractor – Direct Damage Insurance:**

If the Contractor fails to do all or anything that is required of them concerning insurance, the City of Coquitlam may do what is required and any monies expended by the City of Coquitlam for that purpose shall be repayable and recoverable from the Contractor. Should any action, failure or negligence of the Contractor result in higher insurance costs being incurred by the City of Coquitlam, such additional costs shall be payable or recoverable from the Contractor.

24.3.5 **Responsibility of Contractor – Machinery and Equipment Belonging to Others:**

Unless otherwise directed by the City of Coquitlam in writing, the Contractor shall carry insurance covering loss or damage to construction machinery, tools and equipment owned by and/or on bare rental from a third party or parties and used by the Contractor in performing the work, which insurance shall be in a form satisfactory to the City of Coquitlam and having coverage in accordance with the actual cash value of such construction machinery, tools and equipment. Such policies shall also provide for subrogation to be waived against the City of Coquitlam. A certified copy of the policy shall be delivered to the City of Coquitlam not later than thirty days after the commencement of work under the Contract.

24.3.6 **Contractor's Waiver of Liability to Coquitlam:**

The Contractor hereby releases the City of Coquitlam from any and all liability for damages to the extent that such damages are covered by the course of construction insurance referred to in Section 24.3 of these specifications.

24.3.7 **Liability of Contractor:**

Neither the providing of insurance by the Contractor or the City of Coquitlam in accordance with the requirements

hereof, nor the insolvency, bankruptcy, nor failure of any insurance company to pay any claim accruing shall be held to waive any of the provisions of this Contract with respect to the liability of the Contractor or otherwise.

24.3.8 **Responsibility of Contractor for protection of work, persons and property:**

The Contractor and all persons employed by the Contractor or under their control, and all employees and subcontractors, shall use due care that no person or property is injured, and that no rights are infringed in the prosecution of the work. Contractors shall take particular care to protect the work against loss or damage caused by riot, vandalism or malicious mischief and shall be at the expense of the Contractor provide all necessary safeguards in the form of watchmen and/or watch dog protection to prevent loss or damage of this type. The payment of deductibles is the responsibility of the Contractor and if not paid by the Contractor such amounts shall be deducted by the City of Coquitlam from payment due to the Contractor. These deductibles will normally be $250.00 each claim.

24.3.9 **Action to be taken in the event of loss or damage to the work covered by the Contract:**

When any loss or damage occurs to the work or to any materials and supplies on the site of the work, the Contractor shall remove any and all damaged or destroyed property and shall rebuild or replace the damaged or destroyed work, materials, or supplies and complete the work to the satisfaction of the Owner. For such removal, rebuilding, or replacing, the Contractor shall be entitled to receive from the Owner the amount of insurance monies received by the Owner pursuant to the said adjustment which amount shall be paid to the Contractor as the work of rebuilding or replacing proceeds, and in accordance with the Agreement. Damage or destruction of the whole or any part of the work shall not affect the rights and obligations of either party under the Agreement, except that in such event the Contractor shall be entitled to such reasonable extension of time to complete the work as the Architect and/or Contract Administrator may decide.

24.3.10 **Further responsibility of Contractor:**

Other than with respect to loss or damage arising out of insured risks and herein before specified, the Contractor shall be responsible for all loss or damage whatsoever which may occur on or to the works completed or otherwise, until such time as the entire works have been completed and the Notice of Acceptance has been issued by

the Owner, except that loss or damage caused solely by an act of the Owner.

In the event of any loss or damage occurring, the Contractor shall on notice from the Owner immediately put the works into the condition it was immediately prior to such loss or damage, all at the Contractor's expense except as previously stated.

24.3.11 **Owner Not Responsible for Loss or Damage or Loss of Use of Property of Contractors and their Employees:**
The Owner will not be responsible for securing or paying for insurance of any kind other than as specified in Section 24.3 of these specifications nor will the Owner have any responsibility whatsoever for loss or damage from whatever cause occurring to property owned, leased, or otherwise in the possession of the Contractor, subcontractors or their employees including, without restricting the generality of the foregoing, machinery, equipment, tools, supplies, and clothing at the construction site or elsewhere including loss of use of same.

24.4 Additional Insured

24.4.1 **The Contractor shall ensure the following are named as "additional insured" on the liability policy for this contract:**

- The City of Coquitlam

The City may identify private properties that are directly affected by construction. If so, the Contractor shall include the legal owners of these properties named as "additional insured" on the liability policy for this contract.

25.0 MAINTENANCE PERIOD

25.1 Correction of Defects

25.1.4 ***(Add new clause 25.1.4 as follows):***
The Owner is authorized to make repairs to defects or deficiencies if, ten days after giving written notice, the Contractor has failed to make or undertake with due diligence the required repairs. However, in the case of emergency where, in the opinion of the Owner, delay is not reasonable, repairs may be made without notice being sent to the Contractor. All expenses incurred by the Owner in connection with repairs made pursuant to GC 25 shall be paid by the Contractor or may be deducted from the Maintenance Security, or other holdbacks. The Contractor shall promptly pay any shortfall.

27.0 CONTRACTOR PERFORMANCE EVALUATION

27.1 ***(Add new clause 27.1 as follows):***

After the completion of the Contract, the Contractor will be evaluated on their performance of the Work. The evaluation will provide percentage scores on the following categories:

1. *Contract Administration*
2. *Construction Management*
3. *Schedule Management*
4. *Communications*
5. *Resource Management and Contractor Performance*
6. *Quality Management*

An evaluation summary report may be issued to the Contractor with scores for each of these categories. Upon request, the Contractor may attend a meeting with the City to discuss the evaluation.

This internal evaluation may be reviewed for reference on subsequent tenders with the City. Evaluation scores can form part of the tender analysis and influence contract award decisions.

Evaluation Scores in categories that are below 50% may result in a suspension of tendering privileges with the City.

APPENDIX I

PERFORMANCE BOND

NO._____ $_____

KNOW ALL MEN BY THESE PRESENTS THAT

_____
As Principal, hereinafter called the Principal, and

_____
As Surety, hereinafter called the Surety, are held and firmly bound unto

_____
As Obligee, hereinafter called the Obligee, in the amount of

_____Dollars
($)

lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a written contract with the Obligee, dated the_____

day of_____20_____, for

_____

_____

in accordance with the drawings and specifications submitted, therefore, which contract, drawings and specifications and addenda thereto, to the extent provided for, are by reference made part hereof and are hereinafter referred to as the Contract.

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if the Principal shall promptly and faithfully perform said Contract (including any addenda thereto, provided such addenda do not collectively increase the amount to be paid to the Principal by more than twenty per cent (20%) of the amount of the Contract except with the written consent of the Surety) then this obligation shall be null and void; otherwise, it shall remain in full force and effect.

Whenever the Principal shall be, and declared by Obligee to be, in default under the Contract, the Obligee having performed Obligee's obligations thereunder, the Surety may promptly remedy the default, or shall promptly:

1. Complete the Contract in accordance with its terms and conditions, or
2. Obtain a bid or bids for submission to Obligee for completing the Contract in accordance with its terms and conditions, and upon determination by Obligee and Surety of the lowest responsible bidder, arrange for a contract between such bidder and Obligee and make available as work progresses (even though there should be a default or a succession of defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term 'balance of the contract price', as used in this paragraph, shall mean the total amount payable by Obligee to Principal under the Contract less the amount properly paid by Obligee to Principal.

Any suit under this Bond must be instituted before the expiration of two (2) years from date on which the Notice of Acceptance under the Contract is issued.

The Surety shall not be liable for a greater sum than the specified penalty of this Bond.

No right of action shall accrue on this Bond to or for the use of any person or corporation other than the Obligee named herein or the heirs, executors, administrators, or successors of Obligee.

IN TESTIMONY WHEREOF, the Principal has hereto set its hand and affixed its seal, and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its Attorney-in-fact, this_____day of_____20_____.

SIGNED, SEALED and DELIVERED
In the presence of

)
)
)
)
)

_____

_____
PRINCIPAL

_____
SURETY

APPENDIX II

LABOUR AND MATERIAL PAYMENT BOND

(Private Contracts – Trustee Form)

NO._____ $_____

Note: This Bond is issued simultaneously with another Bond in favour of the Obligee conditioned for the full and faithful performance of the Contract.

KNOW ALL MEN BY THESE PRESENTS THAT

_____

As Principal, hereinafter called the Principal, and

_____

As Surety, hereinafter called the Surety, are, subject to the conditions hereinafter contained, held and firmly bound unto

_____

As Trustee, hereinafter called the Obligee, for the use and benefit of the Claimants, their and each of their heirs, executors, administrators, successors and assigns in the amount of

_____Dollars

($) lawful money of Canada, for the payment of which sum well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns jointly and severally, firmly by these presents.

SIGNED AND SEALED this_____day of _____, 20____.

WHEREAS, the Principal has entered into a written contract with the Obligee dated the_____ day of_____, 20____, for

_____

_____

which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if the Principal shall make payment to all Claimants for all labour and material used or reasonably required for use in the performance of the Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect, subject, however, to the following conditions:

1. A Claimant for the purpose of this Bond, is defined as one having a direct contract with the Principal for labour, material, or both, used or reasonably required for use in the performance of the Contract, labour and material being construed to include the part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment directly applicable to the Contract provided that a person, firm or corporation who rents equipment to the Principal to be used in the performance of the Contract under a contract which provides that all or any part of the rent is to be applied towards the purchase price thereof shall only be a Claimant to the extent of the prevailing industrial rental value of such equipment for the period during which the equipment was used in the performance of the Contract. The prevailing industrial rental value of equipment shall be determined, insofar as it is practical to do so, in accordance with and in the manner provided for in the latest revised edition of the publication of the Canadian Construction Association entitled "Rental Rates on Contractors' Equipment" published prior to the period during which the equipment was used in the performance of the Contract.
2. The Principal and the Surety hereby jointly and severally agree with the Obligee as Trustee that every Claimant who has not been paid as provided for under the terms of his contract with the Principal before the expiration of a period of ninety (90) days after the date on which the last of such Claimant's work or labour was done or performed or materials were furnished by such Claimant, may as a beneficiary of the trust herein provided for, sue on this Bond, prosecute the suite to final judgment for such sum or sums as may be justly due to such Claimant under the terms of his said contract with the Principal and have execution thereon. Provided that the Obligee is not obliged to do or take any act, action or proceeding against the Surety on behalf of the Claimants or any of them to enforce the provisions of this Bond. If any act, action or proceeding is taken either in the name of the Obligee or by joining the Obligee as a party to such proceedings then such act, action or proceeding shall be taken on the understanding and basis that the Claimants or any of them who take such act, action or proceeding shall indemnify and save harmless the Obligee against all costs, charges and expense or liabilities incurred thereon and any loss or damage resulting to the Obligee by reasons thereof. Provided still further that subject to the foregoing terms and conditions, the Claimants or any of them may use the name of the Obligee to sue on and enforce the provisions of this Bond.
3. No suit or action shall be commenced hereunder by any Claimant:
    a) unless such Claimant shall have given written notice within the time limits hereinafter set forth to each of the Principal, Surety and Obligee, stating with substantial accuracy the amount claimed. Such notice shall be served by mailing the same by registered mail to the Principal, Surety and Obligee at any place where an office is regularly maintained for the transaction of business by such persons or served in any manner in which legal process may be served in the Province or other part of Canada in which the subject matter of the contract is located. Such notice shall be given (i) in respect of any claim for the amount or any portion thereof required to be held back from the Claimant by the Principal under either the terms of the Claimant's contract with the Principal or under the Mechanic's Liens Legislation applicable to the Claimant's contract with the Principal whichever is the greater within one hundred and twenty (120) days after such Claimant should have been paid in full under the Claimant's contract with the Principal; (ii) in respect of any claim other than for the holdback or portion thereof referred to above within one hundred and twenty (120) days after the date upon which such claimant did

or performed the last of the work or labour or furnished the last of the materials for which such claim is made under the Claimant's contract with the Principal.

b) after the expiration of one (1) year following the date on which Principal ceased work on the Contract including work performed under guarantees provided in the Contract.

c) Other than in a court of competent jurisdiction in the Province or District of Canada in which the subject matter of the Contract or any part thereof is situated and none elsewhere, and the parties hereto agree to submit to the jurisdiction of such court.

4. The amount of this Bond shall be reduced by and to the extent of any payments made in good further and in accordance with the provisions which may be filed of record against the subject matter of the Contract, whether or not claim for the amount of such lien be presented under and against this Bond.
5. The Surety shall not be liable for a greater sum than the specified penalty of this Bond.

IN TESTIMONY WHEREOF, the Principal has hereto set its hand and affixed its seal, and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its Attorney-in-fact the day and year first above written.

SIGNED, SEALED and DELIVERED
In the presence of

)
)
)
)
)

_____
PRINCIPAL

_____
SURETY

_____

APPENDIX III

CERTIFICATE OF INSURANCE

This Certificate issued to the City of Coquitlam is to certify that policies of insurance, as described below, have been issued to the Insured named below and are in force at this time. It is understood and agreed that thirty (30) days' prior written notice by registered mail of any material alterations, transfer, assignment or cancellation of any of the policies listed below, either in part or in whole, will be given to the holder of this Certificate.

A. This Certificate is issued to:

City of Coquitlam
3000 Guildford Way
Coquitlam, BC V3B 7N2

Named Insured and Mailing Address:

B. CONTRACT NUMBER AND/OR NAME

Description of the Work:

C. INSURANCE POLICY

Name of Insurer:
Policy Number:
Effective Date:

Liability Limit:
Expiry Date:

D. INSURANCE COVERAGE

COMMERCIAL GENERAL LIABILITY coverage is required to insure against liability from the activities arising out of operations or work in connection with the above-described project, including liability arising out of the use of City property.

D.1 The minimum limit shall be $5,000,000.00 inclusive per occurrence against bodily injury, personal injury and property damage.

D.2 The City of Coquitlam, its employees, officers, agents and volunteers are added as Additional Insureds, but only with respect to operations conducted by or on behalf of the Named Insured in connection with the above-described project, operations or work.

D.3 This insurance shall be primary as regards the City of Coquitlam, its employees, officers, agents and volunteers as Additional Insureds.

D.4 Any deductible or reimbursement clause contained in the policy shall not apply to the City of Coquitlam and shall be the sole responsibility of the Named Insured.

D.5 The insurance shall include the following coverages:

- D.5.1 Cross Liability Clause
- D.5.2 Non-Owned Automobile Liability
- D.5.3 Unlicensed Automobile Liability
- D.5.4 Blanket Contractual Liability
- D.5.5 Broad Form Property Damage Liability
- D.5.6 Owner's & Contractor's Protective Liability
- D.5.7 Products & Completed Operations Liability

D.6 Indicate provision of special coverage for this project as required by the City:

YES	NO	Special Coverage Description
( )	(**X**)	Shoring and Underpinning Hazard
( )	(**X**)	Pile Driving and Vibrations
(**X**)	( )	Excavation Hazard
( )	(**X**)	Demolition
( )	(**X**)	Blasting

Authorized Signature and Stamp

Date

Name and Title

City' broker to return to City Representative

Department

APPENDIX IV

PRIME CONTRACTOR DESIGNATION

Owner: **CITY OF COQUITLAM**
Contractor: _____
Contract / Permit #: **87419**
Project / Workplace: **Nelson Street Watermain and PRV Installation** (the "Project")

By signing this Prime Contractor Designation form, the Contractor hereby:

1. agrees to be, and accepts designation as, the "prime contractor" for the purposes of the Workers Compensation Act, R.S.B.C. 2019, c. 1 (the "Act") and the Occupational Health and Safety Regulation, B.C. Reg. 223/2022 (the "Regulation") in respect of the Project and Workplace noted above;
2. represents and warrants that the Contractor is qualified and capable to perform the duties of prime contractor and that the undersigned signatory has the authority to accept designation as prime contractor and to bind the Contractor;
3. accepts the duty and responsibility for ensuring the activities of employers, workers and other persons at the Workplace relating to occupational health and safety are coordinated and agrees to do everything that is reasonably practicable to establish and maintain a system or process that will ensure compliance with the Act and the Regulation in respect of the Workplace;
4. covenants and agrees to comply with the occupational health and safety provisions of the Act, the Regulation, any other applicable regulations under the Act, and any applicable orders;
5. acknowledges and agrees that the Owner has provided the Contractor the information known to the Owner that is necessary to identify and eliminate or control hazards to the health or safety of persons at the Workplace; and
6. agrees that the designation as prime contractor hereunder may not be assigned or revoked without the prior written consent of the Owner.

Prime Contractor Name: _____

Prime Contractor Address: _____

_____ _____

Prime Contractor Signature **Date**

_____

Print Name

Please return a signed copy of this designation to the City of Coquitlam, 3000 Guildford Way, Coquitlam, BC, V3B 7N2. If you have any questions, please contact the City of Coquitlam Health & Safety Manager at 604-927-3070.

Supplementary Contract Specifications

Supplementary Contract Specifications

to the
MASTER MUNICIPAL SPECIFICATIONS
Volume II – Platinum Book

Nelson Street Watermain and PRV Installation
CONTRACT 87419

TABLE OF CONTENTS

The following Supplementary Specifications are to be considered part of the Specifications. These Supplementary Specifications take precedence over the Master Municipal Specifications.

1.00	**CONTRACT SPECIFIC INSTRUCTIONS**	
1.01	**Schedule of Work**	The Contractor must provide sufficient resources in a continuous effort and site presence to complete all the work within the allotted time. As set out in the MMCD the Contractor must provide updates to the construction schedule biweekly.
1.02	**Outside Agency Approval**	In accordance with the Contract Documents, the Contractor is responsible to consult with and obtain any approval required to meet and comply with all the conditions required from outside agency such as, but not limited to, BC One Call, Metro Vancouver, BC Hydro, Telus, Kinder Morgan, and Fortis BC in the area of the place of Work.
1.03	**Cooperation with Emergency and Maintenance Activities**	The Contractor will be responsible to cooperate with regular maintenance or emergency vehicles and staff for access to the site when required including: • Fire, Police, and Ambulance • Garbage/Recycling pick-up • City Utilities Maintenance (or representatives)
1.04	**Site Safety**	The Contractor is responsible to ensure the construction site is safe at all times for workers, pedestrians, and vehicle traffic. During non-working hours, the Contractor must ensure that the site has all potentially hazardous areas appropriately identified and protected, and also must provide appropriate signage, lighting, and markings for the direction of vehicle and pedestrian traffic, all to ensure the safety of the public. Supply and use of this equipment is considered incidental to the contract. Manhole lids, valve boxes and other appurtenances within the roadway that may present a traffic hazard during construction must be clearly marked for traffic. Manhole lids left raised in preparation for paving must have a rubberized protector ring for traffic safety. Supply and use of this equipment is considered incidental to the contract.
1.05	**Lane Closure Restrictions**	Refer to: Appendix A: Traffic Management Detail Specifications. A Road and Sidewalk Closure Permit is required for each instance of closure and will be valid for a maximum period of one (1) week and, if still necessary, re-submittal of a Road and Sidewalk Closure Request is required. A copy of the approved Road and Sidewalk Closure Permit must be held on site by both the Site Superintendent and the person/company responsible for the traffic control implementation. The Contractor must take the above information into account in the preparation and submission of the Tender. Costs to complete the works taking the above restrictions into consideration shall be included in the prices bid in the Schedule of Quantities and Prices.
1.06	**Survey Layout**	Construction layout will be staked out by the Contractor.
1.07	**Manholes & Valves**	Access to manholes and valves must be maintained at all time for city utilities crews and external utility companies. In case of an emergency the cost for exposing any buried manhole or valve covers during construction will be paid by the contractor.
1.08	**Utility Adjustments - City Infrastructure and/or**	The Contractor is responsible for adjusting all utilities, belonging to Coquitlam and/or other agencies that are affected by the road works. All adjustments to utilities must be completed to the satisfaction of the utility owner. Utility adjustment will be

	Other Agency Infrastructure	considered incidental to the contract unless otherwise noted in the Contract Documents. The Contractor should note that certain utility owners may decide to complete their own adjustments. The Contractor will be required to cooperate with any utility company providing their own adjustments. The Contractor shall be responsible to contact the appropriate utility company with in minimum of seventy-two (72) hours of the work. No adjustment shall be made without the written approval of the utility company. All manholes must be vertically adjusted a minimum of twenty-four (24) hours prior to paving.
1.09	**Work by Others**	The Contractor is required to accommodate the City crews, Contractors, Developers and Utility companies in their scheduling and sequencing of work.
2.00	**CONSTRUCTION ACTIVITY**	
2.01	**Construction Materials in Sewer Manholes and Pipe**	The Contractor is responsible to ensure that construction activities do not deposit construction materials (e.g. gravels) into the storm sewer or sanitary sewer manholes or pipe. The City has a video record of the pipe before construction. Prior to Substantial Performance, the City may again video inspect the lines to ensure no problems exist due to construction activities under this contract. If problems are encountered, the Contractor will be responsible for the cost of the video and all costs associated with the cleaning of the pipe.
2.02	**Site Clean-up During Construction and End of Construction**	The Contractor will be responsible for the complete clean-up of the work site during construction & at the end of construction and prior to the Substantial Performance review. Payment for this work is considered incidental to the Contract. The work will include cleaning of all catch basins periodically or as directed by the Contract Administrator within the Work area, or nearby location as affected by the Work. All cleaning is to be performed by vacuum truck to the satisfaction of the Contract Administrator and will include off-site disposal of waste material.
2.03	**Asphalt Milling Operations**	Asphalt milling activities shall be done in such manner so as to cause the least disruption and inconvenience to traffic and area residents. The Contractor will be required to provide a plan and schedule for milling sections and the subsequent paving activities and have that approved by the Contract Administrator. This schedule is to be updated as required and take into consideration weather conditions and weather forecasts to ensure work subsequent to milling can be completed in appropriate weather. **MILLING OF EXTENSIVE AREAS THAT CANNOT BE PAVED WITHIN 48 HOURS PERIOD (2 DAYS) WILL NOT BE PERMITTED.**
3.00	**MANDATORY MEETINGS AND CONTRACTOR REPRESENTATIVES AND SUBCONTRACTORS**	
3.01	**Pre-Construction Meeting Requirements**	After the Award of the Contract, the Contractor (Project Manager & Superintendent) must attend a Pre-Construction Meeting with the Contract Administrator and provide all necessary information required by the Contract Administrator prior to provision of a Notice to Proceed. Items required to be provided at the meeting include:

1. A Detailed Construction Schedule showing the start date & completion date and the durations of major work components showing how all work will be completed within the Contract Duration.
2. Proof of insurance
3. Performance Bond and Labour and Materials Payment Bond
4. WCB Clearance Letter and copy of Notice of Project
5. City of Coquitlam Business License
6. A copy of portions of your Health and Safety Plan including the Title Page, Table of Contents, and portion showing latest revision date.

3.02 Contract Schedule, Contract Duration, and Charges

A detailed, realistic construction schedule for this project will be required to be presented at the pre-construction meeting. The schedule must show major components and durations.

All work under this project is to be completed within the designated Contract Duration as contained in the signed Contract Agreement, or as formally amended.

3.03 Contract Superintendent and Subcontractors

In compliance with the MMCD General Conditions, Section 4.7, Superintendent, the Contractor shall have a competent senior representative, (the "Superintendent") in FULL TIME attendance at the Place of Work while work is being performed for the duration of the contract.

This (FULL TIME) attendance is also required when work is being performed by Subcontractors.

Work done by Subcontractors is to be directed by the Superintendent and monitored on site ensuring conformance to the Contract Documents and other particular direction to the Superintendent by the Contract Administrator.

The Owner and Contract Administrator are not responsible for the direction of Subcontractors.

END OF SECTION

1.0 GENERAL

1.1 General

The PRV station specific measurement and payment paragraphs are provided in this section.

Work completed under this Contract will be paid for at the prices tendered in the Schedule of Quantities and Prices.

Prices include all costs associated with finding, supplying and installing all equipment and materials, and performing all work specified herein. Include Contractor's overhead and profit.

Materials and Work performance costs not explicitly listed in the Schedule but included in the drawings and/or specifications by either direct mention or implication must be included in the items to which they pertain most closely.

Prorate costs of a general nature that do not pertain to any one item among all items.

1.2 Description of Payment Items

.1 Electrical Kiosk and Associated Equipment

Payment for the electrical kiosk and associated equipment includes all costs associated with supply and installation of the electrical kiosk including but not limited to:

.1 Supply and installation of the proposed electrical kiosk, concrete slab (including signed sealed engineering shop drawings), and associated wiring and equipment
.2 Supply and installation of grounding systems.
.3 Supply and installation of SCADA equipment.
.4 Installation of new ducts and tie-ins to existing ducts

Lump sum will be paid out as follows (subject to holdback provisions for Contract):

.1 10% of lump sum following review of shop drawings
.2 50% of the lump sum following installation of the kiosk station at site
.3 40% of lump sum amount following commissioning of station less any amount for identified deficiencies.

.2 PRV Chamber Electrical Woeks

Payment for the PRV chamber electrical works includes all costs associated with supply and installation of the PRV chamber electrical equipment including but not limited to:

.1 Supply and installation of the proposed electrical equipment for the PRV chamber

Supply and installation of cable ducts between electrical kiosk and PRV chamber

Lump sum will be paid out as follows (subject to holdback provisions for Contract):

.1 10% of lump sum following review of shop drawings
.2 50% of the lump sum following installation of the kiosk station at site
.3 40% of lump sum amount following commissioning of station less any amount for identified deficiencies.

.3 BC Hydro Coordination

Payment for the BC Hydro service connection item includes all costs associated with supply and installation of necessary BC Hydro service ducting from the service pole to the kiosk.

Contractor coordination with BC Hydro is required.
Payment for this item will be by lump sum as shown on the Schedule of Quantities and Prices.

.4 PRV Station Civil & Mechanical

.1 This item includes all costs associated with supply and installation of the PRV chamber including but not limited to:
  .1 Fabrication, coating and assembly of all piping per the drawings
.2 Supply and installation of precast chamber, plumbing, process piping, valves, accessories, coatings, gauges, and vent piping.
.3 On-site pressure-testing, flushing, disinfection and bacteriological testing, and commissioning of the station.
.4 Excavation, backfill and compaction with imported material, and surface restoration for the site.
.5 All incidentals related to complete the work and as described in other sections.

Lump sum will be paid out as follows (subject to holdback provisions for Contract):
  .1 10% of lump sum following review of shop drawings
  .2 50% of the lump sum following installation of the packaged station at site, including backfill and tie-ins
  .3 40% of lump sum amount following commissioning of station less any amount for identified deficiencies.

PRODUCTS

General .1 Not used.

EXECUTION

General .2 Not used.

END OF SECTION

1.0 GENERAL

1.1 General

.1 The Contract Price is based upon those materials and equipment models identified and named in the detailed specifications. Substitutions or variations to those specified will not be allowed without formal submittal, review and acceptance in accordance with this section.

.2 The specification sections contain pertinent performance criteria, quality, function and requirements for materials and methods to achieve work described.

.3 Coordinate pertinent related work and modify surrounding work as required to complete project under each substitute designated.

.4 Normally substitutions will not be permitted unless:

- .1 The specified product is not available
- .2 The specified product does not meet critical delivery
- .3 The substitute has a greater or equal value to the Owner for a lower cost; and
- .4 All substitutions must be approved by the Contract Administrator in writing.

1.2 Requests for Substitution

.1 Whenever materials or equipment are specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular supplier or manufacturer the naming of the item is regarded as the standard to establish the type, function and quality required.

.2 Material or equipment of equal or better performance and quality may be offered in substitution for those specified. Requests for review of substitute items of material and equipment will not be accepted by the Contract Administrator from anyone other than the Contractor.

.3 Requests for substitution include any request for changes from the Contractor which require significant design changes, redesign or significant design reviews.

.4 Request for substitution to be made by written application to Contract Administrator and to include sufficient data to enable the Contract Administrator to assess the acceptability of requirements, including the following:

- .1 All submittal information required for the specified equipment, including all deviations from the specified requirements and/or necessitated by the requested substitution
- .2 Materials of construction, including material specifications and references
- .3 Dimensional drawings, showing required access and clearances, including any changes to the Work required to accommodate the proposed substitution
- .4 Drawings and details showing changes if the offered substitution necessitates changes to or coordination with other portions of the Work. Perform these changes as part of the substitution of material or equipment at no additional cost
- .5 Certification that the proposed substitute will adequately perform the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified
- .6 Information and performance characteristics for all system components and ancillary devices to be furnished as part of the proposed substitution

.7 Reproducible Contract Drawings, marked up to illustrate all alterations to all structural, architectural, mechanical, electrical and HVAC systems required to accommodate the proposed substitution

.8 Certification that acceptance of the proposed substitute will not prejudice achievement of Substantial Performance

.9 Itemization of all costs including any licenses fee or royalty that will result directly or indirectly from the acceptance of the proposed substitution. Include redesign and cost of claims of any other contract affected by the resulting change

.10 Guaranteed credit or cost reduction offered if the proposed substitution is accepted; and

.11 Recommended maintenance requirements and availability of spare parts and service

1.3 Contract Administrator's Review

.1 The Contract Administrator will evaluate each proposed substitution. The Contract Administrator will be the sole judge of acceptability, and no substitute will be ordered, installed or utilized without the Contract Administrator's prior written acceptance by either a Change Order or a reviewed Shop Drawing.

.2 Pay the Contract Administrator's cost, above and beyond the time required to review Shop Drawings for specified product, for evaluating the requested substitution even though the request may be denied. Costs will be charged on a time-and-expense basis and will be deducted from progress payments due the Contractor. Procedures for processing substitutions to be as specified in Section 01 33 00S – Submittal Procedures.

1.4 Measurement and Payment

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

2.0 PRODUCTS

2.1 General

.1 Not used.

3.0 EXECUTION

3.1 General

.1 Not used.

END OF SECTION

1.0 GENERAL

1.1 Categories of Submittals

.1 General requirements and detailed Specifications require various submissions to demonstrate that materials, equipment, methods, and work comply with the provisions and intent of the Contract Documents. Submittals fall into two general categories:

- .1 Submittals for Review.
- .2 Submittals for Information Only.

.2 Provide submittals in accordance with this section and as specified in the various technical sections contained throughout the Specifications.

.3 The Contract Administrator may require additional submittals from the Contractor when, in the opinion of the Contract Administrator, such additional submittals are warranted.

1.2 Administrative

.1 Submittals covered by these requirements include manufacturers' information and data sheets, descriptive data, certificates, product data, Shop Drawings, test procedures, test results, samples, requests for substitutions, all mechanical, electrical and electronic equipment and systems, fabricated items, piping and miscellaneous work-related submittals.

.2 Adjustments made on Shop Drawings or other submittals by the Contract Administrator are not intended to change the Contract Price. If adjustments affect the value of work, state such in writing to the Engineer prior to proceeding with the work.

.3 Provide the submittals specified to Contract Administrator for review. Submit all information promptly and in an orderly sequence so as to not cause delay in the Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract time and no claim for extension by reason of such default will be allowed.

.4 Do not proceed with work affected by any submittal until review is complete. Normally, submittals for review and comment will be returned to the Contractor within ten (10) days, thirty (30) days for substitution, exclusive of any time awaiting clarification or further information; however, the time for returns will necessarily vary and may exceed ten (10) days depending upon the complexity of the submittal, the number of submittals, and the express needs of the Contractor.

.5 The Contractor to review all submittals prior to submission to the Contract Administrator. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with the requirements of the Work and the Contract Documents. Submittals not stamped, signed, dated and identified by the Contractor will be returned without being examined and will be considered rejected.

.6 Clearly edit submittal documents to indicate only those items, models, or series of equipment, which are being submitted for review. Cross out or otherwise obliterate all extraneous materials.

.7 Ensure that there is no conflict with other submittals.

.8 Coordinate submittals among subcontractors and suppliers.

		.9	Coordinate submittals with the Work so that work will not be delayed and schedule different categories of submittals, so that one will not be delayed for lack of coordination with another.
		.10	The Contractor is responsible for the accuracy and completeness of information submitted. Notify the Contract Administrator in writing of materials, equipment or methods of work which deviate from the Contract Documents. Notification in writing, to accompany submittal transmittal and noted under deviations.
		.11	The Contractor's responsibility for errors, omissions and deviations in submission is not relieved by the Contract Administrator 's review of submittals.
		.12	Keep one reviewed copy of each submission on site.
		.13	Detail all Shop Drawings and data sheets using the metric system. Prepare to a drafting standard equivalent to the Contract Drawings.
		.14	Shop drawings and data sheets indicating modified design requirements or design requirements not included in the Contract Documents require the seal of a qualified professional engineer, registered in the Province of British Columbia.
1.3	**Transmittal Procedure**	.1	Submit digital copies of submittals, by email, to the Contract Administrator.
		.2	Note a unique number, sequentially assigned, in the title of the email for each item submitted. Submittals will be classified according to categories agreed to by the Contractor and the Contract Administrator. Use the following format by category for submittal numbers: "XXX", where "XXX" is the sequential number assigned by the Contractor. Resubmittals will have the following format: "XXX-Y", where "XXX" is the originally assigned submittal number and "Y" is a sequential letter assigned for resubmittals, i.e., A, B, or C being the 1st, 2nd, and 3rd resubmittals, respectively. Submittal 25-B, for example, is the second resubmittal of submittal 25.
		.3	All submittals (Contractor and Subcontractor) to be stamped as reviewed by General Contractor. Submittals not stamped as reviewed will be returned to the General Contractor.
1.4	**Submittals for Review**	.1	All submittals, except where specified to be submitted for information only, to be submitted by the Contractor to the Contract Administrator for review. Provide submittals for review for all equipment and material substitutions, alternatives or deviations from that specified.
		.2	Submittals which do not have all the information required to be submitted, including notation of all deviations from the Contract requirements, are not acceptable and will be returned without review.
		.3	Review by the Contract Administrator is for the sole purpose of ascertaining conformance with the general design concept in accordance with the Specifications. This review does not mean that the Contract Administrator approves the detail design inherent in the submittals, Shop Drawings and data sheets, responsibility for which remains with the Contractor, and such review does not relieve the Contractor of responsibility for errors or omissions in the shop drawings and data sheets or of responsibility for meeting all requirements of the Contract

Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the Site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of the work of all Subconsultants.

.4 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 the adjacent items will be supplied and installed. Indicate cross references to the Contract Drawings and specifications.

.5 Submit digital copies of submittals, by email, including Shop Drawings for each requirement requested in MMCD and Supplementary Specification sections and as the Contract Administrator may reasonably request. PDF copies of Shop Drawings are recommended for most submissions provided all stamps are included. Where submittal contains detailed factory information, original copies must be submitted.

.6 Submittals for review will be returned to the Contractor with one of the four following notations:

- .1 If the review indicates that the material or equipment complies with the Contract Documents, submittal copies will be marked "Reviewed". In this event, the Contractor may begin to implement the Work method or incorporate the material or equipment covered by the submittal.
- .2 If the review indicates limited modifications are required, copies will be marked "Reviewed as Modified". The Contractor may begin implementing the work method or incorporating the material and equipment covered by the submittal in accordance with the noted corrections. Where submittal information will be incorporated in operation and maintenance data, provide a corrected copy.
- .3 If the review reveals that the submittal is insufficient or contains incorrect data, copies will be marked "Revise and Resubmit". Do not undertake work covered by this submittal until it has been revised, resubmitted and returned marked either "Reviewed" or "Reviewed as Modified".
- .4 If the review indicates that the material, equipment, or Work method does not comply with the Contract Documents, copies of the submittal will be marked "Rejected - See Remarks". Submittals with deviations which have not been identified clearly may be rejected. Do not undertake the work covered by such submittals until a new submittal is made and returned marked either "Reviewed" or "Reviewed as Modified".

.7 After submittals are stamped "Reviewed" or "Reviewed as Modified", no further revisions are permitted unless re-submitted to the Contract Administrator for further review.

.8 If upon review by the Contract Administrator, no errors or omissions are discovered or if only minor corrections are made, one (1) copy will be returned and fabrication and installation of work may proceed. If Shop Drawings and data sheets are rejected, noted copy and two (2) unmarked copies will be returned and resubmission of corrected Shop Drawings and data sheets, through the same procedure indicated above, to be performed

before fabrication and installation of Work may proceed. Where four (4) copies have been submitted, one (1) copy will be returned.

.9 **The Owner may deduct, from payments due to the Contractor, costs of additional Contract Administrator reviews incurred if Shop Drawings and data sheets are not corrected after one (1) review by Contract Administrator.**

1.5 Request for Substitution

.1 Make requests for substitution by written application accompanied with sufficient information as specified under Section 01 25 00 – Substitution Procedures to permit the Contract Administrator to identify the nature and scope of the request.

.2 Follow submittal procedures and submit digital copies of all information for each substitution request.

.3 Upon receipt of written application for substitution from the Contractor, including the specific information specified, the Contract Administrator will estimate the cost and time requirement of evaluating the request and present the estimates to the Contractor. The Contractor is advised that the estimates are based upon the best information available to the Engineer at the time; however, the actual cost, based on time and expense, will be documented and applied in the final analysis of the substitution request.

.4 If the Contractor wishes the Contract Administrator to continue the review of the request, advise the Contract Administrator in writing and submit sufficient additional information as may be requested by the Contract Administrator. No evaluation will take place until such time as the Contractor has agreed to the estimate in writing and has authorized the Contract Administrator to deduct the cost of the evaluation from monthly progress payments due the Contractor.

1.6 Measurement for Payment

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

2.0 PRODUCTS

2.1 General .1 Not used.

3.0 EXECUTION

3.1 General .1 Not used.

END OF SECTION

1.0 GENERAL

1.3	**Submission**	Delete 1.3.2 and replace with the following	Submit one copy of an accurate project record document in final form prior to applying for Substantial Performance including any video report. Record documents to include changes in the Issued for Construction Drawings, new elevation, offsets & location of all utilities, manhole rim, catchbasin rim, vaults, valve boxes, inverts walkways/sidewalks, and any unknown/new utilities found on site. Legal holdbacks will not be released until record documents have been submitted and accepted by the Contract Administrator.

END OF SECTION

1.0 GENERAL

1.1 General Requirements

.1 This section specifies general requirements and procedures for the Contractor's submissions of Shop Drawings and product data to the Contract Administrator for review. Additional specific requirements for submissions are specified in individual specifications.

.2 Until submission is reviewed, work involving relevant product may not proceed.

.3 Present Shop Drawings in metric units unless specified otherwise.

.4 The Contractor's responsibility for errors and omissions in submission is not relieved by the Contract Administrator's review of submissions.

.5 Notify the Contract Administrator, in writing at time of submission, identifying deviations from requirements of the Contract Documents stating reasons for deviations.

.6 The Contractor's responsibility for deviations in submission from requirements of the Contract Documents is not relieved by the Contract Administrator's review of submission, unless the Contract Administrator gives written acceptance of specific deviations.

.7 Make any changes in submissions which the Contract Administrator may require consistent with the Contract Documents and resubmit as directed by the Contract Administrator.

.8 Notify the Contract Administrator, in writing, when resubmitting, of any revisions other than those requested by the Contract Administrator.

1.2 Submission Requirements

.1 Coordinate each submission with requirements of Work and Contract Documents. Individual submissions will not be reviewed until all related information is available.

.2 Allow seven (7) days for the Contract Administrator's review of each submission.

.3 Accompany submissions with transmittal letter, in duplicate, containing:

- .1 Date;
- .2 Project title and number;
- .3 Contractor's name and address;
- .4 Identification and quantity of each shop drawing;
- .5 Name and address of:
  - .1 Subcontractor;
  - .2 Supplier;
  - .3 Manufacturer.
- .6 Other pertinent data.

.4 After the Contract Administrator's review, distribute copies.

1.3 Shop Drawings

.1 Shop Drawings: original Drawings, or modified standard Drawings provided by Contractor, to illustrate details of portions of Work, which are specific to project requirements.

.2 Maximum sheet size 1000 x 707 mm.

		.3	Submit digital copies in PDF format.
1.4	**Product Data**	.1	Product data: manufacturer's catalogue sheets, brochures, literature, performance charts and manufactured products.
		.2	Submit two (2) copies of product data if in hardcopy format. PDF is preferred where possible.
1.5	**Measurement for Payment**		Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.
2.0	**PRODUCTS**		
2.1	**General**	.1	Not used.
3.0	**EXECUTION**		
3.1	**General**	.1	Not used.

END OF SECTION

1.0 QUALITY

The Contractor shall provide a final product conforming to the Contract Documents and the intent of the work.

The work is to be accurate to the dimensional and tolerance requirements of the contract.

Payment will be subject to adjustments based on quality assurance tests performed by the Contract Administrator.

1.1 Quality Control (QC) by Contractor

The MMCD (2009) definition of "Quality Control" is the process by which the *Contractor* checks specific materials, products, and workmanship to ensure strict conformance with the Contract Documents.

The Contractor is fully responsible for quality control of the materials, production, and construction processes.

Quality control tests shall be performed by the Contractor, at their own expense, to ensure that products meet the contract specifications.

Failure by the Contractor to conduct adequate quality control testing during production and construction will negate the Contractor's ability to appeal the quality assurance tests used for acceptance/rejection of the work.

Under no circumstances will QC test results produced after completion of the Quality Assurance (QA) results be considered for appeal purposes

Any changes in the Work with respect to the location, grade, or line shall be approved in advance by the Contract Administrator. Failure to notify the Contract Administrator of changes in writing may result in rejection of Work.

1.2 Inspection of Work, Quality Assurance, and Material Testing, by the Owner

The MMCD (2009) definition of "Quality Assurance" means the process by which the *Owner* evaluates if the work is being constructed in accordance with the Contract Documents. This definition will be used for this contract

The *Contract Administrator* may provide construction review through spot inspections and spot materials testing for Quality Assurance.

Any materials testing results indicating a non-conformance to the Contract Documents will require construction corrective action by the *Contractor*.

All subsequent testing to corrective action to verify conformance to the Contract Documents will be the full responsibility of the *Contractor*.

Inspection review by the Owner will not relieve the Contractor from providing a product that meets or exceeds the requirements of the Contract Documents.

1.3 Inspection

Materials testing shall be as described in MMCD General Conditions, Section 4.12 with the following change:

Delete Section 4.12.2(a) and insert the following:

Where the MMCD specification clauses for Inspection and Testing indicate the Contract Administrator will arrange for all testing for work described in this section will be amended to read The Contractor will arrange for and pay for all testing for work described in this section. The testing shall take place at the following prescribed rates and as directed by the Contract Administrator. The Contract Administrator has the authority to call for testing, up to the rates and frequencies specified, at the Contractors cost.

All testing covered under this item shall be performed by a CCIL certified laboratory and technicians with copies of all test results to be sent directly to the Contract Administrator. Re-testing resulting from failed first tests shall be at the Contractors expense.

1.4 Survey Layout

The Contractor shall be responsible for all survey layouts.

1.5 Testing

Contractor shall carry out inspection and testing (QC) to ensure compliance with Contract Documents. Contractor shall submit test results within one week of testing to the Contract Administrator.

The Contractor shall provide test results prior to the preparation of the payment certificate.

1.6 Contractors Responsibilities

Furnish labour and facilities to:

1. Provide access to work to be inspected
2. Facilitate inspections and tests
3. Make good work disturbed by inspection and tests

1.7 Access to Work

Allow inspection testing agencies access to Work.

1.8 Tests

Test rates and frequencies (excluding failed tests), when not defined in the MMCD or Detail Specifications Sections shall be at the following frequencies:

1. Trench Backfilling and Compaction
1.1 Compaction: 1 test / 10 lm / 300mm lift
1.2 Sieve: 1 test / placed material / 50 m^3

2. Granular Base
2.1 Compaction: 1 test/500m^2 / 100mm depth of granular base, min. 1 test if < 500m^2
2.2 Sieve: 1 test / placed material / 250 TONNES

3. Granular Subbase
3.1 Compaction: 1 test/500m^2/150mm depth of granular subbase, min. 1 test if <500m^2
3.2 Sieve: 1 test / placed material / 250 TONNES

4. Embankment (Subgrade)
4.1 Compaction: 1 test/ 50m^2 / 0.15m depth of fill, min. 1 test if < 50m^2
4.2 Sieve: 1 test / placed material / 100 TONNES

5. Asphalt
5.1 Marshall test: 1 test per 250 TONNES placed, per mix specified, min. 1 / day
ASTM D1559, D3203, C117, C136
5.2 Superpave: 1 test per 250 TONNES placed, per mix specified, min. 1 / day
CAI-SP2, ASTM D3203, C117, C136
5.3 Cores: 1 per 500 m^2/lift
5.4 Continuous asphalt density testing during paving.

6. Subgrade Preparation
6.1 Compaction & Moisture: 1 test / 500 m^2, min. 1 test if < 500m^2

7.Concrete Tests
7.1 Air, Slump & 1 Set Cylinders: 1 test / 10 m^3, min. 1 set / day

Mix design, sieve analysis and all required reports to be submitted must be recent and dated within six months prior to construction.

1.9 Measurement and Payment

Payment for all work performed under this section will be incidental to payment for work described in other Sections.

END OF SECTION

1.0	**GENERAL**	Add 1.0.6	The *Contractor* is responsible for all temporary traffic control on the streets required for completion of the work. The *Contractor* will be responsible to provide a Traffic Management Plan (TMP) for approval (10) ten working days prior to any lane closures taking place. TMP is to be prepared by a qualified professional to the satisfaction of the Contract Administrator. The TMP shall outline the approach to traffic management, show recognition and minimization of risks indicates signing locations, identify Traffic Control Persons (TCP) stations, show lane shifting and proposed closures. The Contractor is responsible to ensure and maintain all business/residential vehicles, cyclists and pedestrian accesses open at all times. The contractor may provide temporary accesses if the affected owner agrees. All costs associated with temporary accesses will be at the contractor's expense. The Contractor is responsible to ensure the construction site is safe at all times for workers, pedestrians, and vehicle traffic. During non-working hours, the Contractor must ensure that the site has all potentially hazardous areas appropriately identified and protected, and also must provide appropriate signage, lighting, and markings for the direction of vehicle and pedestrian traffic, all to ensure the safety of the public. Supply and use of this equipment is considered incidental to the contract.
		Add 1.0.7	A Road and Sidewalk Closure Permit is required from Coquitlam for all work affecting pedestrian and traffic flow related to construction. A permit is required for each specific construction interference with pedestrian and traffic flow. The road and sidewalk closure permit form can be obtained for use from the City's website at http://www.coquitlam.ca. The Contractor must follow the approved TMP. Any changes to this TMP must be submitted to City's Traffic Operations for approval.
		Add 1.08	Refer to Appendix A – Traffic Management Detail Specifications
1.4	**Traffic Control**	Delete 1.4.1 and replace with the following	The Contractor shall conduct his operations so as to cause the minimum obstruction and inconvenience to traffic and to places of business and residences adjacent to the Place of Work. No greater quantity of work shall be undertaken at any one time than can be properly conducted with due regard to the rights and interests of the public as may be determined by the Contract Administrator. The Contractor is to provide at all times safe and convenient means of approach and entrance to adjoining lanes, driveways, buildings and property both for vehicles and pedestrians to the satisfaction of the Contract Administrator. For this purpose, he shall construct and maintain suitable and safe platforms, approaches, structures, bridges, diversions or other works. Where traffic must cross open trenches, the Contractor shall provide suitable bridges. Where trenches have been backfilled or where road improvements are incomplete the Contractor shall take any steps necessary to prevent potholes or other traffic hazards. Where the Contract Administrator so instructs or where Contract

Specifications so require, the Contractor shall provide temporary asphalt patching of such hazards.

Add 1.4.9.3.1

The *Contractor,* as required by the *Contract Administrator* and the City, is to supply Construction Zone information signs (stationary), refer to Section 01 58 01S for the required identification signage.

The *Contractor* is responsible for the removal of the signs at the completion of the work.

Delete 1.4.10.1.3 and replace with the following

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

END OF SECTION

1.0 GENERAL

1.0.3	**Erosion and Sediment Control Supervisor**	Add 1.03	The Erosion and Sediment Control (ESC) Supervisor is the Qualified Professional who is experienced in implementing ESC Plans and who is responsible for the inspection and monitoring of ESC Facilities to ensure these are installed and maintained in accordance with the ESC Plan, and if necessary, are modified during construction to ensure compliance with the Stream and Drainage System Protection Bylaw No. 4403, 2013.
1.2	**Temporary Erosion and Sediment Controls**	Delete 1.2.1 and replace with the following	Properly drain all portions of the site. Protect the site and the watercourses to which it drains, directly or indirectly, against erosion and siltation in accordance with a Sediment Control Plan under the City of Coquitlam Stream and Drainage System Protection Bylaw No. 4403, 2013 during construction and until the maintenance period is completed. Ensure no silt, gravel, debris or other deleterious substance resulting from construction activity discharges into existing drainage systems or watercourses or onto highways or adjacent property. The *Contractor* is responsible for all damage that may be caused by water backing up or flowing over, through, from or along any part of the work or otherwise resulting from his operations. Keep existing culverts, drains, ditches and watercourses affected by the work clear of excavated material at all times. When it is necessary to remove or alter any existing drainage structure, provide suitable alternative measures for handling the drainage. Adequately support culverts and drainpipes across trenches to prevent displacement and interference with the proper flow of water due to trench settlement. Sweep streets, and clean catch basins, manhole sumps, detention tanks, and maintain siltation controls as often as the *Contract Administrator* and the City deems necessary.
		Delete 1.2.2.2 and replace with the following	Do not operate construction equipment in watercourses.
		Add 1.2.2.9	All work must be carried out during favorable and low water conditions.
		Add 1.2.2.10	Any fill used on this project shall be certified inert and from a source which is confirmed to be free of contaminants.
		Add 1.2.2.11	All work within a watercourse must be undertaken and completed in isolation of all flowing water to maintain downstream water quality and unrestricted flows.
1.4	**Environmental Protection**	Add 1.4.3.5	Immediately contain and clean up any leaks and spills of prohibited materials at the *Place of Work*.
		Add 1.4.3.6	Ensure that a well-stocked spill kit is on-site at all times and that the *Contractor*'s employees are familiar with appropriate spill response techniques.
		Add 1.4.3.7	Immediately notify the *Contract Administrator* and the City of any leaks or spills of prohibited materials that occur at the *Place of Work*.
		Add 1.4.3.8	Ensure that any fuel stored on-site is located at least 15 meters from the nearest stream, and is placed within a bermed and lined area, in order to prevent leaks or spills into the environment.

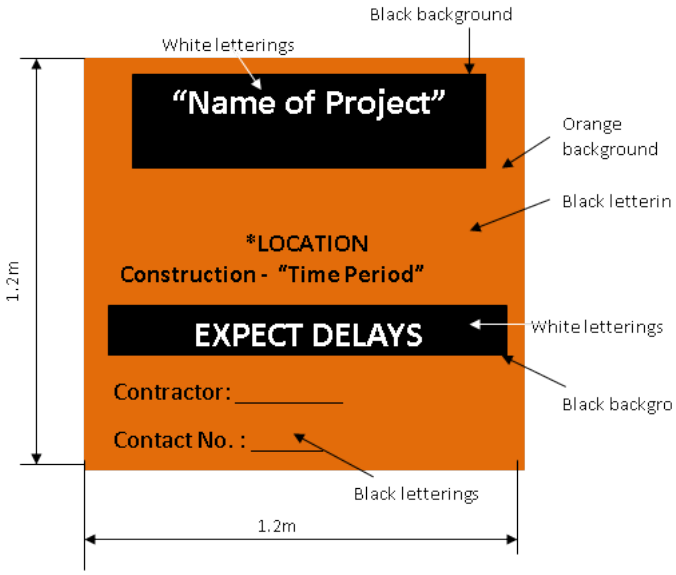
		Add 1.4.3.9	All equipment and machinery must be in good working condition (power washed), free of leaks or excess oil and grease. No equipment refueling or servicing shall be undertaken within a minimum of 15 meters of any water course or surface water drainage.
		Add 1.4.3.10	During all phases of the operation, the Contractor shall take precautions to abate nuisance caused by mud or dust by clean up, sweeping, sprinkling with water or dust control, or other means as necessary to accomplish results satisfactory to the Contract Administrator.
1.6	**Measurement and Payment**	Delete 1.6.1 and replace with the following	Payment for all work performed under this section will be incidental, unless shown otherwise in the Schedule of Quantities and Prices.
		Add 1.6.2	Payment for the poly cover or temporary tarps over stock pile materials or exposed road subgrades shall be treated as incidental work.
1.8	**Clean Up**	Add 1.8.2	The work will include cleaning of all catch basins within the work area, or nearby location as affected by the Work, regardless of the condition of the catch basins prior to starting the Work and all manholes and/or sewers affected by work done under this contract. All cleaning is to be performed by vacuum truck to the satisfaction of the Contract Administrator and will include off-site disposal of waste material.
1.9	**Archaeological / Historical Resources**	Add 1.9	If any archaeological or historical resources are encountered during construction, work must cease immediately. The Contractor shall promptly notify the Contract Administrator and the City. All such resources shall be left in place and must not be disturbed under any circumstances. The Contractor shall comply with the procedures outlined in Appendix B: Archaeological Chance Find Procedures.

END OF SECTION

1.3 Measurement and Payment

Delete 1.3.1 and replace with the following

Payment for the installation of 1.2m x 1.2m static construction Information signs, as shown below, and further described in Appendix A – Traffic Management Detail Specifications includes supply, placement & removal and will be incidental, unless shown otherwise in the Schedule of Quantities and Prices.



END OF SECTION

1.0 GENERAL

1.1 Manual

.1 Provide an organized compilation and description of operational and maintenance data including detailed technical information, documents and records describing operation and maintenance of individual products or systems.

.2 Manuals shall contain the following sections entitled:

- .1 Section 1: Civil Components
- .2 Section 2: Mechanical Components
- .3 Section 3: Electrical Components
- .4 Section 4: All Other Components

.3 For specified equipment and items, the operating and maintenance manuals shall include:

- .1 Specification data;
- .2 Vendor drawings;
- .3 Manufacturers recommended operating, maintenance and service data including:
  - .1 Nameplate information including make, size, capacity, model number and serial number;
  - .2 Spare parts lists as recommended by manufacturer;
  - .3 Operating instructions;
  - .4 Maintenance instructions and maintenance intervals;
  - .5 Maintenance and service materials or special tools;
  - .6 Trouble shooting procedures;
- .4 Name, address and telephone number of local or closest supplier c/w contact person;
- .5 Warranty and guarantee information;
- .6 Test data obtained during commissioning;
- .7 Results of testing and commissioning.

1.2 General

.1 Owner supplied equipment data will be provided to the Contractor for inclusion into the binders.

.2 Assemble, coordinate, bind and index required data into Operation and Maintenance Manual and organize data into required sections.

.3 Label each section with tabs protected with celluloid covers fastened to hard paper dividing sheets.

.4 Type descriptions, lists and notes.

.5 Drawings, diagrams and manufacturers literature must be legible. When more than one model is listed, cross out extraneous model information and indicate, with arrows, specific model information.

.6 Product sheets to be in colour.

.7 Provide one (1) digital combined copy in PDF format for review. PDF to be complete with bookmarks between sections. Combined PDF can be per section as noted in 1.1.32 above.

.8 Once PDF version is accepted, provide one (1) set of completed operating and maintenance manuals to the Contract Administrator for review four (4) weeks prior to commissioning equipment and systems. Revise manuals as directed by the Contract Administrator.

.9 When manuals are approved provide four identical sets of approved operating and maintenance manual binders to the Owner.

.10 Commissioning may not proceed until manuals are approved by the Contract Administrator.

1.3 Binders

.1 Binders: Black vinyl 3-ring hard cover with clear vinyl overlay on front, open at top to accept full page identification insert. Suitable for 8-1/2 inch wide by 11 inch high documents. Spine shall be labelled with project name as displayed on RFP.

1.4 Contents

.1 Binders:

- .1 Cover sheet containing:
  - .1 Date submitted.
  - .2 Project title, location and project number.
  - .3 Names and addresses of Contractor, and all Subcontractors.
  - .4 Table of Contents.
- .2 Technical sections as specified. Provide only the relevant pages from the catalogue for the specific product and where a page has more than one product shown clearly and neatly indicate on that page the specific product used.
- .3 Separate cover sheet for each supplier noting supplier name and contact information prior to the detailed information on each component from that supplier
- .4 Product information to be in colour.
- .5 Identify each major section with individual title page (i.e. CIVIL, MECHANICAL).

.2 Digital Copy (PDF):

- .1 Ensure digital copy includes all information contained in hardcopies
- .2 Use bookmarks when assembling PDF's to separate individual sections of the manual

.3 Equipment:

- .1 Unless specified otherwise all equipment and components supplied and installed under this Contract shall be included in the manuals. The following non-exhaustive list includes items that are to be included in the manuals:
- .2 Civil Items
  - .1 Grout, concrete and mortar mix;
  - .2 Granular Bedding and Backfill materials;
  - .3 Restoration materials.
- .3 Mechanical Items
  - .1 Piping;
  - .2 Pipe coatings;
  - .3 Couplings and flange adapters;
  - .4 Valves and fittings;
  - .5 Appurtenances.

1.5 Measurement for Payment

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

2.0 PRODUCTS

2.1 General

.1 Not used.

3.0 EXECUTION

3.1 General .1 Not used.

END OF SECTION

1.4	**Measurement and Payment**	Delete 1.4 and replace with the following	Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.
2.1	**Materials**	Delete 2.1.5.1 and replace with the following	Hand-formed and hand-placed concrete: Slump: 80 mm Air entrainment: 5 to 8%. Maximum aggregate size: 20 mm. Minimum cement content: 335 kg/m3. Minimum 28 day compressive strength: 32 MPa.
		Add 2.1.7	Tactile warning surface tile shall be replaceable cast-in-place style. Truncated domes shall be in square grid pattern with a 5 mm nominal raised height, base diameter of 23 mm and top diameter of 11.5 mm. Dome spacing range shall be between 40 mm – 60 mm. Color of the panel shall be Federal Yellow (Y) per US Federal Standard 595B Table IV, Color No. 335. Minimum size of the panel shall be 600 mm by 1200 mm.
3.0	**EXECUTION**		
3.5	**Concrete Placement**	Delete 3.5.9 and replace with the following	The *Contractor* is responsible for adjusting all utility manhole frames and valve boxes, belonging to Coquitlam and/or other agencies that are affected by the road works. All adjustments to utilities must be completed to the satisfaction of the utility owner. Riser rings will not be accepted. The *Contractor* should note that certain utility owners may decide to complete their own adjustments. The *Contractor* will be required to cooperate with any utility company providing their own adjustments. The *Contractor* shall be responsible to contact the appropriate utility company within a minimum of seventy-two (72) hours of the work. No adjustment shall be made without the written approval of the utility company. <u>All manholes must be vertically adjusted a minimum of twenty-four (24) hours prior to concrete placement.</u>
3.9	**Expansion Joints**	Delete 3.9.1 and replace with the following	Form transverse expansion joints at both ends of curb returns and at maximum spacing of 9.0 m for sidewalks, 30.0 m of curb and gutter, at each end of driveway crossing, at tangent point of circular work, and on either side of catch basins.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Grout for structural components.

1.2 Reference Standards

.1 ASTM C309, Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete

.2 ASTM C1107, Standard Specification for Packaged Dry, Hydraulic Cement Grout (Non-shrink)

.3 CSA A23.1, Concrete Materials and Methods of Concrete Construction

.4 CSA A23.2, Test Methods and Standard Practices for Concrete

.5 NSF/ANSI 61, Drinking water System Components - Health Effects, Ship, handle, store, and install equipment, products and materials to prevent damage.

1.3 Submittals for Review

.1 Grout specifications.

1.4 Measurement for Payment

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

2.0 PRODUCTS

2.1 Materials

.1 Pre-mixed grouts:

- .1 Use a non-shrink cementitious system conforming to ASTM C1107, free of gas producing agents, oxidizing catalysts, inorganic catalysts and inorganic accelerators including chlorides. Use factory packaged grouts that are delivered to the job site for use with only the addition of water.
- .2 Minimum compressive strength:
  - .1 21 MPa at 3 days;
  - .2 45 MPa at 28 days.

.2 Water: Potable

.3 Aggregates: Maximum 10 mm pea gravel, saturated surface dry, to CSA A23.1.

.4 Curing Compounds to ASTM C309.

.5 Grout products as listed below, unless shown otherwise on the drawings:

- .1 For equipment bases: Masterflow 713 or 928 by Masterbuilders; M-Bed grout by Sternsons; Horngrout by Tamms; Sikagrout 212 HP by Sika Products.
- .2 For general use: Set grout by Masterbuilders; M-Bed Standard by Sternsons

2.2 Product Quality Control

.1 NSF/ANSI 61 test labs to be accredited by the Standards Council of Canada. Accredited labs include, but are not limited to:

- .1 National Sanitation Foundation (NSF)
- .2 Water Quality Association (WQA)
- .3 Canadian Standards Association (CSA)
- .4 Underwriters Laboratories (UL)

2.3	**Painting**	.1	Isolate all aluminum surfaces in contact with concrete with two coats of bituminous paint.
3.0	**EXECUTION**		
3.1	**Preparation**	.1	Clean bolt holes, bolts, as well as sides and underside of base plates and end plates to remove rust, oil, grease and dirt. Clean concrete by pressure wash, or if this is not practical by light chipping hammer and/or sand blast. Expose aggregate and clean consolidated concrete so that it is free of laitance, dirt, oil, grease, and loose particles.
		.2	Saturate concrete for 24 hours prior to grouting. Remove standing water and blow dry before placing grout. Verify that water has been removed for the full depth of anchor bolt holes and pockets.
		.3	Do not grout unless the foundation, base plates, end plates, anchor bolts, and other surfaces to be grouted are at a temperature between 10 degrees Celsius and 20 degrees Celsius before grouting. Ensure that temperatures are maintained within this range during grouting and until the grout has reached final set. Follow the grout manufacturer's recommendations if grouting must be carried out in temperature below 10 degrees Celsius or above 20 degrees Celsius and proceed only with the approval of the Contract Administrator.
3.2	**Formwork**	.1	Provide strong, tight forms to prevent leakage and movement of the grout. Brace forms and caulk so they will not leak or buckle under the weight of fluid grout.
		.2	Design for rapid, continuous and complete filling of the space to be grouted.
3.3	**Mixing**	.1	Mix grouts in accordance with the manufacturer's instructions.
		.2	Provide sufficient manpower and equipment to ensure grout is mixed and then placed rapidly and continuously.
		.3	Do not retemper grout. Discard grout which shows stiffening before use.
3.4	**Placing**	.4	Where practical, use grout with a flowing consistency. Place quickly and continuously. Do not work more than the specified grouting time.
		.5	Pour grout into forms from one end only in a manner that does not entrap air. Provide sufficient head to fill intended cavities, including any associated grout holes.
		.6	Do not vibrate grout. Do not operate nearby machinery that creates vibration until the grout has been placed and has achieved final set. Flow and consolidation may be assisted by strapping under the base plate or between grout holes.
3.5	**Finishing**	.1	Remove forms after grout in the exposed shoulders has set to a stiff putty consistency, such that a pointed mason's trowel can just be inserted into it.
		.2	Cut back excess grout shoulders to a 45 degree angle from the bottom corner of the base plate and end plate. Take care to avoid pulling the grout away from the underside of the base plate and end plate.
		.3	Do not allow the grout to sag and do not leave large exposed grout shoulders extending out from the plate.

.4 Cover freshly poured grout with wet rags until it is ready to shape.

.5 Provide a steel trowel finish to exposed grout.

3.6 Curing

.6 Cure grouts in accordance with the manufacturer's instructions. Treat exposed grout surfaces with grout membrane curing compound.

.7 Cover exposed grout surfaces with rag or wet burlaps.

END OF SECTION

1.0 GENERAL

1.1 Description

.1 This section includes metal ladders for the project.

1.2 Submittals

.1 Provide submittals in accordance with 01 33 00S and 01 33 23S.

.2 Product Data: Submit manufacturer's printed product literature, specifications and data sheets.

.3 Shop Drawings
- .1 Include plans, elevations, sections, details, and attachments.
- .2 Indicate construction details, sizes of steel/aluminum sections, and thickness of steel/aluminum members.
- .3 Indicate welds by standard CWB symbols. Distinguish between shop and field welds, show size, length, and type of each weld. Identify grinding, finish, and profile of welds.
- .4 Indicate position, orientation, material, head type, diameter and length of rivets.
- .5 Submit shop drawing bearing the stamp of a qualified professional engineer registered in British Columbia.

.4 Informational Submittals
- .1 Welding certificates.
- .2 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
- .3 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .4 Qualification data.

1.3 Quality Assurance

.1 Installer Qualifications: Fabricator of products.

.2 Welding Qualifications: Qualify procedures and personnel according to the following:
- .1 AWS D1.2 – Structural Welding Code: Aluminum
- .2 ISO 10042 – Arc-Welded Joints in Aluminum and Its Alloys

1.4 Measurement for Payment

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

2.0 PRODUCTS

2.1 Aluminum Ladders

.1 All aluminum heavy duty fixed vertical ladder, of rivetted construction, with non-slip rungs.

.2 Load rating 135 kg (300 lbs).

.3 Fix to structure with mounting brackets designed to suit chamber dimensions.

.4 Silo ladder and mounting brackets from Falcon Ladder, Kelowna (250-861-9556) approved.

2.2 Ladder Safety Posts

.1 Provide ladder safety posts on all ladders.

.2 Tubular telescoping construction complete with stainless-steel spring balancing mechanism.

.3 Provide fasteners for securing to ladder rungs. Clamp brackets shall be reinforced w/ 6 mm (¼ inch) thick stainless steel plate. Use extended 75 mm (3 inch) mounting bolts.

.4 Hot dip galvanized construction

.5 Install as per the manufacturer's instructions.

.6 Provide Bilco ladder up safety posts or Approved Equal.

3.0 EXECUTION

3.1 Installation

.1 Install plumb and true in exact locations.

.2 316 stainless steel anchors, bolts, and washers shall be used to attach ladders to the structures. Isolation washers or bushings shall be installed between the stainless steel and aluminum components.

.3 Do welding work in accordance with CSA W59.2 unless specified otherwise.

3.2 Cleaning

.1 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.

.2 Upon completion of installation, remove surplus materials, rubbish, tools, and equipment barriers.

END OF SECTION

1.0 GENERAL

1.1 Work Included .1 This specification details anchor bolt requirements for all equipment, machinery, and structural supports.

1.2 Reference Standards .2 CAN3 A23.3, Design of Concrete Structures for Buildings.

.3 CSA/CAN3-S16.1, Steel Structures for Buildings (Limit States Design).

1.3 Submittals for Review .1 Submit the following product information, in accordance with Section 01 33 00S and 01 33 23S, for all bolt systems not cast-in-place:

.1 Data, indicating load capacities and embedment requirements.

.2 Chemical resistance.
.3 Temperature limitations.
.4 Installation instructions.
.5 Submit samples to Engineer of proposed adhesive and expansion type anchors.

1.4 Submittals For Information Only .1 Submit shop drawings in accordance with Section 01 33 00 and 01 33 23, clearly indicating; anchor bolt type, diameter, minimum embedment length, location, materials, projection, plates, washers, nuts, sleeves and torque requirements of anchor bolts to be used. Shop drawings to bear the seal of a Professional Engineer registered in the Province of British Columbia.

1.5 Quality Control .1 Arrange a field demonstration of correct installation procedures with bolt manufacturer, for all adhesive and expansion anchors. Notify the Engineer a minimum of 48 hours in advance of the demonstration. Pull out tests will be carried out by a Testing Laboratory designated by the Engineer. Pull out tests must be performed prior to the use of the anchors on site.

1.6 Measurement for Payment Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

2.0 PRODUCTS

2.1 Typical Products .1 Adhesive anchor bolts: Hilti, HVA adhesive anchors.

.2 Expansion anchor bolts will not be permitted unless approved by the Engineer.

2.2 Design Criteria .1 Design bolt sizing and spacing to CSA/CAN3-S16.1; CAN3-A23.3.

.2 Design anchor bolts with due regard for edge distances, bolt spacing and available embedment depth.

2.3 Materials

.1 Select anchor bolt material according to exposure conditions:

.1 External applications or areas exposed to outside air: Stainless steel to AISI Type 316.

.2 Internal applications: Stainless steel to AISI Type 304.

.3 Permanently or intermittently submerged equipment: Stainless steel to AISI Type 316.

.4 Anchor bolts securing proprietary equipment:

.1 For rotating equipment over 50 hp, provide anchor bolts with sleeves and washers to permit adjustment during installation of the equipment.

.2 Do not use drilled expansion or adhesive anchors for anchor bolts unless submitted and reviewed by the Engineer.

.5 Nuts and washers to be of the same material and of equal or greater strength than bolts. Tapered washers to be provided where mating surface not square with nut.

3.0 EXECUTION

3.1 General

.1 Anchor bolt holes in support frames not to exceed bolt diameter by more than 25 percent, up to a limiting maximum oversizing of 12 mm.

.2 Minimum anchor bolt diameter 12 mm.

.3 Do not use adhesive anchors in overhead applications.

.4 Adhesive and expansion anchor bolt locations to reviewed by the Engineer prior to use or installation.

.5 Field work, including cutting and threading, will not be permitted on galvanized items. Protect dissimilar metals from galvanic corrosion by means of pressure tapes, coatings or isolators. Grout anchor bolts with non-shrink grout, where specified, in accordance with manufacturer's recommendations.

3.2 Installation

.1 Adhesive and Expansion Anchor Bolts

.1 Limit use to locations where exposure to the following on an intermittent or continuous basis is extremely unlikely:

.1 Acid concentrations greater than 10 percent.

.2 Chlorine gas.

.3 Machine or diesel oils.

.4 Fire.

.5 Concrete or rod temperatures above 48 °C.

.2 Adhesive anchor to be threaded or deformed for full length of embedment. Holes to be free of rust, scale, grease and oils. Embedment length as specified or to manufacturer's recommendations.

.3 Install anchor bolts in strict accordance with manufacturer's specifications and recommendations, including maximum hole diameter.

.4 Holes to have rough surfaces, such as can be achieved using a rotary percussion drill. Locate reinforcement using non-destructive method prior to drilling.

.5 Blow clean holes with compressed air to remove dust and standing water prior to installation.

.6 Leave adhesive anchors undisturbed and unloaded for the entire curing period. Replace anchors which have been disturbed or loaded during the adhesive curing period at the Contractor's expense. Concrete temperature (not air temperature) to be compatible with manufacturer's curing requirements.

.7 Anchor sizing requirements a minimum factor of safety of 4 to 1 (allowable load vs actual load).

.1 Expansion anchor bolts to be free of rust, scale, grease and oils.

END OF SECTION

1.0 GENERAL

1.1 Description .1 This section specifies the supply, installation, and commissioning of the access hatches as specified herein, as needed for a complete and operational system.

1.2 Reference Standards .1 Conform to the following standards:
.1 CSA W47.2, Certification of Companies for Fusion Welding of Aluminum.
CSA W48, Welding Electrodes.
CSA W59.2, Welded Aluminum Construction
CSA HA Series M, Standards for Aluminum and Aluminum Alloys
CSA S157, Aluminum Fabrication and Assembly.
ASTM B209M, Specification for Aluminum and Aluminum Alloy Sheet and Plate.
ASTM B221M, Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes.
ASTM B241, Specification for Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.
ASTM B632M, Specification for Aluminum-Alloy Rolled Tread Plate.
ASTM F738-M, Specification for Stainless Steel Metric bolts, Screws and Studs.

1.3 Schedule of Access Hatches .1 See table below.

Location	Access Hatch Numbers	Frame Size (mm x mm)	Clear Opening (mm x mm)	Require Fall Protection Grating System	Require Safety Post	Sealed	No of Hatches
PRV Chamber	AH-1	1219x1219	1067x1191	Yes	Yes	No	1

1.4 Submittal for Review .1 Provide the following information in one complete submittal and in accordance with Section 01 33 00 and 01 33 23:
.1 Product Data: Provide sizes, types, finishes, scheduled locations, accessories, and details of adjoining work.
Show profiles, accessories, location, and dimensions.
Manufacturer's Installation Instructions: Indicate installation requirements, rough-in dimensions and anchorage.

1.5 Submittal for Information Only .1 Not Used.

1.6 Unit Responsibility .1 Assign unit responsibility to a single manufacturer or supplier for the complete hatch assembly, including all components, appurtenances, and accessories required for a fully functional installation.

.2 Identify the responsible entity in the submittal. Submission of shop drawings and product data confirms that the identified entity accepts full responsibility for the design, fabrication, coordination, and performance of the hatch system.

.3 The designated entity shall ensure that all components, whether manufactured directly or provided by others, are fully compatible and meet all specified requirements. The Contractor shall be fully responsible for ensuring that the designated entity fulfills these obligations.

1.7 Coordination .1 Coordinate design, supply and installation of access hatches with manufacturer.

.2 Coordinate frame delivery and installation with concrete forming and pouring.

1.8 Quality Assurance .1 Perform work in accordance with Underwriters Laboratories requirements.

1.9	**Shipment, Protection and Storage**	.1	Ship, protect, and store equipment to prevent damage, in accordance with manufacturer's instructions.
1.10	**Warranty**	.1	Manufacturer's standard warranty: Materials shall be free of defects in material and workmanship for a period of (10) Ten years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.
1.11	**Operation and Maintenance Data**	.1	.1 Submit under provisions of Section 01 78 23. Operation Data: Include manufacturer's instructions, description of operation.
1.12	**Measurement for Payment**		Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.
2.0	**PRODUCTS**		
2.1	**Acceptable Manufacturers**	.1	Trough Frame: 1. USF Fabrication Type T series (in Aluminium) 2. Bilco Type J-AL or JD-AL
2.2	**Access Door Fabrication**	.1	Fabricate floor access assemblies to support live load of 0.45 kPa (300 lb/sq.ft.)
		.2	The aluminum tread plate cover shall be opened using the flush lifting handle to ensure controlled operation throughout the entire arc of opening and closing.
		.3	Frame shall be minimum 1/4" (6.3mm) extruded aluminum with a continuous anchor flange around the entire perimeter of the frame. Frame is designed to be drainable and is not to be considered watertight or floodtight.
		.4	Hinges shall be through bolted to the cover and frame with tamperproof type 316 stainless steel bolts and locknuts.
		.5	All covers and doors shall be lockable by means of heavy duty hasps and staples. One recessed padlocking facility shall be provided for each access hatch. Recessed padlock provisions should drain surface water.
		.6	Lifting mechanisms: Manufacturer shall provide the proper amount of lift assist to ensure that the cover can be opened by one person with no more than 25 kg (40lbs) of force required.
		.7	Hardware: .1 Hinges Type 316 stainless steel hinges shall be provided and shall pivot so the cover does not protrude into the channel frame. Cover shall be equipped with a 316 stainless steel hold open arm, with secondary latch which locks the cover in its full upright and open position. A watertight 316 stainless steel slam lock with threaded plug, removable outside key and fixed inside handle shall be mounted on the underside of the cover. Hardware: Shall be Type 316 stainless steel throughout.
		.8	Finishes: .1 Factory finish shall be mill finish aluminum, An adhesive backed vinyl material, that protects the product during shipping and installation, shall cover the entire top of the door.

.9 Fall protection grating panels shall be aluminum with a powder coat paint finish that is safety yellow or safety orange in color. Panel shall be designed to meet the requirements of OSHA standard 29 CFR 1910.23 and be equipped with a hold open device to lock the grating panels in the open position. Hold open device and all hardware shall be Type 316 stainless steel.

.10 Safety Post: Install on fixed ladders below hatch covers, safety post as manufactured by the USF Fabrication or Bilco Company.

2.3 Field Measurements

.1 Verify that field measurements are as indicated on shop drawings.

3.0 EXECUTION

3.1 Examination

.1 Verify substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

.2 Verify that rough openings for door and frame are correctly sized and located.

3.2 Installation

.1 Install units as shown on drawings, in accordance with manufacturer's literature.

.2 Repair nicks or other damages to bituminous surface of frame prior to installation.

.3 Install frames plumb and level in opening. Secure rigidly in place.

.4 Lubricate and adjust for proper operation.

.5 Trough drains to be plumbed to chamber sump with SCH40 PVC pipe.

END OF SECTION

1.0 GENERAL

1.1	**General**	.1	This section applies to the supply and installation of concrete and masonry coatings, specifically to the concrete PRV chamber.
		.2	Work includes surface preparation, material supply, and installation to provide waterproofing, crack bridging, and joint sealing.
1.2	**Reference Standards**	.1	ASTM C836 – Cold Liquid-Applied Elastomeric Waterproofing Membrane
		.2	ASTM D5385 – Hydrostatic Pressure Resistance of Waterproofing Membranes
		.3	ASTM D5295/D5295M – Concrete Surface Preparation for Waterproofing Systems
		.4	ASTM C990 – Preformed Flexible Joint Sealants for Concrete Structures
		.5	Master Painters Institute (MPI) Standards (Categories #40 and #113 – Elastomeric Coatings).
1.3	**Chamber Coating**	.1	Chamber exterior shall be coated with Asphalt Emulsion.
		.2	Chamber interior shall be painted with Elastomeric Coating.
1.4	**Chamber Sealant**	.1	Mastic sealant (shipped loose) shall be installed in chamber keyway and all joints and pipe penetrations shall be grout-sealed (non-shrink, interior and exterior) prior to backfilling.
1.5	**Measurement for Payment**		Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

2.0 PRODUCTS

2.1	**Asphalt Emulsion**	.1	Coatings shall be high-solids, water-based asphalt emulsion damp proofing / waterproofing coatings suitable for application on below-grade concrete and masonry surfaces.
		.2	Performance Requirements: 1. Provides a continuous waterproof barrier to resist moisture ingress and soil penetration. 2. Excellent adhesion to concrete, masonry, and metal substrates. 3. Flexible membrane to accommodate minor substrate movement and cracking. 4. Resistant to soil chemicals, salts, and mild corrosive environments.
		.3	Physical Properties: 1. Volume solids: approximately 55–65% 2. Minimum dry film thickness: 40–60 mils (1.0–1.5 mm) total system 3. VOC: less than 50 g/L 4. Elongation: greater than 100%
		.4	Finish: Black colour, semi-matte finish.
		.5	Acceptable Product: Henry Company Henry 107 Asphalt Emulsion Damp proofing, AquaSeal AE-100, or approved equivalent.

2.1	**Elastomeric Coatings**	.1	Coatings shall be high solids, internally plasticized elastomeric coatings suitable for use on masonry and concrete.
		.2	Performance Requirements: 1. High elongation for crack bridging up to 1/16 inch (1.6 mm). 2. Resistant to weathering, colour fading, and mildew growth. 3. Waterproof and flexible over temperature variations.
		.3	Physical Properties: .1 Volume solids: approximately 50% .2 Minimum dry film thickness per coat: 6–8 mils .3 VOC: less than 56 g/L
		.4	Finish: White colour, Flat/matte finish.
		.5	Acceptable Product: Cloverdale Paint “Towerthon Elastomeric Coating” or approved equivalent.
2.2	**Butyl Rubber Sealant**	.1	Sealant shall be butyl rubber-based sealing compound for precast concrete joints.
		.2	Performance Requirements: .1 Permanently pliable and watertight .2 Resistant to chemical exposure including acids, bases, and hydrogen sulfide .3 Service temperature range: -34°C to +93°C .4 Suitable for application temperatures: -1°C to 49°C
		.3	Physical Properties: .1 Specific gravity: 1.30–1.45 .2 Penetration: 60–70 dmm
		.4	Acceptable Product: CS-101 Butyl Rubber Sealant or approved equivalent.
2.3	**Primers**	.1	Provide manufacturer-recommended primers where required for adhesion to specific substrates including concrete and masonry.
3.0	**EXECUTION**		
3.1	**Surface Preparation**	.1	Ensure all surfaces are clean, dry, and free from contaminants including grease, dust, loose paint, and mildew.
		.2	Remove loose or peeling coatings and prepare surfaces by cleaning and sanding as required.
		.3	Do not apply coatings at temperatures below 10°C.
3.2	**Application – Asphalt Emulsion & Elastomeric Coatings**	.1	Apply in accordance with manufacturer’s instructions.
		.2	Apply a minimum of two coats to achieve specified film thickness.
		.3	Protect surfaces from rain and allow minimum 24 hours between coats under standard conditions.
		.4	Backfilling should occur only after full curing

3.3	**Installation – Butyl Sealant**	.1	Clean joint surfaces and remove debris prior to installation.
		.2	Install sealant in continuous strands without stretching.
		.3	Provide minimum 50% compression of sealant for effective sealing.
		.4	Do not locate joints within 300 mm of corners.
3.4	**Field Quality Control**	.1	Inspect completed installations for continuity and adhesion.
		.2	Repair defects and reapply materials as required to achieve specified performance.
3.5	**Protection**	.1	Protect completed work from damage until fully cured. Prevent contamination of freshly applied coatings or sealants.

END OF SECTION

1.0 GENERAL

1.1	**Description**	.1	This section includes building plumbing systems, including water, sewage, and drainage systems, plumbing fixtures, and their associated piping and appurtenances.
1.2	**Reference Sections**	.1	Section 40 05 01S – Piping Systems
		.2	Section 40 05 50S – Isolating Valves
		.3	Section 40 05 65S – Control and Check Valves
		.4	Section 40 73 13S – Pressure and Differential Pressure Gauges
1.3	**Reference Standards**	.1	Conform to the following standards: .1 British Columbia Plumbing Code 2024 .2 CAN/CSA B45 Series – Plumbing Fixtures .3 ANSI Z358.1 – Emergency Eyewash and Shower Equipment .4 ASSE 1071 – Temperature Actuated Mixing Valves
1.4	**Submittals for Review**	.1	Shop drawings per Section 01 33 00S and 01 33 23S.
1.5	**Measurement for Payment**		Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

2.0 PRODUCTS

2.1	**Double Check Backflow Preventer**	.1	Double check backflow preventers complete with Lead Free bronze body construction, ball type isolating valves, and test cocks shall be provided.
		.2	Watts LF007M2QT, or approved equal.
2.2	**Hose Bibb Vacuum Breaker**	.1	Hose bibbs shall be 19 mm (3/4 inch), c/w hose connection vacuum breaker furnished with break-away set screw.
		.2	To be used for interior installations.
		.3	Watts 8B, Conbraco 38-304-AS, or approved equal.
2.3	**Pressure Reducing Valve – Direct Acting**	.1	Pressure reducing valves shall be direct acting, spring-loaded, diaphragm-type valve capable of accurate pressure control.
		.2	Valve shall be complete with integral strainer and sensing.
		.3	Pressure reducing valve shall have an adjustable pressure range of 172-517 kPa (25-75 psig) and be preset to 345 kPa (50 psig).
		.4	Valve body and cover shall be lead-free brass with stainless steel trim, 40 mm NPT union inlet and FNPT outlet connection.
		.5	Provide 1100 kPa (160 psig) pressure gauge mounted on valve body tapping.
		.6	Watts LFU5B-Z3-GG.

3.0 EXECUTION

3.1	**General**	.1	After completion of installation, all plumbing fixtures and equipment shall be cleaned.
3.2	**Backflow Preventer**	.1	Backflow preventer shall be installed as per CSA/CAN – B64.10-01.
3.3	**Testing**	.2	After completion of installation, provide testing to demonstrate compliance with the requirements of these specifications.

END OF SECTION

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

1.1 RELATED SECTIONS

.1 Technical Specification 26 05 00S Common Work Results - Electrical
.2 Technical Specification 26 05 02S Seismic Restraint
.3 Technical Specification 26 05 10S Testing and Commissioning
.4 Technical Specification 26 05 20S Wire and Box Connectors (0-1000V)
.5 Technical Specification 26 05 21S Wires and Cables (0-1000V)
.6 Technical Specification 26 05 28S Grounding - Secondary
.7 Technical Specification 26 05 29S Hangers and Supports for Electrical Systems
.8 Technical Specification 26 05 31S Splitters, Junction, Pull Boxes and Cabinets
.9 Technical Specification 26 05 32S Outlet Boxes, Conduit Boxes and Fittings
.10 Technical Specification 26 05 34S Conduits, Conduit Fastenings and Conduit Fittings
.11 Technical Specification 26 05 43 01S Installation of Cables in Trenches and in Ducts
.12 Technical Specification 26 05 80S Fractional Horsepower Motors
.13 Technical Specification 26 09 24S Lighting Control Devices – Low Voltage
.14 Technical Specification 26 24 01S Service Equipment
.15 Technical Specification 26 24 05S Switchboard TVSS Protection
.16 Technical Specification 26 24 16 01S Panelboards Breaker Type
.17 Technical Specification 26 27 16S Electrical Cabinets and Enclosures
.18 Technical Specification 26 27 17S Programmable Logic Controller
.19 Technical Specification 26 27 26S Wiring Devices
.20 Technical Specification 26 29 03S Control Devices
.21 Technical Specification 26 29 04S Transmitters and Indicators
.22 Technical Specification 26 29 05S Data Communications Infrastructure
.23 Technical Specification 26 50 00S Lighting
.24 Technical Specification 26 54 00S Heaters and Ventilation

1.2 REGULATORY REQUIREMENTS

.1 Definitions:
  .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in this Technical Specification, and on Contract Drawings, are those defined by IEEE SP1122.
.2 Reference Standards:
  .1 Canadian Standards Association (CSA International)
  .2 CSA C22.1, Canadian Electrical Code, Part 1, Current Edition.
  .3 CSA C22.2 No. 1-10, General Requirements - Canadian Electrical Code, Part 2, Current Edition.
  .4 CAN3-C235-83, Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
  .5 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
  .6 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, Current Edition.
  .7 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  .8 Material Safety Data Sheets (MSDS).
  .9 Master Municipal Construction Documents Association (MMCDA)
  .10 Master Municipal Construction Documents, Current Edition (MMCD)

1.3 TECHNICAL SPECIFICATION INCLUDES

.1 This Technical Specification covers items common to the Divisions 26 Technical Specifications. This Technical Specification supplements requirements of Division 1.

.2 This Technical Specification 26 05 00S refers to those portions of the Work that are unique to the supply and installation of all electrical, control, and instrumentation and related appurtenances. This Technical Specification must be referred to and interpreted simultaneously with all other Technical Specifications pertinent to the works described herein.

1.4 SCOPE

.1 This project involves installation of a new Pressure Reducing Valve (PRV) station. The PRV station will be located on the corner of Nelson St. and Delestre Ave in Coquitlam, BC.

.2 The electrical scope of the PRV station includes, but is not limited to, the following items of work:

.1 Electrical Kiosk and Associated Equipment

.2 PRV Chamber Instrumentation and Electrical Equipment

.3 Electrical Kiosk and Associated Equipment

.1 Supply and install of the proposed electrical kiosk, including all electrical material, labour, and equipment as indicated on the Contract Drawings, and all applicable supplementary specification.

.2 Supply and installation of necessary BC Hydro service ducting (and pull boxes if required) to the new electrical kiosk. Coordination with BC Hydro is required.

.3 Supply and installation of electrical grounding systems.

.4 PRV Chamber Instrumentation and Electrical Equipment

.1 Supply and installation of all electrical equipment within the PRV chamber as detailed on the drawings and specifications.

.2 Supply and installation of valve data acquisition system within the PRV chamber, including cables to electrical kiosk.

.3 Supply and installation of necessary cable ducts between the new electrical kiosk and the PRV chamber, including trenching and backfilling.

.5 Provide startup and commissioning, including coordination with the City for antenna aiming and testing.

.6 Provide site commissioning services.

.7 Provide all permits, licenses and fees required by applicable Governmental Authorities having jurisdiction.

.8 All work described herein shall be performed by qualified personnel.

.9 Preparation of operations and maintenance manuals.

.10 Provision of training for the operation and maintenance teams.

1.5 MATERIALS SUPPLIED BY OTHERS

.1 Programming and commissioning of Radio, PLC, and SCADA integration.

1.6 DEFINITIONS

.1 The word ‘Supply’ means to obtain and deliver to the Site, ready for unpacking, assembly, and installation.

.2 The word ‘Install’ means the installation of device or equipment referenced to the level required to be complete and operational including unloading, unpacking, assembling, erecting, applying, finishing, protecting, and cleaning.

.3 The word ‘Provide’ means to Supply and Install all associated equipment.

.4 AHJ: Governmental Authority having jurisdiction.

.5 Schematic or Elementary Diagram

.1 A schematic (elementary) diagram shows, by means of graphic symbols, the electrical connections and functions of a specific circuit arrangement. The schematic diagram facilitates tracing the circuit and its functions without regard to the actual physical size, shape, or location of the component devices or parts.

.6 Single-Line Diagram

.1 A single-line diagram shows, by means of single lines and graphical symbols, the course of an electrical circuit or system of circuits and the components, devices or parts used therein. Physical relationships are usually disregarded.

.7 Block Diagram

.1 A block diagram is a diagram of a system, instrument, computer, or program in which selected portions are represented by annotated boxes and interconnecting lines.

.8 Wiring Diagram or Connection System

.1 A wiring or connection diagram includes all of the devices in a system and shows their physical relationship to each other including terminals and interconnecting wiring in an assembly. This diagram may be (a) in a form showing interconnecting wiring only by terminal designation (wireless diagram), or (b) by panel layout diagram showing the physical location of devices plus the elementary diagram.

.9 Interconnection Diagram

.1 An interconnection diagram shows all external connections between terminals of equipment and outside points, such as motors and auxiliary devices. References shall be shown to all connection diagrams which interface to the interconnection diagrams. Interconnection diagrams shall be of the continuous line type. Bundled wires shall be shown as a single line with the direction of entry/exit of the individual wires clearly shown. Wireless diagrams and wire lists are not acceptable. Each wire identification as actually installed shall be shown. The wire identification for each end of the same wire shall be identical. All devices and equipment shall be identified. Terminal blocks shall be shown as actually installed and identified in the equipment complete with individual terminal identification. All jumpers, shielding and grounding termination details not shown on the equipment connection diagrams shall be shown on the interconnection diagrams. Wires or jumpers shown on the equipment connection diagrams shall not be shown again on the interconnection diagram. Signal and DC circuit polarities and wire pairs shall be shown. Spare wires and cables shall be shown.

.10 Arrangement, Layout, or Outline Drawings

.1 An arrangement, layout, or outline drawing is one which shows the physical space and mounting requirements of a piece of equipment. It may also indicate ventilation requirements and space provided for connections or the location to which connections are to be made.

1.7 DRAWINGS, MEASUREMENTS, AND NOTATIONS

.1 Contract Drawings are generally diagrammatic and are intended to indicate the scope and general arrangement of work.

.2 The Contract Drawings show approximate locations of equipment and apparatus, but the right is reserved to make such changes in location before installation or performance of the work as may be necessary to meet the exigencies of construction in any way. No extra will be allowed and conversely, no credit shall be expected for such changes unless for each item of work the distance moved exceeds 3m prior to final installation of same.

.3 Take field measurements where equipment and material dimensions are dependent upon building dimensions.

.4 The Contractor shall supply and install all electrical equipment. Standard notations are used on the Contract Drawings to assist the Contractor in identifying what work needs to be done. These standard notations are defined as follows:

.1 “All equipment is proposed unless noted otherwise” – This notation is used on Contract Drawings where the majority of the equipment on the drawing is to be supplied and installed by the Contractor. The notation means that the Contractor shall perform all work shown on the Contract Drawing except for equipment shown as existing (i.e. to remain).

.2 “All equipment is existing unless noted otherwise”: - This notation is used on Contract Drawings where the majority of the equipment is existing. The notation means that the Contractor shall perform only the Work identified on the Contract Drawings.

1.8 RESPONSIBILITY AND COORDINATION

.1 Provide all labour, materials, equipment, tools, and incidentals necessary to provide a complete electrical installation as indicated on the Contract Drawings and as set out in these Technical Specifications.

.2 Without relieving the Contractor of his responsibilities, the Technical Specifications have been divided into approximate trade sections for convenience. The use of these sections do not, however, limit the responsibility of the Contractor or any Subcontractor or Supplier. The onus of defining the extent of the Subcontractors' work remains with the Contractor, who, when awarding subcontracts, will ensure that the area of responsibility of any particular Subcontractor is set out in full detail.

.3 The Contractor shall advise the Contract Administrator of any specified material or equipment which is either no longer available from manufacturers or whose delivery is likely to exceed the requirements of the anticipated Work Schedule. Failure of the Contractor to perform the above shall cause the Contractor to supply, at his own expense, alternate material or equipment as selected by the Contract Administrator at a later date. Alternatively, the Contractor shall procure the specified material or equipment at his own additional expense by means of air freight or other special means of transportation.

.4 Advise the Contract Administrator of any specified equipment, material, or installation of same which appears inadequate or unsuitable or which is in violation of Laws, ordinances, rules, or regulations of Governmental Authorities having jurisdiction. Provide all labour and materials which are obviously necessary or reasonably implied to be necessary to complete the work as if the work was shown on the Drawings and/or described in the Specifications.

.5 Check drawings of all trades and coordinate the installation of all material and equipment to ensure adequate space and free access and to maintain headroom limitations for all proposed and indicated future work. Work out jointly, with all Subcontractors on the Site, solutions to interference problems. Coordinate all work before fabricating or installing any material or equipment. It is incumbent on all Subcontractors on the Site to ensure that all materials and equipment fit into the allocated spaces and that all equipment can be properly inspected, serviced, and replaced if and when required. Advise the Contract Administrator of space problems before fabricating or installing any material or equipment. Demonstrate to the Contract Administrator on completion of its work that all equipment and material installed by the Contractor can be properly and safely serviced and replaced. Make no deviations from the intent of the design, or any involving additional cost, without the Contract Administrator's written direction.

.6 Ensure that any building structure loaded during the installation is adequate to carry such load.

.7 A contractor is entitled to engage in the regulated work for which the contractor is licensed.

.1 A licensed contractor must not:

.1 Manage or do regulated work that is:

.1 Outside the scope of the license,

.2 Contrary to any term or condition of the license, or

.3 Contrary to any term or condition imposed by the regulations on the use of the license, or

.2 Permit regulated work to be undertaken by persons under the control of the licensed contractor if they are not authorized.

.2 A licensed contractor must:

.1 Maintain current knowledge of the Applicable Laws, relevant regulations, relevant directives, relevant safety orders and any other relevant material that the minister makes publicly available, and

.2 Ensure that individuals who do regulated work for the licensed contractor maintain similar current knowledge.

1.9 COMMON PRODUCT REQUIREMENTS

.1 All products and warranties shall be registered in the Owner’s name.

.2 Products shall be purchased through authorized supply chains to ensure that all warranties and technical support remain valid in British Columbia following installation of the products.

.3 Any products installed that had their warranties or technical support voided for any reason shall be replaced at the Contractor's expense with an identical replacement product that has a valid warranty in British Columbia. Any resulting costs from complications that require remediation from products with voided warranties or technical support shall be borne solely by the Contractor to make the Work good.

.4 Contractor is responsible to ensure that all products are purchased from the OEM or an OEM authorized supply chain/channel such as an authorized distributor or reseller. Any non-OEM products installed shall be replaced at the Contractor's expense, even if non-OEM products are discovered after completion of the project. Any resulting costs from complications that require remediation from the use of non-OEM products shall be borne solely by the Contractor to make the Work good.

.5 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections or field reviews. Inspection does not relieve responsibility, but is precaution against oversight or error. Contractor to remove and replace defective products at own expense and is responsible for any delays and expenses caused by rejection.

.6 Contractor shall provide letters of assurance from the OEM manufactures identified throughout the specifications which assure that the products purchased as part of the project were purchased through an OEM authorized channel and that the products are new.

.1 Details on required letters of assurance from OEM manufacturers are provided in Section 1.19 Closeout Submittals.

1.10 TESTING, OPERATION AND SET-UP

.1 Testing in accordance with Technical Specification 26 05 10 Testing and Commissioning.

1.11 PERMITS, FEES, AND INSPECTIONS

.1 Before commencing work obtain and pay for all necessary approvals and permits. The Contract Administrator shall provide any documents required by the Authority Having Jurisdiction to obtain such permits.

.2 Arrange for inspection of the work at rough-in completion, prior to Substantial Completion, and as otherwise required by all applicable Authorities Having Jurisdiction.

.3 Notify Contract Administrator of any changes required by the Authorities Having Jurisdiction prior to proceeding with changes.

.4 Provide Contract Administrator with a certificate of unconditional approval for all electrical work from the appropriate Authorities Having Jurisdiction. Final payment to the Contractor shall not be made prior to submission of the inspection certificate.

1.12 EVALUATION OF CONTRACT CHANGES

.1 In accordance with Division 1 specifications.

1.13 MEASUREMENT AND PAYMENT

.1 Payment for all work performed under this Section will be Lump Sum per the Schedule of Quantities and Prices and as described in Section 01 20 00S.

1.14 REVIEW OF WORK

.1 In accordance with the General Conditions.

1.15 SCHEDULING OF WORK

.1 Work shall be scheduled as required to coordinate with other Divisions and Owner's work restrictions.

1.16 ACTION AND INFORMATIONAL SUBMITTALS

.1 In accordance with Division 1 specifications.

1.17 SHOP DRAWINGS

.1 Provide a single combined digital copy of all shop drawings in one submission. Shop drawings shall be submitted in PDF format. Organize and separate shop drawings per Technical Specification for review. Unless otherwise noted, all partial or incomplete submittals will be marked “re-submit” (R3) without comment.

.2 The Shop Drawing will be retained by the Contract Administrator for their office use and a copy will be marked and returned to the Contractor for correction, if necessary, further reproduction, and distribution as required.

.3 Accompany submissions with transmittal letter, containing:

- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.4 Where specifically noted in other Technical Specifications in Division 26, submit drawings stamped and signed by Professional Engineer registered or licensed in British Columbia, Canada.

.5 Contractor shall review all Shop Drawings prior to submittal. All Shop Drawings shall be stamped and signed by the electrical Subcontractor engaged by the Contractor. Unstamped drawings will be marked “re-submit” (R3) without comment.

.6 All Shop Drawings shall use metric dimensions. Scaled drawings shall use metric scale.

.7 Each Shop Drawing shall clearly indicate the equipment ID and equipment type (e.g. Luminaire Type ‘A’, Panelboard SD-A) where applicable.

.8 Where manufactures’ brochures that include multiple equipment or device models are submitted, they shall be clearly labelled with the equipment model and options to be supplied. Submit relevant sections of manufacturer’s catalogues only. Submissions of complete catalogues will be rejected.

.9 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.10 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.11 Indicate on Shop Drawings clearance requirements for: operation, maintenance, and replacement of operating equipment devices.

.12 Review of Shop Drawings by the Contract Administrator is for the sole purpose of ascertaining conformance with the general design intent. The review shall not mean approval of the detail design inherent in the Shop Drawings, responsibility for which shall remain with the Contractor submitting same, and such review shall not relieve the Contractor of its responsibility for errors or omissions in the Shop Drawings or of its responsibility for meeting all requirements of the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of the work of all sub-trades.

.13 Allow a minimum of 10 working days for review of submittals by the Consultant and a further 5 working days for resubmittal incorporating adjustments required by the Consultant. More than two submission cycles will be considered extra work.

.14 Shop Drawings stamped as “Revise and Resubmit” to be corrected and resubmitted by the Contractor within 10 days of the Shop Drawing review.

.15 Ensure that copies of all accepted Shop Drawings are available at the job site.

1.18 CLOSEOUT SUBMITTALS

.1 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.

.2 Operation and Maintenance Manuals:

- .1 Provide draft version of Operations and Maintenance Manual to Contract Administrator two weeks prior to Substantial Performance Review.

.3 Upon completion of all electrical, control, and instrumentation work, submit Record Drawings, including all as-built information and changes.

1.19 AS-BUILT DOCUMENTS AND SAMPLES

.1 Maintain at Site for Contract Administrator one record copy of:
- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Change Orders and other modifications to Contract.
- .5 Reviewed shop drawings, product data, and samples.
- .6 Field test records.
- .7 Inspection certificates.
- .8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction in secure location.

.3 Label record documents and file in accordance with section number listings in list of contents of this project manual.

.4 Maintain record documents in clean, dry and legible condition.
- .1 Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Contract Administrator.

.6 Obtain and pay for three sets of white prints. As the project progresses, mark these prints to accurately indicate installed work. Have the white prints available for inspection at the Site at all times and present for scrutiny at each project meeting.

.7 Show on the Record Drawings the installed inverts of all services entering and leaving the building and the property. Dimension underground services at key points of every run in relation to the structure and building.

.8 Indicate exact location of all services for future work. Show and dimension all work embedded in the structure.

.9 Maintain in the site office in up-to-date condition, one (1) complete set of whiteprints of each of the electrical Contract Drawings and one (1) set of Technical Specifications, including revisions to the Contract Drawings, marked clearly and indelibly in red, indicating as-built conditions where such conditions deviate from the original directions of the Contract Documents, and indicating final installation of feeders and branch circuits.

.10 ”As-Built” markings shall include the following:
- .1 All changes in circuiting.
- .2 Size and routing of all conduits for branch circuits including power, lighting, and systems. Note that branch circuit wiring is generally not shown on Contract Drawings. Accurately record on "As-Built" drawings the size and routing of all installed raceways and cables.
- .3 Number and size of conductors in raceways and cables
- .4 Location of all junction and pull boxes
- .5 Location of all access panels
- .6 Location of all conduit or duct stubs, installed equipment, devices, and fixtures
- .7 All changes to electrical installation resulting from Addenda, Change Orders, and Field Instructions (Architectural / Engineering Instructions)
- .8 Exact location of all services left for future work
- .9 Location by accurate horizontal and vertical dimensions of the routes and terminations of all raceways and cables installed underground beyond the building.
- .10 Exact labeling of each communication system cable at each data outlet location. Locate label numbers adjacent each communication outlet indicated on Contract Drawings. Label numbers to match those at the communication room cable end.
- .11 Where extensive changes have been made to an area to the point where it is not practical to update the original Contract Drawing, the area in question shall be enclosed with a heavy dotted line and reference made to the applicable Change Order, Instruction, and/or associated Revision Drawing.
- .12 For each and every "As-Built" drawing, reference shall be neatly drawn inside the framed space above the title block, listing all Contemplated Change Orders, Instructions, and Revision Drawing Numbers applicable to the particular "As-Built" drawing in question.

.13 Each "As-Built" drawing as defined above shall bear the Contractor's identification and signature, the date of record, and the notation: "We hereby certify that these drawings represent the work as built."

.14 All Addenda and Revision Drawings not having their details transferred onto the submitted "As-Built" drawings shall be included in the submission using the same drawing format as previously described.

.11 Recording Information on Project Record Documents.

.1 Record information on set of Contract Drawings.

.2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress.

.4 Do not conceal Work until required information is recorded.

.5 Contract Drawings and Shop Drawings: mark each item to record actual construction, including:

.6 Changes made by Change Orders.

.7 Details not on original Contract Drawings.

.8 References to related Shop Drawings and modifications.

.9 Specifications: mark each item to record actual construction, including:

.10 Manufacturer, trade name, and catalogue number of each product installed, particularly optional items and substitute items.

.11 Changes made by Addenda and Change Orders.

.12 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, as required by Technical Specifications.

.13 Provide digital photos, if requested, for site records.

1.20 OPERATION AND MAINTENANCE MANUAL

.1 Submission:

.1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.2 Copy will be returned after final inspection, with Contract Administrator's comments.

.3 Revise content of documents as required prior to final submittal.

.4 As a condition of Substantial Completion submit to the Contract Administrator, four final copies of operating and maintenance manuals in English.

.5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

.6 If requested, furnish evidence as to type, source and quality of products provided.

.7 Defective products will be rejected, regardless of previous inspections. The Contractor shall replace products at their own expense, with no increase to the Contract Price.

.8 Pay costs of transportation.

.2 Format

.1 Organize data in the form of an instructional manual.

.2 Provide a digital copy of the O&M manual in PDF format.

.3 Arrange content by systems under Technical Specification numbers and sequence of Table of Contents.

.4 Provide organized digital bookmarks for content by systems under Technical Specification Numbers and sequence of Table of Contents.

.3 Contents – Each Volume:

.1 Table of Contents: provide title of Project;

.2 Date of submission; names,

.3 Addresses, and telephone numbers of Engineer and Contractor with name of responsible parties;

.4 Schedule of products and systems, indexed to content of volume.

.5 For each product or system:

.6 List names, addresses and telephone numbers of Subcontractors and Suppliers, including local source of supplies and replacement parts.

.7 Product Data

.8 Mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.9 Drawings

.10 Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.11 Typewritten Text

.12 As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

.13 Guarantees, Warrantees and Bonds

.14 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.15 List Subcontractor, Supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.16 Obtain warranties and bonds, executed in duplicate by Subcontractors, Suppliers, and manufacturers, within ten days after completion of the applicable item of work.

.17 Except for items put into use with Owner's permission, leave the date of when the warranty begins blank until the Substantial Completion Date is determined. The beginning date of the warranty will then be updated to state the Substantial Completion Date.

.18 Verify that documents are in proper form, contain full information, and are notarized.

.4 Equipment and Systems:

.1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut down, and emergency instructions. Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.12 Additional requirements: As specified in the Contract Documents.

1.21 DELIVERY, STORAGE, AND HANDLING

.1 Delivery and Acceptance Requirements: deliver materials to Site in original factory packaging, labelled with manufacturer's name and address.

.2 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Except for equipment intended for installation outdoors, store equipment indoors in dry location.

.3 Store and protect equipment and materials from nicks, scratches, and blemishes.

.4 Replace defective or damaged materials with new.

.3 Packaging Waste Management: remove and dispose of all packaging waste materials.

.1 Where possible, return packaging materials to supplier for re-use.

.2 Divert all recyclable materials from landfill.

1.22 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with the Contract and the Division 1 Technical Specifications.

.2 Qualifications: electrical work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices in accordance with authorities having jurisdiction as per the conditions of Electrical Safety Regulation within the Electrical Safety Act and the Building Code and By-Laws.

.1 Employees registered in provincial apprentices' program: permitted, under direct supervision of qualified licensed electrician, to perform installation tasks.

.2 Submit list showing names and qualifications of key supervisory personnel.

1.23 SAFETY AND PRECAUTION

.1 Safety practices shall include the following requirements:

.1 Compliance with safety requirements provided in the Contract Documents

.2 Workers' Compensation Board Regulations

.3 Municipal By-Laws

.4 Canadian Electrical Code

.5 Electrical Safety Act of BC

.6 Municipal, Provincial and Canadian Building Code

.2 Tests shall be performed with apparatus de-energized unless otherwise specified (e.g., rotation, phasing).

.3 Power circuits shall have conductors shorted to ground by an approved hotline grounded device.

.4 In all cases, work shall not proceed until the Contractor's safety representative has determined that it is safe to do so.

.5 The Contractor shall have sufficient protective barriers and warning signs available, where necessary, to conduct specified tests safely.

.6 The Project safety procedures shall be reviewed and accepted by the Contractor and all sub-trades.

1.24 CARE, OPERATION, AND START-UP

.1 Instruct Contract Administrator and operating personnel in the operation, care and maintenance of systems, system equipment and components.

.2 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

1.25 APPROVALS

.1 Without limiting or restricting the contents of the Contract Documents, requests for approval of the substitution of materials pertaining to electrical work must be submitted to the Contract Administrator and the Owner in accordance with the Review Procedure.

.2 All submissions shall include the following information:

.1 Name and identification of specified item.

.2 Manufacturer, brand name, and catalogue number of the alternative item proposed.

.3 Detailed technical data and characteristics of alternative item such as dimensions, voltage, power requirements, performance characteristics, etc.

.4 Request for lighting fixture substitutions must be followed by photometric data and Shop Drawings.

.5 A list of any and all changes to the installation which may be required as a result of the substitution.

.3 Materials, equipment, apparatus, light fixtures, or other products specified by manufacturers' brand name, type, or catalogue number are so specified in one of two ways:

.1 Specified item followed by the words "or equal" or "approved equal" or preceded by the words "equivalent to" or "equal to"; when the Technical Specification is so worded, it is intended to establish a specific standard of quality and style but the item may be substituted for, provided the Contract Administrator provides its written approval. It is the responsibility of the Contractor to assure the Contract Administrator that all features of the specified items are supplied as part of the substitute item. If the Contract Administrator does not provide its written approval for a substitute item, the item shall be supplied precisely as specified in the Contract Documents.

.2 Specified items not followed or preceded by any such qualifying phrases: When the Technical Specification is so worded, the item shall be supplied as specified and no approved equals or equivalents will be allowed.

.4 Review by the Contract Administrator of alternate materials as permitted above is only a general approval in principal and shall not relieve the Contractor of its responsibility to ensure that any approved alternate materials perform in the same manner and with the same intent as the originally specified material would have otherwise performed.

.5 Where such substitutions alter the design or space requirements indicated on the Contract Drawings, include all material, labour, design, and engineering costs for the revised design and construction including costs of all other trades affected and those incurred by the Owner and Contract Administrator.

.6 It is the Contractor's responsibility to ensure substituted products are approved and that Suppliers have written approval indicating conditions of any such approval. Alternate manufacturers who do not have such approval shall not be used in the work. If requested by the Contract Administrator, the Contractor for Division 26 shall submit for inspection, samples of both the specified and the proposed substitute items on short notice.

PART 2 Products

2.0 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.

.1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

.3 Language operating requirements: provide identification nameplates for control items in English.

2.1 MATERIALS AND EQUIPMENT

.1 Equipment and material shall be new and certified by a certification body accredited by the Standards Council of Canada (SCC). Where there is no alternative to supplying equipment which is not certified, obtain special approval and pay all associated fees. Notify Contract Administrator prior to supplying material that is not SCC approved.

.2 Factory assemble control panels and component assemblies.

.3 Substitution of Products

.1 After acceptance of the list of products, no substitution of any item will be permitted unless the approved item cannot be delivered in time to comply with the work schedule and the Contract Administrator accepts the change in items.

.2 To receive acceptance, proposed substitutes must equal or exceed the quality, finish and performance of those specified in the Contract Documents and/or shown in the Contract Drawings, and must not exceed the space requirements allotted on the Contract Drawings.

.3 Provide to the Contract Administrator documentary proof of equality, difference in price (if any) and delivery dates, in the form of certified quotations from suppliers of both specified items and proposed substitutions.

.4 Include costs for any required revisions to other structures and products to accommodate such substitutions.

2.2 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of authority having jurisdiction and Contract Administrator.

.2 Decal signs, minimum size 175 x 250 mm.

2.3 WIRING TERMINATIONS

.1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.4 EQUIPMENT IDENTIFICATION

.1 Identify equipment cabinets with nameplates as follows:
.2 Nameplates:
  .1 Lamicoid 3 mm thick plastic engraving sheet, lettering accurately aligned and engraved into core, mechanically attached with self-tapping screws or permanent self-adhesive.
  .2 Nameplate colours as follows:
    .1 Normal Power Systems: black face, white core
    .2 Emergency/Standby Power Systems: red face, white core
    .3 Life Safety Systems: red face, white core
    .4 Colours for other equipment as specified by the Contract Administrator.
    Sizes as follows:

NAMEPLATE SIZES			
Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

.3 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise in the Contract Drawings.
.4 Wording on nameplates to be approved by Contract Administrator prior to manufacture.
.5 Allow for minimum of twenty-five (25) letters per nameplate.
.6 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
.7 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
.8 Terminal cabinets and pull boxes: indicate system and voltage.
.9 Transformers: indicate capacity, primary and secondary voltages.

2.5 WIRING IDENTIFICATION

.1 Refer to Technical Specification 26 05 21 – Wires and Cables (0-1000V).

2.6 CONDUIT AND CABLE IDENTIFICATION

.1 Refer to Technical Specification 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings.

2.7 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
.2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
.3 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.
.4 Repair or replace any equipment or structures damaged by the Work, to its original condition at no cost to the Owner.

PART 3 Execution

3.0 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Technical Specifications are acceptable for installation in accordance with manufacturer's written instructions.
.2 Visually inspect substrate in presence of Contract Administrator.
.3 Inform Contract Administrator of unacceptable conditions immediately upon discovery.
.4 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Contract Administrator.

3.1 INSTALLATION

.1 Complete installation in accordance with CSA C22.1 except where specified otherwise.
.2 Do overhead and underground systems in accordance with CAN/CSA-C22.3 No.1 except where specified otherwise in the Contract Drawings.

3.2 NAMPLATES AND LABELS

.1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.3 CONDUIT AND CABLE INSTALLATION

.1 Install conduit and sleeves prior to pouring of concrete.
    .1 Sleeves through concrete: schedule 40 plastic, sized for free passage of conduit, and protruding 50 mm.
.2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.
.3 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.4 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise in the Contract Drawings.
.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

3.5 CO-ORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.6 FIELD QUALITY CONTROL

.1 Refer to Technical Specification 26 05 10 Testing & Commissioning.

3.7 SUBSTANTIAL PERFORMANCE REVIEW

.1 Prior to the Contractor submitting an Application for Substantial Completion, the Contractor will submit written confirmation that:
    .1 All wiring devices, cover plates, motor controls, lighting fixtures, and other equipment are operational, plumb, clean, and correctly labelled.
    .2 All distribution equipment (cabinets, panels, distribution transformers, etc.) has been cleaned and vacuumed.
    .3 All test reports have been submitted.
    .4 All auxiliary systems have been tested as required and are in good and proper working order.
    .5 All certificates of final acceptance from the authorities having jurisdiction have been received and submitted to the Contract Administrator.

.6 Factory finished equipment has been cleaned, touched up, or refinished as necessary to present a new appearance.

.7 All sealing of conduits, cables, cable trays, wireways, etc. at wall, ceiling, and floor penetrations have been completed.

.8 All lighting fixtures including lenses and reflectors have been properly cleaned as specified in the Contract Drawings.

.9 All loose equipment including spare parts and replacement parts have been turned over to the Owner and receipts obtained for same.

.10 The operations and maintenance manuals have been submitted.

.11 All demonstrations and instructions to the Owner have been completed.

.12 Verification letter from Seismic Engineer has been submitted.

.2 Provision of the above shall not be construed as compliance with all administrative documentation required.

.3 Notwithstanding any other provisions of the Contract, failure if the Contractor fails to complete all of the requirements in this section 3.7 the Contract Administrator may refuse to issue a Certificate of Substantial Completion.

3.8 SYSTEM START-UP

.1 Arrange and pay for services of manufacturer's factory service representative to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.2 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

3.9 CLEANING

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

.3 Where work is performed in a phased manner, or Owner will take partial occupancy of the area of Work, perform final cleaning at the end of each Phase or prior to Owner taking occupancy of each area.

.4 Waste Management: separate waste materials for reuse and recycling.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.10 Measurement for Payment

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

END OF SECTION

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 It is the responsibility of equipment manufacturers to design their equipment so that the strength and anchorage of internal components of the equipment exceeds the force level used to restrain and anchor the unit itself to the supporting structure.

.2 Manufacturer's shop drawings to be submitted with seismic information on equipment structure, bracing and internal components and as required by the Specifications.

.3 Provide restraint on all equipment and machinery, which is part of the building electrical services and systems, to prevent injury or hazard to persons and equipment in and around the structure. Restrain all such equipment in its normal position in the event of an earthquake.

.4 When manufacturer mounting requirements and seismic information are not available to suit the application, the Contractor will ensure that the total electrical seismic restraint design, field review and inspection will be by a B.C. registered professional structural engineer who specializes in the restraint of building elements (the "Seismic Consultant"). Contractor to allow for coordination, provision of seismic restraints, as well as all costs for the services of the Seismic Consultant. The Seismic Consultant will provide normal engineering functions as they pertain to seismic restraint of electrical installations.

.5 The Contractor shall be aware of, and comply with, all current seismic restraining requirements and make provision for those that may come into effect during construction of the Project. Any changes in conditions will not result in an increase to the Contract Price, unless otherwise stated in the Contract Documents.

.6 The Seismic Consultant shall provide detailed seismic restraint installation shop drawings to the Contractor when required. Copies of the shop drawings to be included in the Project Binder.

.7 Provide seismic restraints on all equipment, and/or installations or assemblies, which are suspended, pendant, shelf mounted, freestanding and/or bolted to the building structure or support slabs per manufacturer instructions or the Seismic Consultants direction as required.

.8 The Seismic Consultant shall provide inspections during and after installation when their services are required. The Contractor shall correct any deficiencies in accordance with the General Conditions of the Contract.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00S Common Work Results – Electrical

.2 Technical Specification 26 05 29S Hangers and Supports for Electrical Systems

1.3 REGULATORY REQUIREMENT

.1 Restraints shall meet the requirements of the latest edition of the British Columbia Building Code and amendments.

.2 The Contractor's seismic consultant shall submit original signed BC Building Code Letters of Assurance Schedules S-B and S-C to the Contract Administrator together with Shop Drawings submission.

.3 Importance Factor: 1.5.

.4 Use the Electrical Contractors Association of BC details in the absence of any local requirements.

.5 The above requirements shall not restrict or supplant the requirements of any Applicable Laws, including local bylaws, codes, or other certified agencies which may have jurisdiction over all or part of the installation.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

.2 Submit shop drawings of all seismic restraint systems including details of attachment to the structure, either tested in an independent testing laboratory or approved by the Seismic Consultant.

.3 Submit all the proposed types and locations of inserts or connection points to the building structure or support slabs. Follow the directions and recommendations of the Seismic Consultant.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S Common Work Results – Electrical

1.6 Measurement for Payment

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

Part 2 Products

2.0 GENERAL

.1 Seismic Restraint Systems (SRS) shall be designed to avoid high impact loads.

.2 SRS shall restrain seismic forces in all directions.

.3 Fasteners and attachment points shall resist same load as seismic restraints.

.4 SRS utilizing cast iron and other brittle materials is not acceptable.

.5 Equipment assemblies required to be vibration/noise isolated shall be provided with seismic rated isolators and restraints which are certified as being rated for the specification application requirements.

.6 Seismic control measures shall not interfere with integrity of fire stopping.

2.1 SLACK CABLE SYSTEMS

.1 Slack shall prevent sway in a horizontal plane, rocking in a vertical plane, sliding and buckling in axial direction.

.2 Hanger rods shall withstand compressive loading and buckling forces.

.3 Slack cable systems to allow normal maintenance of equipment and shall not create additional hazard by their location or configurations. Contractor shall rectify any such installations at no additional cost, all to the satisfaction of the engineer and inspection authority having jurisdiction.

.4 Coordinate requirements of slack cables with suppliers prior to installation.

Part 3 Execution

3.0 GENERAL

.1 All seismic restraints systems shall conform to Governmental Authorities, including local authority having jurisdiction and all Applicable Laws and applicable code requirements.

3.1 CONDUITS

.1 Provide restraint installation information and details on conduit and equipment as indicated in Section 3.2 of this Technical Specification:

.2 Vertical Conduit

- .1 Attachment - Secure vertical conduit at sufficiently close intervals to keep the conduit in alignment and carry the weight of the conduits and wiring. Stacks shall be supported at their bases and, if over 2 stories in height, at each floor by approved metal floor clamps.
- .2 At vertical conduit risers, wherever possible, support the weight of the riser, at a point or points above the center of gravity of the riser. Provide lateral guides at the top and bottom of the riser, and at intermediate points not to exceed 9.2 m o.c.
- .3 Riser joints shall be braced or stabilized between floors.

.3 Horizontal Conduits

.1 Supports - Horizontal conduit shall be supported at sufficiently close intervals to keep it in alignment and prevent sagging.

.4 Do not brace conduit runs against each other. Use separate support and restraint system.

.5 Support all conduits in accordance with the capability of the pipe to resist seismic load requirements indicated.

.6 Trapeze hangers may be used. Provide flexible conduit connections where conduits pass through building seismic or expansion joints, or where rigidly supported conduits connect to equipment with vibration or seismic isolators.

.7 A conduit system shall not be braced to dissimilar parts of a building or two dissimilar building systems that may respond in a different mode during an earthquake. Examples: wall and a roof; solid concrete wall and a metal deck with lightweight concrete fill.

.8 Provide large enough conduit sleeves through walls or floors to allow for anticipated differential movements with firestopping where required.

.9 The Contractor will ascertain that an appropriate size restraint device be selected for each individual piece of equipment. Submit details on Shop Drawings. The Contractor will review the Shop Drawings with Seismic Consultant and submit Shop Drawings to the Contract Administrator for their reference.

3.2 FLOOR MOUNTED EQUIPMENT

.1 Bolt all equipment, (including transformers, kiosks, switchgear, generators, motor control centres, free standing panelboards, control panels, capacitor banks) to the structure. Seismic Consultant shall design anchors and bolts.

END OF SECTION

PART 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Provide testing and commissioning services and equipment to assure that all electrical equipment is operational within industry manufacturers' tolerances, calibrated per the power system studies, complies with all applicable codes, is installed in accordance with design specifications, and functions in the system in the manner designed by the Consultant.

.2 Inspections, calibrations, and acceptance tests for all equipment systems shall be performed. The inspections and testing activities shall be divided among the following groups, as specified in this Section:

.3 The original equipment manufacturer's authorized service representative shall provide special equipment, labour, and technical supervision, when required, in addition to what is supplied by the Contractor.

.4 Inspections, calibrations, and acceptance tests for equipment and systems not requiring the services of the manufacturer's representative shall be performed by the Contractor.

.5 In cases where equipment and systems require the involvement of two or all of the parties, the parties mentioned above shall coordinate and perform all inspection and testing requirements. The Contractor shall be responsible for coordination of the work and ensuring that the requirements of this Section are met.

.6 All testing and commissioning to be carried out in accordance with the terms of this Contract.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00S Common Work Results – Electrical

.2 Technical Specification 26 27 16S Electrical Cabinets and Enclosures

1.3 REFERENCES

.1 Definitions:

- .1 Stage 1 – Functional Testing (By the Contractor)
  - .1 **"Functional Testing"** refers to the stage of testing where the *Contractor* and sub-contractors provide end to end testing and documentation of all individual electrical and mechanical system components to ensure correct operation and consistency with the design.
- .2 Stage 2 – PLC/HMI/RTU Configuration and Programming (By the City)
  - .1 **"PLC/HMI/RTU Configuration and Programming"** refers to the stage of testing where the Owner provides PLC, HMI, and RTU configuration and programming.
- .3 Stage 3 – Commissioning (By the Contractor and the Owner)
  - .1 **"Commissioning"** refers to the stage of testing where the Contractor demonstrates complete system functionality.
- .4 Stage 4 – Performance Testing (By the Contractor)
  - .1 **"Performance Testing"** refers to the stage of testing post Commissioning, where the station must demonstrate trouble-free functionality for a period of two (2) weeks.

.2 Reference Standards:

- .1 All inspections and tests shall be in accordance with, but not limited to, the following applicable codes and standards except as provided otherwise in this Section.
  - .1 International Electrical Testing Association - NETA
  - .2 National Electrical Manufacturer's Association – NEMA
  - .3 Canadian Electrical Manufacturers Association - CEMA
  - .4 American Society for Testing and Materials - ASTM
  - .5 Institute of Electrical and Electronic Engineers – IEEE

.1 1584-2018, Guide for Performing Arc-Flash Hazard Calculations

.6 American National Standards Institute – ANSI

.1 ANSI Z535.4-2011, Product Safety Signs and Labels

.7 Canadian Electrical Code - Parts 1 and 2

.8 Canadian Standards Association – CSA

.1 CSA Z462-18, Workplace electrical safety, provides assistance in determining the severity of potential exposure, planning safe work practices, and selecting personal protective equipment to protect against shock and arc flash hazards.

.9 Insulated Power Cable Engineers Association - IPCEA

.10 National Fire Protection Association - NFPA

.11 ANSI/NFPA 70B: Electrical Equipment Maintenance

.12 WCB Regulations

.13 CANICSA-B72-M87: Lightning Protection Code

.14 Municipal By-Laws

.2 All inspections and tests shall utilize the following references:

.1 Project design drawings and specifications

.2 Shop drawings and submittals

.3 Manufacturer's instruction manuals applicable to each particular apparatus

.4 Applicable NETA acceptance testing work scope sections per NETA ATS (Latest Edition)

1.4 QUALIFICATIONS

.1 The Contractor shall retain the services of an individual that is qualified to test electrical equipment and is approved by the Consultant.

1.5 COORDINATION

.1 The Contractor, their associated sub-contractors, and suppliers shall be available during the Commissioning activities. This includes, but is not limited to:

1. Entire Duration:

.1 Instrumentation Technician

.2 Electrician/Wireman

.2 The Contractor shall provide configuration, functional testing, and system operation testing and verification of all individual components.

.3 Coordinate the factory field-testing and assistance per the requirements of this Section.

1.6 SUBMITTALS

.1 Submit the qualifications of the individual(s) doing testing and commissioning according to this Section for approval.

.2 Submit the coordinated test schedule for approval.

.3 Submit detailed test procedures corresponding to the requirements in this Section for approval. The test procedures shall be detailed test instructions, written with sufficient step-by-step information to allow a test to be repeated under identical conditions. List all setpoint values and acceptable results for each condition tested.

.4 Submit a preliminary copy of the hand-written field test results to the Consultant and the Owner within one (1) week after the test is completed.

.5 Prior to energization of equipment, submit a letter certifying that the electrical installation being energized complies with contract documents, applicable codes, and proper system operation.

.6 The test reports shall be compiled and submitted in formal form with a summary.

1.7 OPERATIONS AND MAINTENANCE (O&M) MANUALS

.1 Operations and Maintenance Manuals shall be in accordance with 26 05 00S Common Work Results – Electrical.

1.8 SCHEDULING

.1 Perform all testing after installation and before energizing. All systems shall pass tests prior to being put into service.
.2 The Contractor, in coordination with the equipment manufacturer's representatives, shall confirm the test schedule with the Consultant prior to the test. The Contractor shall coordinate the test schedule so that the Consultant can witness the testing, if required.
.3 Testing and calibration of electrical equipment shall be completed prior to the start of commissioning activities. When required during commissioning, the Contractor shall retest and re-calibrate equipment to support the commissioning activities.

1.9 MEETINGS

.1 Pre-Commissioning conference: The *Contractor* shall request a pre-commissioning conference with the Consultant (conference calls accepted).

1.10 SAFETY AND PRECAUTIONS

.1 Safety practices shall include, but are not limited to, the following requirements:
  .1 Workers' Compensation Board Regulations
  .2 Municipal By-Laws
  .3 Canadian Electrical Code
  .4 Electrical Safety Act of BC
  .5 Municipal, Provincial and Canadian Building Code
.2 Tests shall be performed with apparatus de-energized unless otherwise specified (e.g., rotation, phasing).
.3 Power circuits shall have conductors shorted to ground by an approved hotline grounded device.
.4 In all cases, work shall not proceed until the Contractor's safety representative has determined that it is safe to do so.
.5 The Contractor shall have sufficient protective barriers and warning signs available, where necessary, to conduct specified tests safely.
.6 The Project safety procedures shall be reviewed and accepted by the Contractor and all sub-trades.

1.11 TEST EQUIPMENT

.1 All test equipment shall be furnished by the Contractor.
.2 Test instrument calibration
  1. The Contractor shall have a calibration program which maintains all applicable test instrumentation within rated accuracy.
  2. The accuracy shall be traceable to the National Bureau of Standards in an unbroken chain.
  3. Up-to-date calibration labels shall be visible on all test equipment.
.3 Use of torque wrenches
  1. Use calibrated torque wrenches for all bolted connections on buses and power cable terminations. Mark the head of the bolt with a coloured marking pen after its being torqued to manufacturer's recommended value.

1.12 Measurement for Payment

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

PART 2 Products

2.0 NOT USED

PART 3 Execution

3.0 REQUIREMENTS

.1 Perform acceptance tests in accordance with manufacturer's recommendations, WCB regulations, and testing specifications NETA ATS (Latest Edition).

.2 Voltage adjustments shall be in accordance with CSA CAN3-C235.83, Preferred Voltage Levels for AC Systems, to 50,000 V.

.3 The test plan, procedures, test results, and reports shall be reviewed, under the supervision of and approved by the Consultant.

.4 Division of responsibility

.1 During Functional Testing the Contractor shall be responsible for the following elements of testing.

.1 End to end testing for all communications and power cabling installed as part of the contract between end devices, any intermediate splice/ terminal junction boxes, and the distributions panels, control panels, and RTU panels.

.2 Individual control panel component testing within the factory and in the field following installation including the following:

.1 Push buttons,
.2 Pilot lights,
.3 Control relays,
.4 Control timers,
.5 Control circuit breakers and fuses,
.6 HMI screens,
.7 PLC controller (test power up),
.8 Pressure transmitters,
.9 Valve position transmitters,
.10 Flow meter transmitters; and,
.11 All other components contained within the control panel.

.3 Individual field component testing once installed and powered including the following:

.1 Verification of labelling and identification of field components,
.2 Flow meters,
.3 Pressure transmitters,
.4 Valve position transmitters,
.5 Float switches,
.6 Door/Hatch contacts,
.7 and all other instrumentation and control components shown on the Contract Drawings.

.4 The Contractor shall confirm that all devices are powered, and signals are being transmitted between the field devices and the control panel prior to control system integration and testing.

.5 Contractor to configure and setup all Instrumentation.

.6 The Contractor shall coordinate tests to ensure proper functionality of the system.

.2 The PLC/HMI/RTU Configuration and Programming stage(s) shall take place both before and concurrently with Functional Testing. The Contractor shall coordinate with the City's programmer to allow adequate access to the site. During this stage, the Owner's Programmer will be available to assist with the Contractor's Functional Tests.

.3 After the Functional Testing and Programming stages are complete, the Contractor shall perform Commissioning activities. This includes the following elements of testing.

.1 Demonstrating complete system functionality by running the system through the Process Narrative.

.2 Confirming system functionality through all programming and instrumentation setpoints with the assistance of the Owner's Programmer.

.4 Once the Contractor has sufficiently demonstrated system functionality to the Owner's Programmer Performance Testing shall commence. This includes the following elements of testing.

.1 The Contractor shall monitor the system for a period of two (2) weeks.

.2 The system must perform trouble-free from the entire two-week period to meet the performance goal and be considered substantially complete.

.3 If there are any deficiencies, operational issues, or system failures during the two (2) week period, at the Owner's discretion the Performance Test period may be restarted after the issue/deficiency has been addressed.

3.1 GENERAL TESTING REQUIREMENTS

.1 Contractor shall coordinate and pay for all testing required by the Contract Documents including any additional testing required by authorities having jurisdiction.

.2 All deficient equipment/devices shall be replaced and retested.

.3 Testing for each system shall be performed after the system installation is complete and prior to the system being put into continuous operation.

.4 Advise the Contract Administrator a minimum of five (5) Business Days in advance of each test and carry out tests in the presence of the Contract Administrator.

.5 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of Work.

.6 Submit detailed typewritten test reports to the Contract Administrator within five (5) Business Days after the completion of each test. Include all test reports in the Project Binder.

.1 Test reports shall clearly indicate each component that has been individually tested, test results, and whether the results are within acceptable limits.

.2 Each test report shall be accompanied by a cover sheet outlining the test and summarizing any items that have failed the tests.

.3 Cover sheet shall include names, signatures, and contact information of the individuals who conducted the tests.

.7 Protective Device Setting and Testing

.1 All work shall conform to NETA standards.

.2 Ensure circuit protective devices including overcurrent trips, relays, and fuses are installed to required values per protection and coordination study.

.8 The following is a list of general requirements for testing of equipment and cabling to be completed by the Contractor prior to detailed system testing:

.1 The Contractor shall torque down all accessible bolts, perform routine insulation resistance and continuity tests on branch and feeder circuits, and perform rotational tests for all distribution and utilization equipment, prior to, and in addition to tests performed by the Contractor specified in this Section.

.2 The Contractor shall supply a suitable and stable source of test power at each test site.

.3 The Contractor shall clean all the electrical equipment prior to testing.

.4 The Contractor shall be responsible for implementing all final settings and adjustments on protective devices and electrical equipment in accordance with the equipment calibration requirements or Power System Protective Device Studies.

.9 Any questions or concerns identified shall be promptly addressed to the Consultant.

.10 Any system, material, or workmanship which is found defective on the basis of electrical inspections and tests shall be reported directly to the Consultant.

.11 If a test reveals a fault or problem, the materials of equipment under test will be repaired or replaced and the entire test will be repeated. Tests will not be accepted until the problem is corrected. Submit additional written test reports.

.12 Maintain a written record of all tests and, upon completion of the project, assemble and certify a final test report. The field test reports shall be compiled and signed by the individual performing the testing.

.13 Power systems protective device calibration

.1 Adjustments, settings, and modifications

.1 The Contractor shall calibrate necessary field settings, adjustments, and minor modifications to conform to the coordination study without additional cost (examples of minor modifications are trip sizes within the same frame, the time curve characteristics of induction relays, ranges, etc.).

.2 Adjust or replace protective devices to the values provided in the coordination study.

.3 The trip characteristics, when adjusted to setting parameters, shall fall within the manufacturer's published time-current characteristic tolerance.

.2 The Contractor shall verify that the protective devices have been adjusted and set in accordance with the approved Power System Study.

.14 Acceptance criteria

.1 Each function and test shall be performed under conditions which simulate actual operating conditions as closely as possible.

.1 To that end, the Contractor shall provide all necessary materials, equipment, and temporary system voltages and currents to simulate fault conditions on the system being tested in order to prove and verify proper operation (fuses excepted).

.2 At satisfactory completion of all verified tests, the building electrical system being tested shall be returned to the condition required by the contract documents as a complete and operational system.

.2 The Contractor shall perform general inspections at the job site and shall also review the following:

.1 Assembly of the accessory equipment, and the interconnecting wiring for control circuits.

.2 General inspection of the following: appearance, finish, alignment of doors, covers, and similar parts; quality of workmanship; possible shipping and other damage; missing, broken or incorrectly applied devices; loose or missing accessories, bushings, or hardware; loose or broken wires; proper installation of all equipment; verification that shop drawings and instructions have been shipped with all equipment and are available.

.3 Support of electrical equipment: inspect and check all electrical equipment for support and seismic bracing.

.4 Spare equipment: The Contractor shall inspect and verify spare equipment inventory as specified by Division 26.

.3 The Contractor shall provide technical verification of systems installed including the following:

.1 Technical verification: Purpose to ensure that all systems and devices are properly installed and free of defects and damage. Technical verification includes:

.1 Measurements of tension and power.

.2 Connecting joints and equipment fastening.

.3 Measurements of signals (dB, lux, baud rate, etc).

.4 Compliance with manufacturer's specification, product literature and installation instructions.

3.2 SYSTEM OPERATIONAL TESTING REQUIREMENTS AND PROCEDURES

.1 Distribution System Testing:

.1 The following equipment and systems shall be inspected and tested by the Contractor per manufacturer's instructions and additional requirements noted.

.2 The following tests require that the Contractor provide materials, tools, and labour (qualified personnel) to prepare equipment and devices for testing and to perform tests and to make adjustments and recalibrations for re-testing as necessary and to reconnect systems after the testing is completed. Include in the Tender, all costs associated with the provision of labour to remove and re-install panel plates, to disconnect/reconnect cables, and perform any labour other than testing, and to provide any materials and tools.

- .1 Cables
  - .1 Apply grounds for a time period adequate to drain all insulation-stored charge.
  - .2 Insulation Resistance test per NETA ATS 2017 standards.
- .2 Other utilization equipment
- .3 Switches
  - .1 Verify correct wire bending radii at terminations per wire manufacturer's recommendations and CEC.
- .4 Protective relays and devices
  - .1 Conduct tests according to the manufacturer's recommended testing procedures.
  - .2 Calibrate and set all settings according to the Protective Device Coordination Study.

.3 The following equipment shall be inspected and tested by the Contractor. Coordinate activities with the manufacturer's authorized service representatives.

- .1 The Contractor shall coordinate with the suppliers and Subcontractors to perform the following tests:
  - .1 Control and switching - all circuits shall be tested for the correct operation of devices, switches, and controls, including sequenced operation of systems where applicable.
  - .2 Include in the written reports to the Consultant, the time and date on which each load was measured and the voltage at time of test.
- .2 General power system tests
  - .1 Insulation Resistance test all 120 V and higher circuits, feeders, and equipment.
  - .2 Check resistance to ground before energizing any equipment.
  - .3 Phase balance - when load conditions are commensurate with actual operating conditions, measure the load and the voltage on each phase at each switchboard, splitter, motor control centre, motor distribution centre, distribution panelboard, and lighting and power panelboard and report the results, including neutral currents, in writing to the Consultant. Rearrange circuit connections as necessary to balance the load on each phase to within 15% of average load. Measure phase voltages at connected loads under fully load conditions and adjust transformer taps to within 2% of rated voltage of equipment. Provide upon completion of the work specified herein, load balance report, phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.
  - .4 Phase relationship tests: Check connections to all new and existing equipment, outlets and devices for proper phase relationship. During such check, disconnect all devices which could be damaged by the application of voltage or reversed phase sequence.
- .3 Low voltage feeder and branch circuit conductors (600 V and below)
  - .1 Test for continuity of each lighting and heating circuit originating from branch distribution panels.

.2 Test for grounds in each circuit; test shall consist of the physical examination of the installation to ensure that all required ground jumpers, devices, and appurtenances do exist and are mechanically firm.

.3 Perform a 500V M-Ohm meter test on each circuit between the conductor and ground. The insulation resistance shall not be less than 2 megohms for circuits under 120V, 6 M-Ohms between conductor and ground on those circuits (120 - 600 V) with total single conductor length of 2,500 feet and over, nor less than 8 M-Ohms for those circuits (120 - 600 V) with single conductor length of less than 2500 feet. If conductor fails test, replace wiring or correct defect and retest.

.4 Perform torque test for every conductor tested and terminated in an overcurrent device or bolted type connection; torque all connections per manufacturer's recommendations.

.5 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.6 Check resistance to ground before energizing.

.4 Panelboards

.1 Inspect for physical damage, proper installation, supports, and grounding.

.2 Verify that neutrals are grounded only at the main service.

.3 Load balance tests: Check all panelboards for proper load balance between phase conductors and make adjustments as necessary to bring unbalanced phases to within 15% of average load.

.4 Electronic and adjustable Breakers: provide adjustments as required to align with connected equipment.

.5 Devices

.1 Test all receptacles for proper polarity, circuitry and grounding.

.6 Grounding systems

.1 Verify that generator neutral is solidly bonded to the building ground by removing the service neutral grounding conductor and insulation resistance test the neutral bus.

.2 Perform point-to-point tests to determine the resistance between the main grounding system and all major electrical equipment frames, system-neutral, and/or derived neutral points installed as part of this Contract. Investigate resistance values, which exceed 0.5 ohm. If this resistance cannot be obtained with the ground system, notify the Consultant for further instruction.

.3 The resistance to ground between the equipment enclosures and the grounding grid shall be tested. In soils of low conductivity, additional ground rods, ground plates, and ground wires shall be added, as required. Ground measurements shall not exceed 25 ohms. Measurements shall be undertaken under dry soil conditions, and when frost penetration has not exceeded 150mm. Test results shall be documented by the Contractor and copies given to the Contract Administrator.

.4 Test Method: 3-Point (Fall-of-Potential) Method per IEEE Standard 81.

3.3 HVAC AND LIGHTING SYSTEMS

.1 The following applies to heating, ventilation, and lighting systems:

.1 Heating and Ventilation Systems

.1 Purpose to ensure that existing systems are functional. Verification includes:

.1 Confirmation of thermostat settings for heating and cooling.
.2 Confirmation of operation of heaters and fans.
.3 Confirmation of all control panel elements for ventilation control panels are operational and functioning.

.2 Lighting Systems
.1 Purpose to ensure that systems are functional. Verification includes:
.1 Confirmation that lighting within each building is activated by the associated switches.
.2 Confirmation that emergency lighting is operational in the event of power failure.
.3 Confirmation that kiosk and enclosure lighting is operating as intended per Contract Drawings.

3.4 CONTROL SYSTEMS

.1 The following applies to control systems and instrumentation:
.1 Loop testing: Purpose is to test all control wiring loops between instrumentation and terminations within the control panel to ensure signal continuity and correct signal polarity. Loop testing to be completed for the following instruments:
.1 Pressure transmitters
.2 Float switches
.3 Door/Hatch contacts
.4 And any other devices included within the Contract Documents.
.2 Operational verification: Purpose to ensure that devices and systems' performance meet or exceed established functional requirements. Operational verification includes:
.1 Operation of control system (PLCs, HMIs, relay components, etc.).
.2 Operation of each device individually and within its environment.
.3 Operation of buttons, switches, and pilot lights.
.4 Operation of the external devices, including:
i. Float switch
ii. Pressure Transmitters
.5 Provide assistance during Owner testing and commissioning activities.

.2 Labels
.1 Upon completion of the inspection, calibration, and testing, attach a label to all devices tested. These labels shall indicate the date tested, the Contractor company name, and tester's initials.

.3 Re-testing
.1 Any fault in material or in any part of the installation revealed by these tests shall be investigated, replaced, or repaired by the Contractor and the same test repeated by the Contractor at Contractor’s expense until no fault appears.

3.5 MANUFACTURER'S FIELD SERVICES:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit manufacturer's field reports to Contract Administrator for review. Include field reports in Project Binders.
.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
.3 Obtain manufacturer’s field services for commissioning of equipment as required in other Sections of Division 26 Technical Specifications.
.4 Conduct additional testing as required in other Sections in Division 26 Technical Specifications.

3.6 STANDARDS

.1 The following tests shall be conducted in accordance with latest CSA, ASTM, IEEE and IPCEA standards, recommendations for power cable and equipment testing and standards of the authority having jurisdiction. Notwithstanding the test levels listed in these standards, in no case shall the maximum DC test level exceed manufacturer's factory test AC level for that equipment.

.2 Where production tests are required by EEMAC or CSA for manufactured equipment, provide records of these tests. All tests shall be completed in accordance with manufacturer's published instructions. If these instructions do not conform to the test requirements as specified herein inform the Contract Administrator prior to proceeding with the test.

3.7 TEST APPARATUS AND INSPECTION REPORT

.1 The Contractor is responsible for furnishing all apparatus and labour required for the test operations.

.2 Inspection and test results to be recorded on a suitable form which shall be furnished by the Contractor. The inspection and report forms shall be submitted to the Contract Administrator. Each form to be signed by the test technician. Space to be provided for noting approved items and their disposition.

.3 The Contractor will submit full commissioning reports and information for as-built drawings and acceptance documents signed by test technician.

.4 Upon completion of the Work, the Contractor will assemble complete sets of inspection/test results/reports to be placed in the operating and maintenance manuals. Reports shall include the following:

- .1 Summary of project
- .2 Description of equipment tested
- .3 Description of test
- .4 Test results including re-testing results
- .5 Test dates
- .6 Tester’s name
- .7 Witnesses (when required)
- .8 Corrective work
- .9 Acceptance criteria
- .10 Conclusions and recommendations
- .11 Appendix, including appropriate test forms

3.8 DEMONSTRATION

.1 Demonstrate and instruct the Owner's personnel on operating and maintenance procedures for all electrical systems using the assistance of specialist sub-trades and manufacturer's representatives for instruction. Systems to be demonstrated and trained on shall include the following:

- .1 Entire power distribution systems
- .2 Operation of circuit breakers, interlocking schemes, etc.
- .3 Instrumentation and field monitoring/control devices.
- .4 Manual and automatic station control operation.
- .5 Continuity between switches/pilot lights/field devices and the PLC.
- .6 Loss of power controls and backup power operation.
- .7 Alarming.
- .8 Routing and installation of major feeders, grounding and raceways.
- .9 Labeling and identification schemes.
- .10 Use of the operations and maintenance manuals.

3.9 TRAINING

.1 Arrange an acceptable time with the Owner and the Contract Administrator and submit a program of instruction and demonstration for the Owner's approval. Assume that the Owner's staff are not familiar with any of the special equipment and/or systems installed.

.2 As a condition of Substantial Completion, submit to the Contract Administrator complete list of systems demonstrated and training completed, and state for each system:

- .1 Date that instructions were given to the Owner’s staff.
- .2 Duration of instruction.

.3 Names of persons instructed.
.4 Other parties present (manufacturer's representative, Contract Administrator, etc.).
.5 Signature of the Owner's staff stating that they properly understood the system installation, operation, and maintenance requirements and identifying any systems or equipment which were not demonstrated to their satisfaction and which must be re-demonstrated

3.10 SYSTEM ACCEPTANCES

.1 Prior to requesting inspection, submit, for review by the Contract Administrator letters from the manufacturers of equipment and systems indicating their technical service representatives have inspected and tested the equipment and systems and are satisfied with the methods of installation, connections and operation.
.2 Such acceptance letters shall be submitted for the following:
.1 Distribution and Power Panels.

END OF SECTION

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation for wire and box connectors.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00S Common Work Results – Electrical
.2 Technical Specification 26 05 21S Wires and Cables (0-1000V)

1.3 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)
  .1 CAN/CSA C22.2 No. 18.1-13, Metallic Outlet Boxes
  .2 CAN/CSA C22.2 No. 18.2-06, Nonmetallic Outlet Boxes
  .3 CAN/CSA C22.2 No. 18.3-12, Conduit, Tubing, and Cable Fittings
  .4 CAN/CSA C22.2 No. 18.4-04, Hardware for the Support of Conduit, Tubing
  .5 CAN/CSA C22.2 No. 65-18, Wire Connectors.
.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
  .1 EEMAC 1Y 2, 1961 Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).
.3 National Electrical Manufacturers Association (NEMA)

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.6 Measurement for Payment Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

PART 2 Products

2.0 MATERIALS

.1 Pressure type wire connectors to: CSA C22.2 No. 65, with current carrying parts of copper sized to fit copper conductors as required.
.2 Fixture type splicing connectors to: CSA C22.2 No. 65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.
.3 Bushing stud connectors: to EEMAC 1Y 2 to consist of:
  .1 Connector body and stud clamp for copper conductors.
  .2 Clamp for stranded copper conductors.
  .3 Stud clamp bolts.
  .4 Bolts for copper conductors.

.5 Sized for conductors as indicated.

.4 Clamps or connectors for armoured cable and flexible conduit as required to comply with CAN/CSA C22.2 No. 18 (all subsections).

PART 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wire and box connectors installation in accordance with manufacturer's written instructions.

.2 Visually inspect substrate in presence of Consultant or provide photographic evidence of areas of concern.

.3 Inform Consultant of unacceptable conditions immediately upon discovery.

.4 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:

.1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.

.2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No. 65.

.3 Install fixture type connectors and tighten. Replace insulating cap.

.4 Install bushing stud connectors in accordance with EEMAC 1Y 2.

END OF SECTION

Part 1 General

1.0 Documents

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 Scope

.1 Materials and installation for wire and cables.

1.2 Related Technical Specifications

.1 Technical Specification 26 05 00S Common Work Results – Electrical
.2 Technical Specification 26 05 20S Wire and Box Connectors (0-1000V)
.3 Technical Specification 26 05 43 01S Installation of Cables in Trenches and Ducts

1.3 Regulatory Requirements

.1 Canadian Standards Association (CSA International)
- .1 CAN/CSA C22.2 No. 0.3-09, Test Methods for Electrical Wires and Cables
- .2 CAN/CSA C22.2 No. 38-14, Thermoset-insulated wires and cables
- .3 CSA C22.2 No. 49, Flexible Cords and Cables
- .4 CSA C22.2 No. 51, Armoured Cables
- .5 CSA C22.2 No. 52, Underground secondary and service-entrance cables
- .6 CSA C22.2 No. 65, Wire Connectors
- .7 CAN/CSA C22.2 No. 75, Thermoplastic insulated wires
- .8 CAN/CSA C22.2 No. 127-15, Equipment and lead wires
- .9 CSA C22.2 No. 131, Type TECK 90 Cable
- .10 CAN/CSA C22.2 No. 131-17, Type TECK 90 Cable
- .11 1.4.13 CSA C22.2 No. 174, Cables and Cable Glands for Use in Hazardous Locations
- .12 CSA C22.2 No. 2556, Wire and Cable Test Methods

1.4 Shop Drawings and Submittals

.1 Submit in accordance with Technical Specification 26 05 00SS Common Work Results – Electrical.

1.5 Delivery, Storage and Handling

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.6 Measurement for Payment

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

Part 2 Products

2.0 Power Wiring

.1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG, unless noted otherwise.
.2 Copper conductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE, Jacketed.
.3 Colour Code:
- .1 AC 3-Phase:
- .2 Line 1: Red
- .3 Line 2: Black
- .4 Line 3: Blue
- .5 Neutral: White

.4 AC Single Phase:

.1 Hot: Black
.2 Hot (Secondary): Red
.3 Neutral: White

.5 Grounding conductors to be in accordance with requirements in Technical Specification 26 05 28 Grounding - Secondary.

2.1 Teck 90 Cable

.1 Conductors:
.1 Grounding conductor: copper.
.2 Circuit conductors: copper, size as indicated.
.2 Insulation:
.1 Cross-linked thermosetting polyethylene rated type RW90 XLPE.
.2 Rating: 1000V
.3 Inner jacket: polyvinyl chloride material.
.4 Armour: interlocking aluminum.
.5 Overall covering: thermoplastic polyvinyl chloride.
.6 Connectors:
.1 Watertight approved for TECK Cable.
.2 Explosion proof in classified areas approved for TECK cable.

2.2 Control and Instrumentation Cable

.1 Internal cabinet control wiring shall be TEW (tinned).
.1 Wire: to CAN/CSA C22.2 No. 127-15.
.2 Minimum Size (unless otherwise noted by Contract Drawings):
.1 120VAC: 14AWG.
.2 24VDC: 18AWG.
.2 Colour Code
.1 AC Hot: Black
.2 AC Hot (Secondary): Red
.3 AC Neutral: White
.4 DC Positive: Red
.5 DC Negative: Blue
.6 Ground: Green
.3 Analog instrumentation wiring:
.1 Cable: to CAN/CSA-C22.2 No. 75.
.2 Conductors:
.1 Circuit conductors: 7 strand tinned copper.
.3 Insulation:
.1 Cross-linked thermosetting polyethylene rated type RW90 XLPE.
.2 Rating: 300V and 600V, as required.
.4 Jacket: polyvinyl chloride material.
.5 Shield:
.1 Individual Foil
.2 Tinned copper drain wiring under and in contact with foil.

2.3 Ethernet cables

.1 CAT6 (250MHz) rated, compatible with 1000BaseT networks.
.2 Outdoor rated, installation in conduit approved, UV resistance.
.3 Conductors:
.1 8 x 23 AWG solid copper conductors, arranged in 4 twisted pairs.
.2 RJ45 Termination: TIA 568A
.3 Straight-through (non-crossover) wiring, unless noted otherwise.
.4 Jacket:
.1 Oil and sunlight resistant PVC.
.2 Colour: Blue

2.4 Ethernet patch cables

.1 CAT6 (250MHz) rated, compatible with 1000BaseT networks.
.2 8 x 23 AWG solid copper conductors, arranged in 4 twisted pairs.
.3 Straight-through (non-crossover) wiring, unless noted otherwise.
.4 RJ45 male connectors with molded boots.
    .1 Termination: TIA 568A
.5 Colour: Blue

2.5 Armoured Control and Instrumentation Cable

.1 Cable: to CAN/CSA-C22.2 No. 239-21.
.2 Conductors:
    .1 Circuit conductors: 7 strand tinned copper.
    .2 Conductor size per Contract Drawings.
.3 Insulation:
    .1 Cross-linked thermosetting polyethylene rated type RW90 XLPE.
    .2 Rating: 300V and 600V, as required.
.4 Inner jacket: polyvinyl chloride material.
.5 Armour: interlocking aluminum.
.6 Overall covering: thermoplastic polyvinyl chloride.
.7 Certification:
    .1 FT-4 Flame Rated
    .2 Temperature: 105°C dry, 75°C wet, and -40°C
    .3 Suitable for installation in Class I, Zone 1 and Zone 2, and Class II, Division 1 and 2 Hazardous Locations.
.8 Connectors:
    .1 Watertight approved for armoured control and instrumentation cable.
    .2 Explosion proof in classified areas approved for armoured control and instrumentation cable.

2.6 Twisted Pair Shielded (TPSH) Armoured Cables

.1 TPSH cables are to be constructed as follows:
    .1 Compliance: CSA C22.2 - No. 38, No. 174 and No. 239
    .2 Two copper conductors, stranded, tinned, minimum #16 AWG, PVC-insulated, twisted in nominal intervals of 50 mm. Conductor identification to be by black and white coloured insulation.
    .3 100 percent coverage aluminum foil or tape shield and bare stranded, tinned copper drain wire, minimum #16 AWG for each pair.
    .4 Separate bare stranded, tinned copper drain wire, minimum #16 AWG for each pair.
    .5 Overall shield and bare stranded tinned copper drain wire for multi-pair cables.
    .6 Insulated for 600 V, 90 degrees C.
    .7 Interlocking aluminum armour.
    .8 Overall flame-retardant PVC jacket rated to minus 40 degrees C and meeting low gas emission and FT4 flame test requirements as specified in CSA-C22.2 – No. 0.3 and IEEE 383, and sunlight (UV) resistant rated.
    .9 Overall PVC jacket to be grey in colour.
    .10 HL rating for hazardous location Class 1 Div. 1 or 2.
    .11 Suitable for cable tray installation, indoor and outdoor, for direct burial, and for installations in conduits.
    .12 Each pair of multiconductor TPSH cables to be individually shielded and continuously number coded.

2.7 Triad Shielded Armoured Cables

.1 Triad shielded armoured cables constructed same as Twisted Pair Shielded cables except for:
    .1 Three copper conductors per triad group.

Part 3 Execution

3.1 Field Quality Control

.1 Perform tests in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

3.2 General Cable Installation

.1 Install cable in trenches in accordance with Technical Specification 26 05 43 01 Installation of Cables in Trenches and in Ducts.
.2 Terminate cables in accordance with Technical Specification 26 05 20 Wire and Box Connectors - (0-1000 V).
.3 Conductor length for parallel feeders to be identical.
.4 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.
.5 All field wiring/communication cabling that maybe field installed directly onto any cabinet door mounted components shall be suitably routed and protected across the door hinge to prevent possible mechanical damage upon door opening and/or door closing.

3.3 Wiring Identification

.1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of cable.
.2 Maintain phase sequence and colour coding throughout.
.3 Colour code: to CSA C22.1.
.4 Use colour coded wires in communication cables, matched throughout system.
.5 Wire Labeling:
.6 As indicated on the Contract Drawings.

3.4 Analog Signals

.1 Use twisted-pair shielded armoured (instrument TECK cable) as applicable, for low-level analog signals such as 4-20 mA, 1-5VDC, 0-10VDC, pulse type circuits 24VDC and under, and other signals of a similar nature.
.2 Use triad shielded armoured cable for connections between RTDs and transmitters or CDAC RTD inputs.

3.5 Digital Signals

.1 Use TPSH armoured cable for input and output signals 24 VDC and under and terminate in the marshalling panels.
.2 Use Control TECK cable or wire and conduit power to instruments, for 120 V signals other than those mentioned above and as otherwise shown in the Contract Drawings.

3.6 Installation of Building Wires

.1 Install wiring as follows:
.2 In conduit systems in accordance with Technical Specification 26 05 43 01 Installation of Cables in Trenches and in Ducts.

3.7 Installation of Teck90 Cable (0-1000V)

.1 Install cabling as follows:
    .1 In conduit systems in accordance with Technical Specification 26 05 43 01 Installation of Cables in Trenches and in Ducts.
.2 Install cable exposed, securely supported by straps or hangers.
    .1 Group cables wherever possible on channels, individually strapped.

3.8 Installation of Armoured Cable

.1 Install cabling as follows:
    .1 In conduit systems in accordance with Technical Specification 26 05 43 01 Installation of Cables in Trenches and in Ducts.
.2 Install cable exposed, securely supported by straps or hangers.
    .1 Group cables wherever possible on channels.

3.9 Installation of Control and Instrumentation Cable

.1 Ground control cable shield at control cabinet only.
.2 Cut and heatshrink shield at terminations to field devices.

3.10 Installation of Armoured Control and Instrumentation Cable

.1 Install cabling as follows:
  .1 In conduit systems in accordance with Technical Specification 26 05 43 01 Installation of Cables in Trenches and in Ducts.
.2 Install cable exposed, securely supported by straps or hangers.
  .1 Group cables wherever possible on channels.

END OF SECTION

PART 1 GENERAL

1.0 Documents

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 Scope

.1 Materials and installation for secondary grounding.

1.2 Related Technical Specifications

.1 Technical Specification 26 05 00S Common Work Results – Electrical

.2 Technical Specification 26 24 01S Service Equipment

1.3 Regulatory Requirements

.1 CSA C22.1 - Canadian Electrical Code, Part 1: Section 10 Grounding and Bonding

.2 American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)

.1 ANSI/IEEE 837-02, QUALIFYING PERMANENT CONNECTIONS USED IN SUBSTATION GROUNDING.

1.4 Shop Drawings and Submittals

.1 Submit in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.5 Delivery, Storage and Handling

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.6 Measurement for Payment

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

PART 2 PRODUCTS

2.0 Equipment

.1 Rod electrodes: copper clad steel, 19mm dia. by 3 m long.

.2 Plate electrodes: copper surface area minimum 0.2 m^3, 1.5mm thick, In accordance with the CEC.

.3 Grounding conductors: medium hard drawn, 7 strand, bare stranded copper, size as indicated on Contract Drawings.

.4 Insulated grounding conductors: green, size as indicated.

.5 Ground bus: copper, size as indicated, complete with insulated supports, fastenings, connectors.

.6 Non corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:

.1 GROUNDING AND BONDING BUSHINGS.

.2 PROTECTIVE TYPE CLAMPS.

.3 BOLTED TYPE CONDUCTOR CONNECTORS.

.4 BONDING JUMPERS, STRAPS.

.5 PRESSURE WIRE CONNECTORS.

PART 3 EXECUTION

3.1 General Installation

.1 Install exterior buried grounding loop system as indicated on the Contract Drawings.

.2 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories. Where EMT is used, run ground wire in conduit.

.3 Install connectors in accordance with manufacturer's instructions.

.4 Protect exposed grounding conductors from mechanical injury.

.5 Make buried connections, and connections to conductive water main, electrodes, using permanent mechanical connectors or inspectable wrought copper compression connectors to ANSI/IEEE 837.

.6 Use mechanical connectors for grounding connections to equipment provided with lugs.

.7 Soldered joints not permitted.

.8 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.

.9 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.

.10 Connect building structural steel and metal siding to ground by welding copper to steel.

.11 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.

.12 Bond single conductor, metallic armoured cables to cabinet at supply end.

3.2 Electrodes

.1 Install rod electrodes and make grounding connections.

.2 Bond separate, combine multiple electrodes together, if separate.

.3 Size copper conductors for connections to electrodes, sized as indicated on Contract Drawings.

.4 Make special provision for installing electrodes that will give acceptable resistance to ground value where rock or sand terrain prevails. Ground as indicated.

3.3 System and Circuit Grounding

.1 Install system and circuit grounding connections to neutral secondary 120V system.

3.4 Equipment Grounding

.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, frames of motors, motor control centres, starters, control panels, building steel work, generators, elevators and escalators, distribution panels, outdoor lighting.

3.5 Junction Boxes and Vaults

.1 Bond lids of in-ground junction boxes and vaults.

3.6 Master Ground bus

.1 Install copper grounding bus mounted on insulated supports on wall of electrical kiosk.

.2 Ground items of electrical equipment in electrical kiosk to ground bus with individual copper connections, sized as indicated on the Contract Drawings.

.3 Ground items of water system to ground bus with copper connections, sized as indicated on the Contract Drawings.

3.7 Field Quality Control

.1 Perform tests in accordance with Technical Specification 26 05 00S Common Work Results – Electrical and Technical Specification 26 05 10 Testing and Commissioning.

.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Contract Administrator and Government Authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

.4 Disconnect ground fault indicator during tests.

END OF SECTION

PART 1 GENERAL

1.0 Documents

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with the Contract Documents.

1.1 Scope

.1 Materials and installation for hangers and supports for electrical systems.

1.2 Related Technical Specifications

.1 Technical Specification 26 05 00S Common Work Results – Electrical

.2 Technical Specification 26 05 02S Seismic Restraint

1.3 Regulatory Requirements

.1 American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)

.1 ANSI/IEEE 837-02, QUALIFYING PERMANENT CONNECTIONS USED IN SUBSTATION GROUNDING.

1.4 Shop Drawings and Submittals

.1 Submit Shop Drawings in accordance with Section 26 05 00S Common Work Results – Electrical.

1.5 Delivery, Storage and Handling

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.6 Measurement and Payment Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

PART 2 PRODUCTS

2.0 Support Channels and Stanchions

.1 Select channel as indicated in the Contract Drawings:

.1 U SHAPE, STAINLESS STEEL, SIZE 41 X 41 MM, 2.5 MM THICK, SURFACE MOUNTED AND SUSPENDED WITH STAINLESS STEEL HARDWARE.

.2 ALL MATERIALS TO ASSEMBLE STANCHIONS SHALL BE FROM SAME MANUFACTURER.

.2 Wire and cable ties: nylon 'Ty-rap' or approved equal for wiring and control cable. Velcro cable wraps for data cables.

PART 3 EXECUTION

3.0 Installation

.1 Refer to Technical Specification 26 05 02 – Seismic Restraint.

.2 Contractor to note that the intent of this Technical Specification is for the Contractor to provide under the base contract all seismic restraint of electrical equipment.

.3 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.1 ONE-HOLE STAINLESS STEEL STRAPS TO SECURE SURFACE CONDUITS AND CABLES 53 MM AND SMALLER.

.2 TWO-HOLE STAINLESS STEEL STRAPS FOR CONDUITS AND CABLES LARGER THAN 53 MM.

.4 For surface mounting of two or more conduits use channels at 1500 mm on centre spacing.

.5 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.6 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.7 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.8 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Contract Administrator.

.9 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

END OF SECTION

PART 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation for splitters, junction, pull boxes, and cabinets.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00S Common Work Results – Electrical
.2 Technical Specification 26 05 34S Conduits, Conduit Fastenings and Conduit Fittings
.3 Technical Specifications 26 27 16S Electrical Cabinets and Enclosures

1.3 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)
  .1 CSA C22.1, Canadian Electrical Code, Part 1, Current Edition.
  .2 CSA C22.2 No. 76, Splitters.
  .3 CSA-C22.2 No. 85, Rigid PVC Boxes and Fittings.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.6 Measurement and Payment

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

PART 2 Products

2.0 SPLITTERS

.1 Compliance: CSA C22.2 No. 76, Splitters.
.2 Sheet metal enclosure with welded corners, and formed hinged gasketed cover suitable for locking in closed position.
.3 Main and branch lugs or connection bars to match required size and number of connecting conductors as specified.
.4 At least three spare terminals on each set of lugs in splitters.

2.1 JUNCTION AND PULL BOXES

.1 RPVC construction sized to suit. Screw on flat covers. All mounting hardware to be stainless steel.
.2 Internal dielectric barrier for separating controls and power terminations only where indicated on Contract Drawings.

2.2 EXPLOSION PROOF JUNCTION BOXES

.1 Aluminum construction sized to suit.
.2 Certification: Class 1, Division 1 & 2.
.3 Internal back panel for terminal block mounting.
.4 Gasketed, front cover.
.5 Stainless steel hardware.

2.3 TERMINAL AND PULL BOXES

.1 Intended for surface mounting, except as otherwise specified.
.2 Weatherproof, Style WP1
  .1 Copper-free cast aluminum, Type 4.
  .2 Hinged door if any one dimension exceeds 300 mm.
  .3 Manufactured breather, designed to maintain weatherproof classification of enclosure.
  .4 When used as terminal box, equipped with mounting pan and terminal strip.
.3 Weatherproof, Style WP2
  .1 Same features as for Style WP1, except made of sheet aluminum, minimum 2.3 mm thick.
  .2 Dripshield.
.4 Weather- and Corrosion-Proof, Style WP3
  .1 Same features as for Style WP1, except Type 4X enclosure, made of 316 stainless steel.
.5 Weather- and Corrosion-Proof, Style WP4
  .1 Same features as for Style WP1, except non-metallic, Type 4X fibreglass enclosure.
  .2 Quick-release latches.
.6 Indoor Dry Location Non-process Area, Style GP5
  .1 Welded steel or aluminum Type 12 enclosure.
  .2 Hinged cover with quick-release latch or automotive handle, for enclosures that exceed 300 mm in width or height.
.7 Watertight, Style WT
  .1 Same as weatherproof styles WP1 to WP 4, except without breather.
  .2 Explosion-proof, Style XP
  .3 Same features as for Style WP1, except, in addition to being weatherproof, also suitable for the hazardous location specified.

2.4 CABINETS

.1 Intended for surface mounting, except as otherwise specified.
.2 Enclosure rating is to be the higher rating of the rating shown in the drawings and the rating based upon location of installation.
.3 Single - or double-door construction with 316 stainless steel full-length hinge.
.4 Minimum standard: formed and welded Type 12 construction, of minimum 1.8 mm thick sheet steel, with automotive door handle.
.5 For process and outdoor areas and below-grade valve chambers: formed and welded Type 4X construction of minimum 2 mm thick sheet aluminum, with 316 stainless steel door clamps and hardware.
.6 Full-size equipment mounting pan of formed sheet metal.

PART 3 Execution

3.0 SPLITTERS

.1 Install splitters and mount plumb, true, and square to the building lines.
.2 Extend splitters full length of equipment arrangement except where specified otherwise.

3.1 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.
.2 Mount cabinets with top not higher than 2 m above finished floor, unless otherwise indicated.
.3 Install pole mount enclosures as indicated.
.4 Install equipment and terminal blocks as indicated in cabinets.
.5 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

3.2 IDENTIFICATION

.1 Provide equipment identification in accordance with Technical Specification 26 05 00S Common Work Results - Electrical.

END OF SECTION

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation for outlet boxes, conduit boxes, and fittings.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00S Common Work Results – Electrical

1.3 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)
  .1 CSA C22.1, Canadian Electrical Code, Part 1, Current Edition.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.6 Measurement and Payment Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

Part 2 Products

2.0 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1.
.2 102 mm square or larger outlet boxes as required for special devices.
.3 Gang boxes where wiring devices are grouped.
.4 Blank cover plates for boxes without wiring devices.
.5 240V outlet boxes for 240V switching devices.
.6 Combination boxes with barriers where outlets for more than one system are grouped.
.7 Provide clear while-in-use gasketed cover for interior outlets, where indicated in Contract Drawings.

2.1 CONDUIT BOXES

.1 FD NEMA 4X RPVC boxes with factory-threaded hubs, mounting feet, and gasketed covers, where indicated in Contract Drawings.
.2 Provide clear while-in-use gasketed cover for interior outlets, where indicated in Contract Drawings.

2.2 WEATHER-PROOF OUTLET BOXES

.1 RPVC boxes for outlets rated for outdoor environments.
.2 Connected to TECK 90 cables as required, minimum size 102 x 54 x 48 mm.

.3 Provide weatherproof clear lockable while-in-use covers for all GFI locations, where indicated.

2.3 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.
.2 Knock out fillers to prevent entry of debris.
.3 Conduit outlet bodies for conduit up to 32 mm and pull boxes for larger conduits.

Part 3 Execution

3.0 INSTALLATION

.1 Recess mount lighting and outlet boxes located on building exterior.
.2 Surface mount boxes located in building interior.
.3 Support boxes independently of connecting conduits.
.4 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of the work.
.5 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not allowed.
.6 Vacuum clean interior of outlet boxes before installation of wiring devices.

3.1 IDENTIFICATION

.1 Provide equipment identification in accordance with Technical Specification 26 05 00S Common Work Results - Electrical.
.2 Install identification labels indicating circuit, voltage, and phase.

END OF SECTION

Part 1 General

1.0 DOCUMENTS

.1 This Section of the Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation for conduits, conduit fastenings and conduit fittings.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00S Common Work Results – Electrical
.2 Technical Specification 26 05 21S Wires and Cables (0-1000V)
.3 Technical Specification 26 27 16S Electrical Cabinets and Enclosures

1.3 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)
  .1 CSA C22.1, Canadian Electrical Code, Part 1, Current Edition.
  .2 CAN/CSA C22.2 No.18.3 12, Conduit, Tubing, and Cable Fittings
  .3 CAN/CSA C22.2 No.18.4-04, Hardware for the Support of Conduit, Tubing and Cable
  .4 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid Tight Flexible Metal Conduit.
  .5 CSA C22.2 No. 45.2-08, Electrical Rigid Metal Conduit – Aluminum, Red Brass, and Stainless Steel.
  .6 CSA C22.2 No. 83-1-04 – Electrical Metallic Tubing
  .7 CSA C22.2 No. 211.2 06, Rigid PVC (Unplasticized) Conduit.
  .8 CAN/CSA C22.2 No. 227.2.1-04, Liquid Tight Flexible Nonmetallic Conduit.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.
.2 Quality assurance submittals:
  .1 Test reports: submit certified test reports.
  .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  .3 Instructions: submit manufacturer's installation instructions.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.6 Measurement and Payment — Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

Part 2 Products

2.0 CONDUITS

.1 Rigid aluminum conduit: to CSA C22.2 No. 45.2.
.2 Rigid PVC conduit: to CSA C22.2 No. 211.2.
.3 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal.
.4 Flexible PVC conduit: to CAN/CSA-C22.2 No. 227.2.1.

.5 Electrical metallic tubing (EMT) to CSA C22.2 No. 83-1-04.

2.1 CONDUIT FASTENINGS

.1 One hole stainless steel straps to secure surface conduits 53 mm and smaller. Two hole stainless steel straps for conduits larger than 53 mm.
.2 Seismic beam clamps to secure conduits and supports to exposed steel work.
.3 Channel type supports for two or more conduits at 1500 mm oc.
.4 Threaded rods, 6 mm diameter, to support suspended channels.
.5 All conduit fastenings and supports shall be stainless steel.

2.2 CONDUIT FITTINGS

.1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.
.2 Factory "elbows" where 90 degree bends are required for 27 mm and larger conduits.
.3 Watertight connectors and couplings for EMT.
    .1 Set-screws are not acceptable.

2.3 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion.
.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.
.3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.4 PULL CORD

.1 Polypropylene
    .1 Minimum tensile strength of 1.1kN.
    .2 Mildew and rot resistant.

Part 3 Execution

3.0 MANUFACTURER'S INSTRUCTIONS

Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.1 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
.2 Use rigid PVC conduit underground.
.3 Use liquid tight flexible metal conduit for connection to devices, motors, or vibrating equipment with the exception of connections made using armoured cable.
.4 Install conduit sealing fittings in hazardous areas.
    1. Fill with compound.
.5 Minimum conduit size for lighting and power circuits: 21mm
.6 Bend conduit cold:
    1. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
.7 Mechanically bend steel conduit over 21 mm diameter.
.8 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
.9 Install polypropylene fish cord in empty conduits.
.10 Remove and replace blocked conduit sections.
    1. Do not use liquids to clean out conduits.
.11 Dry conduits out before installing wire.

3.2 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.
.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.
.3 Run conduits in flanged portion of structural steel.
.4 Group conduits wherever possible on suspended or surface channels.
.5 Do not pass conduits through structural members except as indicated.

3.3 CONCEALED CONDUIT

.1 Run parallel or perpendicular to building lines.
.2 Do not install horizontal runs in masonry walls.
.3 Do not install conduits in terrazzo or concrete toppings.

3.4 CONDUITS IN CAST-IN-PLACE CONCRETE

.1 Locate to suit reinforcing steel. Install in centre one third of slab.
.2 Protect conduits from damage where they stub out of concrete.
.3 Install sleeves where conduits pass through slab or wall.
.4 Provide oversized sleeve for conduits passing through waterproof membrane, before membrane is installed. Use cold mastic between sleeve and conduit.
.5 Do not place conduits is slabs in which slab thickness is less than 4 times conduit diameter.
.6 Encase conduits completely in concrete with minimum 25 mm concrete cover.
.7 Organize conduits in slab to minimize cross-overs.

3.5 CONDUITS IN CAST-IN-PLACE SLABS ON GRADE

.1 Run conduits 25 mm and larger below slab and encased in 75 mm concrete envelope. Provide 50 mm of sand over concrete envelope below floor slab.

3.6 UNDERGROUND CONDUITS

.1 Refer to Technical Specification 26 05 43 01 Installation of Cables in Trenches and in Ducts for installation of cable procedures.
.2 The Contractor shall provide and install all necessary bends, couplings, reducers, bell end fittings, plugs, caps and adaptors of the same product material as the conduit to ensure a complete installation.
.3 All conduits shall drain towards junction boxes. Spacing between power and communications conduits for longitudinal runs shall be 300mm (unless concrete encased). The spacing may be reduced to 50mm at crossover points and where the conduits enter and exit junction boxes and pull pits.
.4 The Contractor shall not use any factory bends in the conduit runs except where shown on the Contract Drawings or as approved by the Contract Administrator. Where factory 90 degree bends are approved, the radius shall be greater than 900mm.
.5 All conduits shall be verified and cleaned using the following procedure:
    .1 To verify integrity of conduit, pull through each conduit duct a hard rubber mandrel, not less than 300mm long and of a diameter 6mm less than the internal diameter of the duct, preceded by a swab of suitable diameter to remove sand, earth and other foreign materials.
    .2 Notify Contract Administrator in the event of conduit failure.
    .3 Clean ducts before laying. Cap both ends during Construction and after installation to prevent entry of any foreign materials.
    .4 Install pull line.
    .5 Terminate conduit ends in the junction box.
    .6 Clean and vacuum junction boxes.
    .7 Locations shall be laid out by the Contractor and field reviewed by the Contract Administrator prior to installation.
.6 Waterproof joints (PVC excepted) with heavy coat of bituminous paint.

.7 Trench Markers:
  .1 Concrete type cable markers: Minimum 600 mm x 600 mm x 100 mm, with words: "cable," "conduit," or additional circuit identification if so directed by Engineer, impressed in top surface, with arrows to indicate change in direction of conduit runs.

.8 Warning Tape:
  .1 Detectable by a pipe/cable locator or metal detector from above the undisturbed ground.
  .2 Minimum 50 mm wide with an aluminum foil core laminated between two layers of 3.5 mil thickness polyester plastic.
  .3 Plastic colour coding: red for electrical lines, orange for telephone lines, and orange for optic fibre cables.
  .4 Imprint a warning continuously along the length, with message reading similar to: "CAUTION – BURIED ELECTRIC (TELEPHONE) LINE BELOW".

.9 Conduit Spacers:
  .1 Preformed, rigid plastic spacers designed for direct burial and concrete encasement.
  .2 Base and intermediate spacers to suit conduit trade size.
  .3 Snap feature or non-metallic ties to obtain required configuration.

END OF SECTION

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00S Common Work Results – Electrical
.2 Technical Specification 26 05 28S Grounding – Secondary

1.2 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)
  .1 CSA C22.1, Canadian Electrical Code, Part 1, Current Edition.

1.3 SCOPE

.1 Installation of cables in trenches and in ducts.
  .1 Wherever the term “duct” appears, it also applies equally to conduit; similarly, the term “cable” also means wires and conductors.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.
.2 Quality assurance submittals:
  .1 Test reports: submit certified test reports.
  .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  .3 Instructions: submit manufacturer's installation instructions.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.6 Measurement and Payment Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

Part 2 Products

2.0 NOT USED

Part 3 Execution

3.0 CABLE INSTALLATION IN DUCTS

.1 Install cables in ducts as indicated in Contract Drawings.
.2 Do not pull spliced cables inside ducts.
.3 Install multiple cables in duct simultaneously.
.4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.
.5 Install instrumentation (4-20ma analog) cables in separate ducts from other cables as specified in the Contract Drawings.

.6 Install digital communication cables in separate ducts from other cables as specified in the Contract Drawings.

.7 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.

.8 Allow extra length of cable in loop form at splice boxes, pullpits and manholes as per good trade practice.

.9 Leave a pull rope in each conduit after installation of cables to permit installation of additional cables after the completion of the Work.

.10 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.

.11 After installation of cables, seal duct ends with duct sealing compound.

.12 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Technical Specification 26 05 00S Common Work Results - Electrical.

.2 Perform tests using qualified personnel. Provide necessary instruments and equipment.

.3 Check phase rotation and identify each phase conductor of each feeder.

.4 Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.

.5 Pre acceptance tests:

.1 After installing cable but before splicing and terminating, perform insulation resistance test with 1000V megger on each phase conductor.

.2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.

.6 Provide Contract Administrator with list of test results showing location at which each test was made, circuit tested and result of each test.

.7 Remove and replace entire length of cable if cable fails to meet any of test criteria.

END OF SECTION

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation of fractional horsepower motors.

1.2 RELATED TECHNICAL SPECIFICATIONS

Technical Specification 26 05 00S Common Work Results – Electrical

1.3 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)
- .1 CSA C22.2 No. 100, Motors and Generators.
- .2 CSA C22.2 No. 145, Motors and Generators for Use in Hazardous Locations.

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
- .1 EEMAC M1-7, Standard for Motors and Generators.

.3 NEMA Std. MG1. Motors and Generators.

.4 IEEE Std 114. IEEE Standard Test Procedure for Single-Phase Induction Motors

SPEC NOTE: Electrical and Electronic Manufacturer's Association of Canada (EEMAC) stopped issuing standards in 1994. Their standards are still available but have not been updated nor are they planning to update them. Almost all products now are manufactured to National Electrical Manufacturers Association (NEMA) standards.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.6 Measurement and Payment Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

Part 2 Products

2.0 PERFORMANCE AND DESIGN CRITERIA

.1 General:
- .1 Motors are to be approved and bear CSA labels or similar certification marks or labels that are acceptable to Technical Safety BC.
- .2 Unless otherwise specified, motors 1/3 hp and smaller to be squirrel cage, single-phase, capacitor start, induction run type.

.3 Construction features listed in this Section may be as normally supplied by the equipment manufacturer.

.4 Service factor of 1.15 at 40 degrees C ambient, Class F insulation and non-hygroscopic windings, Class B temperature rise unless otherwise specified.

.5 Provide copper rotor material and copper windings.

.6 Motor nameplate shall be engraved or stamped 316 stainless steel. Information shall include those items enumerated in NEMA Standard MG1, as applicable. Nameplate shall be permanently fasten to the motor frame and shall be visibly position for inspection.

.7 Provide corrosion resistant hardware.

.8 Motors shall include integral overload and overheating protection per CSA Section 28 or shall include an external motor starter installed as required to provide overload and overheating protection.

.2 Rating:

.1 Unless specified otherwise, motors to be rated for operation at 115VAC / 1PH / 60HZ, and continuous-time rated in conformance with NEMA Standard MG1, paragraph 10.35.

.2 Motors shall be approved and listed with CSA certification for environments installed. This also includes classification, division, and surface temperature markings for hazardous locations.

.3 Motors are capable of starting and running continually when the terminal voltage is from +10 percent to -10 percent of nameplate voltage.

.3 Service and Operating Conditions:

.1 Unless specified otherwise, provide motors suitable for continuous operation at an elevation of 300 m above sea level.

.2 Motors installation location shall be suitable for environmental conditions.

.3 Motors shall be rated for project site condition as specified in Technical Specification 26 05 00S Common Work Results - Electrical

Part 3 Execution

3.0 INSTALLATION

.1 Install motors and valve actuators per manufacturer’s instructions.

.2 Dry out motor if dampness present in accordance with manufacturer's instructions.

.3 Make wiring connections per manufacturer’s recommendations. Include connections for:

.1 Power

.2 Pump Monitoring Sensors

.4 Check for correct direction of rotation.

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Technical Specification 26 05 00S Common Work Results - Electrical.

END OF SECTION

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation of low voltage lighting control devices.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00S Common Work Results – Electrical

1.3 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)

1. CSA C22.2 No. 184.1, Solid-State Dimming Controls (Bi-national standard with UL 1472 updates).

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.6 Measurement and Payment Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

Part 2 Products

2.0 MANUAL ON/OFF SWITCHING

.1 Individual switches ganged as indicated.
.2 Single or double pole, single or double throw as required to suit switching shown on drawings.
.3 Load rating of device shall be sufficient for size and type of lighting load being switched.
.4 Provide additional control contactors or relays for multi-circuit switching as required.
.5 Key operated where shown on Contract Drawings
.6 Decora style commercial grade. Provide complete with cover plate. Refer to Technical Specification 26 27 26 Wiring Devices for cover plate requirements.

Part 3 Execution

3.0 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet .

3.1 INSTALLATION

.1 Locate and install equipment in accordance with manufacturer's recommendations and as indicated.

.2 Where lighting control devices are to be located in close proximity, they shall be ganged with a common device box and cover plate, with voltage barriers as required

3.2 FIELD QUALITY CONTROL

.1 Site Tests:

.1 Perform tests in accordance with Technical Specification 26 05 00S - Common Work Results for Electrical and Technical Specification 26 05 10 Testing and Commissioning.

END OF SECTION

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation of service equipment.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00S Common Work Results – Electrical
.2 Technical Specification 26 05 28S Grounding - Secondary

1.3 REGULATORY REQUIREMENTS

.1 BC Hydro
- .1 Refer to BC Hydro Requirements for Secondary Voltage Revenue Metering
- .2 Refer to BC Hydro ES54 S0-04 and S1 Standards for 120/240V Single-Phase Secondary Services up to 600A

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Section 26 05 00S Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.6 Measurement and Payment Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

Part 2 Products

2.0 METER SOCKET

.1 Ratings as indicated in Contract Drawings.
.2 Supplied with screw type ring.

2.1 METER ENCLOSURE

.1 Rating: CSA Type 3R
.2 Construction:
- .1 Material: stainless steel
- .2 Flip-up padlockable cover
- .3 Pole bracket designed for bolt or band-on installation
- .4 Suitable for overhead or underground service

.3 Viewing Window: As required when indicated on Contract Drawings.
- .1 Material: 1/2 inch thick lexan.

.4 Mount: As indicated on Contract Drawings.

2.2 METERING ANTENNA

.1 Include provision for exterior antenna per BC Hydro standards.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Technical Specification 26 05 00S - Common Work Results for Electrical.
.2 Label size: 2.
.3 Nameplate shall include equipment name, voltage, and phase.
    .1 Confirm nameplate wording with Contract Administrator prior to manufacture.

Part 3 Execution

3.0 INSTALLATION

.1 Install service equipment as indicated on Contract Drawings.
.2 Connect to incoming service.
.3 Connect to outgoing load circuits.
.4 Make grounding connections in accordance with Technical Specification 26 05 28 Grounding - Secondary
.5 Make provision for BC Hydro's metering.
.6 Allow for BC Hydro coordination, supply and delivery of materials.

END OF SECTION

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation of transient voltage surge suppression (i.e. surge protection device).

1.2 RELATED TECHNICAL SPECIFICATION

.1 Technical Specification 26 05 00S Common Work Results – Electrical

1.3 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)

CSA C22.1, Canadian Electrical Code, Part 1, Current Edition.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.6 Measurement and Payment Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

Part 2 Products

2.0 SURGE PROTECTION DEVICE

.1 Provide for transient voltage surge suppression as indicated on Contract Drawings.
.2 Short Circuit Current Ratings: 200kA
.3 Surge Capacity Rating:
  .1 Service Entrance (347/600V) – 200kA per Phase (min.)
  .2 Service Entrance (120/208V) – 100kA per phase (min.)
  .3 Service Entrance (120/240V) – 50kA per phase (min.)
.4 One (1) form C (NO/NC) dry relay alarm output contacts.
.5 Direct bus mounted.
.6 Standard of acceptance: same manufacturer as panelboard.

2.1 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Technical Specification 26 05 00S Common Work Results for Electrical.
.2 Label size: 2.
.3 Nameplate shall include equipment name, voltage, and phase.
  .1 Confirm nameplate wording with Contract Administrator prior to manufacture.

Part 3 Execution

3.0 INSTALLATION

.1 Surge protection device integral to panelboard.

.2 Install conductors between suppressor and point of attachment to service equipment sized in accordance with manufacturer's shop drawings and keep conductor lengths as short as possible, not to exceed 600 mm. Provide information from manufacturers who offer an integrated surge protection device in the main service entrance equipment clearly showing lead lengths, including the neutral and ground connections.

.3 Grounding: bond suppressor ground to the equipment grounding conductor and service entrance ground.

END OF SECTION

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation of panelboards and circuit breakers.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00S Common Work Results – Electrical
.2 Technical Specification 26 28 16 02S Molded Case Circuit Breakers

1.3 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)
  .1 CSA C22.2 No. 29-11, Panelboards and enclosed Panelboards.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.6 Measurement and Payment Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

Part 2 Products

1.6 PANELBOARDS

.1 Panelboards based on CSA C22.2 No. 29.
.2 Product of one manufacturer.
  .1 Install circuit breakers in panelboards before shipment.
  .2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.
.3 Bus and breakers rated as indicated on the Contract Drawings. Symmetrical interrupting capacity as indicated on Contract Drawings but not less than 10kA.
.4 Sequence phase bussing with odd numbered breakers on the left and even numbered breakers on the right, with each breaker identified by permanent number identification as to circuit number and phase.
.5 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.
.6 Minimum of 2 flush locks for each panelboard.
.7 Two keys for each panelboard and key panelboards alike.
.8 Copper bus with neutral of same ampere rating as mains.
.9 Mains: suitable for bolt-on breakers.
.10 Trim with concealed front bolts and hinges.
.11 Trim and door finish: baked grey enamel.
.12 Isolated ground bus.

.13 Include grounding busbar with 3 of terminals for bonding conductor equal to breaker capacity of the panel board.

.14 Provide minimum additional space for future breakers in panelboards as follows:

.1 Panelboards 120/240V, up to 225A: minimum 10% space and 10% spare 15A breakers or as noted on the Contract Drawings

1.7 BREAKERS

.1 Breakers: in accordance with Technical Specification 26 28 16 02 Molded Case Circuit Breakers.

.2 Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.

.3 Main breaker (where applicable): separately mounted on top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.

1.8 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Technical Specification 26 05 00S Common Work Results for Electrical.

.2 Label size: 2.

.3 Nameplate shall include equipment name, voltage, and phase.

.1 Confirm nameplate wording with Contract Administrator prior to manufacture.

.4 Complete circuit directory with typewritten legend showing location and load of each circuit.

Part 3 Execution

1.0 INSTALLATION

.1 Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.

.2 Mount panelboards to height specified in Technical Specification 26 05 00S Common Work Results – Electrical or as indicated on Contract Drawings.

.3 Connect loads to circuits.

.4 Connect neutral conductors to common neutral bus.

END OF SECTION

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation for equipment and components housed in cabinets and enclosures.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00S Common Work Results – Electrical
.2 Technical Specification 26 05 10S Testing and Commissioning
.3 Technical Specification 26 05 31S Splitters, Junction, Pull Boxes and Cabinets
.4 Technical Specification 26 28 16 02S Molded Case Circuit Breakers
.5 Technical Specification 26 28 23S Disconnect Switches
.6 Technical Specification 26 29 03S Control Devices
.7 Technical Specification 26 50 00S Lighting

1.3 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)
  .1 CSA C22.1, Canadian Electrical Code, Part 1, Current Edition.
  .2 C22.2 No. 94.1-15 - Enclosures for electrical equipment, non-environmental considerations
  .3 C22.2 No. 94.2-15 - Enclosures for electrical equipment, environmental considerations.
.2 National Electrical Manufacturers Association (NEMA)
  .1 NEMA 250-2008, Enclosures for Electrical Equipment (1000 Volts Maximum).
.3 BC Hydro Kiosk Standards
  .1 ES54 S1-04 – Secondary Single-Phase Services 200A to 600A Pad-Mounted Kiosk and Pedestal, Self-Contained and CT-Based Meter Installation

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.6 Measurement and Payment

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

Part 2 Products

2.0 CONTROLS CABINET

.1 Application:
  .1 House electrical equipment within electrical kiosks providing a degree of protection from falling dirt, dust, oil, and water.
  .2 House electrical equipment at remote monitoring sites providing a degree of protection against ingress of water.
.2 Construction:
  .1 Outdoor enclosures shall be fabricated from marine grade aluminum. Steel enclosures are acceptable for indoor areas.
  .2 Enclosures shall be rigid, wall or pole mounted. Outdoor enclosures shall be rated NEMA 3R. NEMA 1 is acceptable for indoor enclosures.
  .3 Smooth, continuously welded seams without knockouts, cutouts, or holes.

.4 Welded brackets for enclosure mounting.
.5 Formed lip on door and enclosure to prevent ingress of flowing liquids and contaminants.
.6 Continuously hinged door with provision for removal by pulling hinge pin.
.7 Door secured with multi-point latch system including provision for padlocking.
.8 Permanently secured continuous gasket around door.
.9 Removable inner back and side panels, as required.
.10 Bonding studs on door, enclosure, and panels.
.11 Grounding and Bonding lugs, as required.
.12 Literature pocket located on inside of door.
.13 Heating and ventilation per the Contract Drawings.

.3 Finish:
.1 Door and enclosure shall be finished in recoatable smooth ANSI 61 gray powder coating inside and out.
.2 Inner panels shall be finished with white powder coating.

.4 Enclosure dimensions on Contract Drawings are approximate only. Contractor to determine final enclosure dimensions to layout all of proposed equipment.

.5 Control panel shall include provision for 20 percent future expansion.

.6 All enclosure assemblies shall be from the same manufacturer, shall bear the CSA seal of approval, or other certification mark acceptable in the Province of British Columbia, and be manufactured by an electrical control panel manufacturer regularly engaged in this type of work.

.7 Shop Drawings for the electrical enclosures are to be submitted in accordance with Technical Specification 26 05 00S Common Work Results - Electrical.

2.1 CONTROL CABINET COMPONENTS

.1 Selector Switches:
.1 Refer to Technical Specification 26 29 03 Control Devices.

.2 Indicators/Pilot Lights:
.1 Refer to Technical Specification 26 29 03 Control Devices.

.3 Push buttons:
.1 Refer to Technical Specification 26 29 03 Control Devices

.4 HMI:
.1 Refer to Technical Specification 26 27 17 Programmable Logic Control.

.5 Ethernet Bulkhead Receptacle:
.1 Refer to Technical Specification 26 27 26 Wiring Devices.

.6 Network switch:
.1 Refer to Technical Specification 26 29 05 Data Communications Infrastructure.

.7 PLC/RTU Equipment:
.1 Refer to Technical Specification 26 27 17 Programmable Logic Controller.

.8 Interposing Relays:
.1 Refer to Technical Specification 26 29 03 Control Devices.

.9 24VDC Power Supply and Diode Module
.1 Refer to Technical Specification 26 29 03 Control Devices.

.10 UPS
.1 Refer to Power Supply and Battery Module indicated in Technical Specification 26 29 03 Control Devices.

.11 Circuit Breakers
.1 Refer to Technical Specification 26 27 16 02 Molded Case Circuit Breakers.

.12 Terminals and Interconnect Wiring:
.1 In accordance with Technical Specification 26 05 00S Common Work Results - Electrical.
.2 DIN rail mounted terminals complete with dividers and end stops as required. Provide 10 spare terminals on each section and additional spare terminals as noted on the Contract Drawings.
.3 Utilize plastic finger wiring ducts for organization of all interior and field wiring. Ducts are to be filled to no more than 50% of capacity.
.4 Use ferrules at termination points on stranded wires.

.5 A space of 200 mm must be kept clear for field wiring. All wiring labels must be clearly visible at completion.

2.2 ELECTRICAL KIOSK

.1 Electrical Kiosk shall be rigid, free-standing, vandal resistant kiosk, rated CSA Type 3R and certified to CAN/CSA C22.2 No. 94.1-15 and CAN/CSA C22.2 No. 94.2-15.

.2 Kiosk dimensions on Contract Drawings are approximate only. Contractor to determine final kiosk dimensions to layout all of proposed equipment.

.3 All kiosk assemblies shall be from the same manufacturer, shall bear the CSA seal of approval, or other certification mark acceptable in the Province of British Columbia, and be manufactured by an electrical control panel manufacturer regularly engaged in this type of work.

.4 General Material Requirements:

.1 All materials shall be new.

.2 Equipment shall be fabricated from marine grade 5052-H32 sheet aluminum of a least 3.2 mm (1/8 in.) thickness.

.3 Use stainless steel hardware, unless otherwise noted.

.5 Connecting Hardware:

.1 Miscellaneous hardware other than screws, nuts, bolts and washers shall be stainless steel.

.2 Connecting hardware (i.e. screws, nuts, bolts and washers) 3/8” diameter or smaller and shall conform to the following:

.1 All hardware shall have unified national thread form (ANSI) and shall be stainless steel.

.2 All nuts and bolts 1/4-20 and large shall have unified national threads and hexagon heads, and shall bear suitable markings to identify their grade and origin of manufacture.

.3 All machine screws smaller than 1/4-20 (ex. 8-32 UNC, 10-24 UNC) shall be Robertson pan-head. All screw heads shall be sized so only one screwdriver is required when working on the panels.

.4 No sheet metal or self-tapping screws shall be used.

.6 Fabrication Mechanical Requirements

.1 The kiosk shall be fabricated with sufficient bracing to form a structure capable of withstanding transportation, wind, snow and ice loading. The kiosk manufacturer is responsible for obtaining certification from EGBC registered professional engineer.

.2 Recommended anchor locations shall be provided on Shop Drawings.

.3 Anchor requirements shall be provided based on wind, snow and seismic loading criteria for the geographic location of the installation.

.4 Importance factor of one (1) shall be considered for the installation.

.1 All exterior corners shall be rounded to a radius of 3.17mm (1/8 inch) minimum.

.2 All sharp edges shall be de-burred to a radius of 0.4mm (1/64 inch) minimum in order to reduce hazards to service personnel.

.5 Welding:

.1 All welds shall be in accordance with CAN/CSA W59.2 – Welded Aluminum Construction.

.2 All welding to be performed by Canadian Welding Bureau certified welders.

.3 The Supplier shall have suitable credentials to weld aluminum and shall adhere to all applicable ANSI standards. Project references shall be made available upon request.

.4 All exterior seams shall be of continuously welded construction. Exterior seams shall not be visible. All exterior welds shall be ground smooth.

.5 All welds shall be free of slag and spatter.

.6 Roof:

.1 The roof shall have a minimum 75 mm overhang with continuous rain gutters.

.2 Lifting eyes shall be secured to the frame or the kiosk on reinforced material and be removable after installation.

.7 Doors:

.1 Doors shall have internal bracing when required to prevent excessive distortion.

.2 Doors shall be at least 100mm above concrete pad.

.3 All kiosk doors are to be lockable. The latches must contain minimum 13 mm diameter hole to receive padlock. Door handles must contain provision for double padlock capability.

.4 All double doors to be overlapping with no center mullion.

.5 The door handle shall be galvanized steel and powder coated the same colour as the kiosk. Latch handle shall swing towards hinge side of door.

.6 Doors shall have three point latching devices with vertical bars that are riveted to actuator bar.

.7 Handles, latches and padlocks shall be installed recessed in a pocket such that they cannot be struck off or cut with a standard hacksaw.

.8 Handle shall not protrude from recessed pocket during operation.

.9 Door hardware to be mounted with tamper resistant hardware.

.10 Each door shall have a hydraulic dampener to hold the door in the open position at 90 degrees.

.11 Hinges shall be hidden and not accessible from the outside with the door closed. Hinge body to be aluminum with stainless steel hinge pin. Hinges to be of permanently lubricated design

.8 Door Gaskets:

.1 The gasket shall be of one continuous piece per side (ex. four strips per opening) and shall be permanently bonded to the metal.

.2 The gasket shall be of an appropriate length so as not to have gaps at gasket joints or to shrink over time.

.3 The surface of the gasket shall be covered with a silicon lubricant to prevent sticking to the mating surface.

.4 The hinge shall be designed to prevent binding of the gasket.

.9 Plan Pouch and Laptop Shelf

.1 Kiosk shall include a waterproof plan pouch (400mm high x 300mm wide minimum) on inside of door in the controls compartment. The pouch shall be secured using stainless steel fasteners.

.2 Kiosk shall include fold down door-mounted equipment/laptop shelf in the controls compartment. Shelf shall be mounted such that top of shelf is located 1100mm (36”) above the top of finished grade.

.7 Kiosk Finish

.1 General Requirements:

.1 The powder coating process shall be tested on at least one piece from a given batch of aluminum components to ensure a high quality coating for that type of component before the complete batch is powder coated. If there is uncertainty about the quality or appearance of the powder coating, the Contractor shall obtain the Owner’s approval on the powder coating.

.2 Items to be powder coated shall be free of dents, scratches, weld burns, ripples, pits, and abrasion before powder coating.

.3 Removable components which may be damaged by the powder coating process shall be removed before powder coating and reassembled after powder coating.

.4 Mask all threaded hardware and tapped holes, as required.

.2 Pre-Treatment:

.1 The powder coating pre-treatment shall include the following steps in sequential order:

.1 Alkaline cleaning, or equivalent as required, to remove process oil, grease, and dirt.

.2 Rinsing, as required.

.3 Multi-metal iron phosphate coating or dried in place pre-treatment to increase corrosion resistance and improve paint adhesion. Follow chemical supplier's specifications. Chemical concentration, temperature, and timing specifications must be followed precisely.

.4 Rinsing, as required.

.5 Non-chrome, or equivalent, sealing coating to provide additional corrosion protection. Follow chemical supplier's specifications. Chemical concentration, temperature, and timing specifications must be followed precisely.

.3 Drying / Pre-Heating:

.1 All items to be powder coated must be completely dry and pre-heated as required to help prevent out-gassing before powder coat application.

.4 Application:

.1 Powder coat shall be of type Polyester-TGIC.

.2 Powder coat colour: RAL code to be provided by the Owner at the time of shop drawing review.

.3 For porous castings, a powder coat type shall be selected to help prevent out-gassing.

.4 Powder coat must be applied to meet the powder coat manufacturer's specifications.

.5 Powder coat thickness shall be applied to a total 2.5-3.5 mils thickness.

.6 Full-coverage of interior and exterior surfaces is required, with no light spots allowed on exterior surfaces.

.5 Final Appearance:

.1 All powder coatings shall be smooth, substantially free of contamination, flow lines, light spots, powder build-up, powder washout, streaks, sagging, runs, blisters, and other defects that would in any way impair serviceability or detract from the general appearance.

.2 The final product shall be free of thickness variations, poor adhesion, orange peel, blistering, pinholes, craters, powder puffs, drips, colour variations, clouding or grainy/wavy flow, dents, scratches, weld burns and abrasions harmful to its strength and general appearance.

.3 Contractor shall supply and install shrink-wrapped image around all sides of electrical kiosk. Owner to provide image during shop drawing review process.

.8 Equipment Mounting Panels:

.1 The kiosk shall be provided with full height inside mounting panels.

.2 Panels shall be minimum 14 gauge galvanized steel painted white.

.3 Panels shall be removable and suitable for drilling and tapping in order to mount internal components.

.9 Kiosk Environmental Requirements

.1 General:

.1 Provide sufficient airflow to keep equipment temperature to below its maximum temperature rating to prevent overheating of the equipment under all prevailing temperature conditions for the area in which it will be installed.

.2 Provide positive pressure ventilation to ensure that dust does not enter the cabinets.

.2 Insulation:

.1 The Supplier shall insulate all sides, doors, and roof of the kiosk.
.2 Insulation shall be 25mm Polyisocyanurate Insulation Sheathing. All edges and seams to be sealed with foil tape.
.3 The insulation shall have a minimum R-rating of 4.5.
.4 On doors, insulation shall be concealed by full height 20 gauge aluminum plates.
.5 On sides and roof, insulation shall be located between outer shell and mounting panels.

.3 Ventilation:
.1 Refer to Technical Specification 26 54 00 Heaters and Ventilation.

.4 Kiosk Heating:
.1 Refer to Technical Specification 26 54 00 Heaters and Ventilation.

.5 Thermostat:
.1 Refer to Technical Specification 26 54 00 Heaters and Ventilation.

.10 Kiosk Lighting:
.1 Kiosk lights shall be LED in accordance with the requirements under Technical Specification 26 50 00 Lighting.
.2 Provide door switch in accordance with Technical Specification 26 27 26 Wiring Devices.

.11 Conduit and Wiring:
.1 Wiring between components within the kiosk shall be in EMT.
.2 Conduit to be in accordance with the requirements under Technical Specification 26 05 34 Conduits, Conduit Fastenings and Conduit Fittings.
.3 Wiring to be in accordance with the requirements under Technical Specification 26 05 21 Wires and Cables (0-1000V)

.12 Electrical Assemblies:
.1 Equipment within the kiosk shall be within enclosures in accordance with the requirements under Technical Specification 26 05 31 Splitters, Junction, Pull Boxes and Cabinets.
.2 Enclosures shall be gray powder coat finish inside and out over pretreated surfaces.
.3 Additional equipment are listed in the Contract Drawings and in the electrical Technical Specifications.

Part 3 Execution

3.0 INSTALLATION

.1 Install cabinets as indicated in the Contract Drawings.
.2 Apply touch up paint as required.
.3 Make field power and control connections as indicated.
.4 Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and datasheet.
.5 Supply all necessary equipment and wiring to provide the points connected to the equipment as indicated on the Contract Drawings.
.6 Assemble the control cabinets and VFD cabinets to include the components identified within the Contract Documents and indicated on the Contract Drawings.
.7 Supply, install, and connect external sensors and components as shown on the Contract Drawings.
.8 Contractor to install radio and ancillary equipment including, but limited to, antenna and coax cabling. Contractor to coordinate radio configuration and antenna aiming with Owner where indicated on the Contract Drawings.

3.1 CONTROLS

.1 Refer to process narrative for programming requirements.

3.2 MAINTENANCE MATERIALS

.1 Provide:

.1 Ten (10) spare fuses of each type used in the panel, as required.

.2 One (1) control relay of each type used in the control panel.

.3 Any other components which the Contractor recommends to be kept as spares.

3.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

.2 Ensure moving and working parts are lubricated where required.

.3 Operate system to prove satisfactory performance of complete system during 24 hour period.

END OF SECTION

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation of programmable logic controllers (PLC) and operator stations.

1.3 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00S Common Work Results – Electrical
.2 Technical Specification 26 27 16S Electrical Cabinets and Enclosures

1.4 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)
  .1 CSA C22.1, Canadian Electrical Code, Part 1, Current Edition.

1.5 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.7 Measurement and Payment Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

Part 2 Products

2.0 FUNCTION

.1 PLC systems to be control panel mounted, functional and operational as a stand-alone control system and be capable of integration with existing SCADA control system.
.2 Provide PLC arrangement as shown on the Contract Drawings.
.3 The SCADA system will provide supervisory control of the equipment through the PLC. All PLC inputs and outputs (discrete and analog) shall be accessible to the SCADA system.

2.1 PLC/RTU EQUIPMENT

.1 Install PLC hardware and HMI in accordance with the manufacturer's latest installation publication.
.2 Utilize best practices input/output (I/O) addressing as defined by the programming manual for the chosen controller system. Do not use complimentary I/O addressing.
.3 All PLC discrete I/O cards to be 24 VDC. All equipment I/O points are to be isolated points powered from the equipment being controlled.
.4 Provide equipment in conjunction with Technical Specification 26 05 00S Common Work Results – Electrical.
  .1 Standard of Acceptance: Schneider SCADAPack 474 complete with analog output module:

2.2 PLC CONTROL PANEL

.1 Provide PLC system control panel, including, but not limited to, the following:

.1 Control panel as indicated on the Contract Drawings
.2 PLC processor, PLC chassis, chassis power supplies, required discrete and analog I/O modules, communication modules, and all required cabling and PLC wiring systems.
.3 All 24VDC power supplies.
.4 Terminal blocks and circuit breakers.
.5 Two 150 mm copper ground buses.

.2 All relays and contactors to be complete with suitably sized surge suppressors.

.3 Provide single pole circuit breakers (DIN 35 rail mounted) in the PLC control panel as indicated on Contract Drawings.

2.3 WIRING

.1 All wire and cable to meet requirements of Technical Specification 26 05 21 Wires and Cables (0-1000V).

.2 Use #16AWG conductors from I/O wiring arm to panel terminal blocks only: all field and equipment conductor sizing and wiring types to meet requirements detailed in Technical Specification 26 05 21 Wires and Cables (0-1000V)

.3 Wire all I/O card terminations to terminal blocks, whether used or spare.

2.4 GROUNDING AND BONDING

.1 Ground and Bond per Technical Specification 26 05 28 Grounding – Secondary.

2.5 PROGRAMMING

.1 Programming by the City.

Part 3 Execution

3.1 INSTALLATION

.1 Install PLC control panel with its PLC as per Technical Specification 26 05 00S Common Work Results – Electrical.

.2 Mount PLC components in control panels as per the Technical Specifications 26 27 16 Electrical Cabinets and Enclosures.

.3 Mount the PLC and HMI on the control panel at an ergonomically correct operating height.

3.2 FIELD QUALITY CONTROL

.4 Provide testing and commissioning in accordance with Technical Specification 26 05 10 Testing and Commissioning.

.5 Test all PLC I/O panel wiring connections, testing of all HMI screens and pushbutton functions, testing of all interlocks with equipment supplied by others, confirming the operation integrity of all network communications including the link and "failure relay".

.6 Test the system including a complete simulation of the process or equipment to be controlled and verification of interlocking and operator station controls and alarming.

3.3 COMMISSIONING

.1 Additional testing includes, but is not limited to, testing of all interlocks with equipment supplied by others, integrity of all communication links, and communication with the Owners SCADA System.

END OF SECTION

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Switches, receptacles, wiring devices, cover plates and their installation.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00S Common Work Results – Electrical

1.3 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)

- .1 CSA C22.2 No. 42-10, General Use Receptacles, Attachment Plugs and Similar Devices.
- .2 CSA C22.2 No. 42.1-13, Cover Plates for Flush Mounted Wiring Devices (Bi national standard, with UL 514D).
- .3 CSA C22.2 No. 55-15, Special Use Switches.
- .4 CSA C22.2 No. 111-10, General Use Snap Switches (Bi national standard, with UL 20).
- .5 CSA-C22.2 No. 177-13, Clock-operated Switches
- .6 CSA-C22.2 No. 184-15, Solid-State Lighting Controls

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.6 Measurement and Payment Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

Part 2 Products

2.0 SWITCHES

.1 15A, 120 V, single pole, specification grade switches to: CSA-C22.2 No. 55 and CSA-C22.2 No. 111.

.2 Manually-operated general purpose AC switches with following features:

- .1 Terminal holes approved for No. 10 AWG wire.
- .2 Silver alloy contacts.
- .3 Urea or melamine moulding for parts subject to carbon tracking.
- .4 Suitable for back and side wiring.
- .5 White toggle.

.3 Toggle operated fully rated for tungsten filament, fluorescent, and LED lamps, and up to 80% of rated capacity of motor loads.

.4 Switches will be of one manufacturer throughout the Project.

2.1 RECEPTACLES

.1 Duplex receptacles, CSA type 5-15 R/20R as indicated, 125 V, 15/20 A as indicated, U ground, to: CSA-C22.2 No.42 with following features:

.1 White urea moulded housing.
.2 Suitable for No. 10 AWG for back and side wiring.
.3 Break-off links for use as split receptacles.
.4 Eight back wired entrances, four side wiring screws.
.5 Triple wipe contacts and riveted grounding contacts.

.2 Other receptacles with ampacity and voltage as indicated in Contract Drawings.
.3 Receptacles will be of one manufacturer throughout the Project.
.4 Ground fault interrupting capabilities as indicated in Contract Drawings.

2.2 COVER PLATES

.1 Cover plates for wiring devices to: CSA-C22.2 No. 42.
.2 Cover plates will be of one manufacturer throughout the Project.
.3 Stainless steel.
.4 Weatherproof RPVC cover plates for surface-mounted FS or FD Type boxes.
.5 Weatherproof clear, lockable, while-in-use cover plates for all GFI locations, as indicated in Contract Drawings.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.
.2 Install identification labels indicating circuit, voltage, and phase.

Part 3 Execution

3.1 INSTALLATION

.1 Switches:
.1 Install single throw switches with handle in "UP" position when switch closed.
.2 Install switches in gang type outlet box when more than one switch is required in one location.
.3 Mount toggle switches at height in accordance with Technical Specification 26 05 00S Common Work Results – Electrical or as indicated on the Contract Drawings.

.2 Receptacles:
.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
.2 Mount receptacles at height in accordance with Technical Specification 26 05 00S Common Work Results – Electrical or as indicated on the Contract Drawings.
.3 Where split receptacle has one portion switched, mount vertically and switch upper portion.
.4 Install GFI type receptacles as indicated on Contract Drawings.

.3 Cover plates:
.1 Install suitable common cover plates where wiring devices are grouped.
.2 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

3.2 PROTECTION

.1 Protect installed products and components from damage during Construction.
.2 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.
.3 Repair damage to adjacent materials caused by wiring device installation.

END SECTION

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation for electrical control devices.
.2 Some equipment and devices listed under the Products section of the may not be utilized for this project. The Contractor shall refer to the Contract Drawings to identify which equipment is required.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00S Common Work Results - Electrical.
.2 Technical Specification 26 27 16S Electrical Cabinets and Enclosures.

1.3 REGULATORY REQUIREMENTS

.1 CSA International
  .1 CSA C22.2 No. 14, Industrial Control Equipment.
.2 National Electrical Manufacturers Association (NEMA)
  .1 NEMA ICS 1, Industrial Control and Systems: General Requirements.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit documents to the Contract Administrator in accordance with Technical Specification 26 05 00S - Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S - Common Work Results – Electrical.

1.6 Measurement and Payment Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

Part 2 Products

2.0 CONTROL RELAYS

.1 Control Relays: to CSA C22.2 No. 14.
.2 Unless otherwise noted, use flat-pin encapsulated type plug-in relays.
.3 120 VAC relays: General purpose, 2PDT, plug-in, complete with test button, operation indicator, and surge suppressor.
.4 24 VDC relays: General purpose type, 2PDT, plug-in, complete with test button, operation indicator (red), and surge suppression RC Circuit. RC circuit may be external to relay using manufacturer's approved components, soldered and insulated using heat-shrink sleeves.
.5 Relay contacts: Form C rated 110 VAC, 10A resistive, and 7.5 A inductive.
.6 Provide retainer to hold/secure relay in seated position.

2.1 TIMING RELAYS

.1 Unless otherwise noted, use plug-in timer relays.
.2 Time delay relays for behind panel-mounting: 2PDT, plug-in, and programmable for 16 time ranges and 6 operation modes.
.3 Time delay relays for flush panel mounting and accessible timing range modifications: SPDT, screw terminals, programmable for five timing ranges and nine operation modes, complete with digital display, module for time settings, and flexible protective cover.
.4 Output contact: Form C rated at 250 VAC, 5 amp with p.f. = 1.
.5 Provide relay plug-in sockets for DIN mounting, complete with stacked screw clamp terminals.
.6 Provide retainer to hold/secure relay in seated position.

2.2 RELAY ACCESSORIES

.1 Standard contact cartridges: normally-open - convertible to normally-closed in field.

2.3 DOOR SWITCHES

.1 Provide a door switch mounted to the kiosk such that actuation occurs when the outer door with handle is opened, the switch is triggered.
.2 Provide a door switch mounted to the generator enclosure such that actuation occurs when each door with handle is opened.
.3 Door switch shall have a lever type actuation with 1 normally open and 1 normally closed set of contacts.
.4 Door switch shall be suitably rated for hazardous application locations where indicated on the Contract Drawings.

2.4 LIMIT SWITCHES

.1 Minimum standard is heavy duty, oiltight, or as specified for field-located devices.
.2 Adjustable wand-type operating levers.

2.5 PUSHBUTTONS

.1 Panel mountable, 120VAC/24VAC/DC rated, as required, momentary contacts, normally open, 30mm.
.2 Bezel Material: Chromium Plated Metal.
.3 Colour: Black unless otherwise indicated on Contract Drawings.

2.6 SELECTOR SWITCHES

.1 Panel mountable, two, three or four position, as indicated on the Contract Drawings, 30mm.
.2 Contact arrangement as indicated and to suit control requirements.
.3 120VAC/24VAC/DC rated, as required.
.4 Bezel Material: Chromium Plated Metal
.5 Colour: Black unless indicated otherwise on Contract Drawings.

2.7 INDICATING LIGHTS

.1 Panel mountable, round, LED-based, push-to-test, 30mm, 120VAC/24VAC/DC rated, as required.
.2 Bezel Material: Chromium Plated Metal
.3 Colour as indicated on Contract Drawings.

2.8 POWER SUPPLY

.1 Din-rail Mounted, 120VAC input, 24VDC @ 10A output
.2 Supports energy storage device connection
.3 Standard of Acceptance: Phoenix Contact TRIO-UPS

2.9 BATTERY MODULE:

.1 x 12VDC, 12AH, Battery Module

.2 Standard of Acceptance: Phoenix Contact UPS-BAT

2.10 PANEL DISPLAY METER:

.1 Standard of Acceptance: Precision Digital Trident PD765-7R5-00 or approved equivalent.

2.11 PANEL BUZZER:

.1 Standard of Acceptance: Sonalert SC628N

2.12 NETWORK SWITCH:

.1 Standard of Acceptance: as indicated on Contract Drawings

2.13 RADIO

.1 Standard of Acceptance: MDS Orbit MCR
.2 900 MHz Unlicensed Radio
.3 Network management enabled
.4 Din-rail mounting kit

2.14 CONTROL FUSE HOLDERS AND FUSES

.1 Applicable to fuses protecting control circuits, primary and secondary windings of instrument transformers, voltage sensing circuits, and other similar circuits.
.2 Type and size as shown or as selected by panel builder for optimum protection of equipment being served.
.3 Door-mounted fuse holders for small-dimension fuses 6.4 x 31.8 mm (¼" x 1¼ "). Where possible, use different models for different voltages:
1. 120 VAC circuits, Type HKL with clear octagon knob.
2. 12 V dc circuits, Type HKT with amber octagon knob.
3. 24 V dc circuits, Type HKX with amber flat sided knob.
.4 Fuse holders mounted on back pan to be finger safe dead-front type for use with HRC fuses.

Part 3 Execution

3.0 INSTALLATION

.1 Install control devices as indicated in Contract Drawings. Make readily accessible for servicing maintenance and adjustments.

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Technical Specification 26 05 00S - Common Work Results for Electrical and Technical Specification 26 05 10 Testing and Commissioning.
.2 Depending upon magnitude and complexity, divide control system into convenient sections, energize one section at time and check out operation of section.
.3 Upon completion of sectional test, undertake group testing.
.4 Check out complete system for operational sequencing

END OF SECTION

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 SCOPE

.1 Materials and installation for Transmitting and Indicating devices.

1.2 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00S – Common Work Results for Electrical.

1.3 REGULATORY REQUIREMENTS

.1 CSA International
1. CSA C22.2 No.14, Industrial Control Equipment.

.2 National Electrical Manufacturers Association (NEMA)
1. NEMA ICS 1, Industrial Control and Systems: General Requirements.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit documents to the Contract Administrator in accordance with Technical Specification 26 05 00S - Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S - Common Work Results – Electrical.

1.6 Measurement and Payment

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

Part 2 Products

2.0 GENERAL

.1 Provide each device as a pre-assembled, packaged unit. Upon delivery to the Work Site, each system shall be ready for installation with only final piping and electrical connections required by the Contractor.

.2 Provide power supply to the transmitters and as indicated on the Contract Drawings. Derive any required power for the primary elements from the transmitter.

.3 Two spare fuses of each type required.

2.1 MOUNTING HARDWARE

.1 Provide all mounting brackets, cables, connectors, and hardware necessary to install primary elements.

.2 Provide brackets and mounting hardware to allow standard 50mm pipe-stand or wall mounting, unless otherwise noted.

.3 Fabricate brackets from aluminum or stainless steel and all sundry hardware from stainless steel.

.4 Primary elements and transmitters are to be complete with necessary liquid filling, identification, configuration, etc. as necessary to make the unit ready for use.

2.3 INTERCONNECTING CABLE

.1 Provide an interconnecting cable from the element to the transmitter for systems where the primary element and transmitter are physically separated.
.2 The cable shall be the type approved by the instrument manufacturer for the intended purpose of interfacing the element to the transmitter.
.3 Length of cable shall be as indicated in the Instrument Specification Sheet, or if not specifically indicated, shall provide a continuous unbroken length sufficient to route via approved supports from the element to the transmitter plus additional length to permit the element to be easily removed and reinstalled.

2.4 PROGRAMMING DEVICE

.1 For systems that require a dedicated programming device for calibration, maintenance, or troubleshooting, provide two such programming devices for each class or type of instrument. Include appropriate operation manuals and the programming device in the training requirements.
.2 For systems that allow the programming device functions to be implemented in software, running on a laptop computer, provide two full licensed copies of the software instead of the programming device.

2.5 CONTROL COMPONENTS

.1 CLA-VAL XP2F-X35 Data Acquisition & Flow Metering Package:
    1. I/O connected to Loop-Powered Displays
    2. I/O:
        .1 Flow Rate: 4-20mA signal for instantaneous flow
        .2 Inlet Pressure: 4-20mA signal
        .3 Outlet Pressure: 4-20mA signal
        .4 Valve Position: 4-20mA Signal
        .5 Totalizer: Pulsing output
    3. Refer to Mechanical Specifications for additional information.
.2 Float Switches:
    1. Provide float switches with contacts that will activate in the presence of liquid.
    2. Specific Gravity: 0.95 – 1.10
    3. Materials:
        .1 Body: Polypropylene (Grey)
        .2 Length: 162mm
        .3 Strain Relief: EPDM Rubber
        .4 Weight: Zinc
    4. Cable:
        .1 Conductors: 3C No. 18
        .2 Length: to suit installation. 20m minimum
        .3 Coil excess cable on hanger cable support
    5. Approvals: Class I, Div. 1 & 2, Groups A-D
.3 Hatch Position Switches:
    1. Voltage: As indicated on contract drawings.
    2. Enclosure Material: 304 stainless steel with corrosion resistant coating (polyurethane)
    3. Approvals: Class I, Div. 1 & 2, Groups A-D
    4. Contact Form: SPDT (Form C)
    5. Lead Wires: 1829mm (72”) minimum
    6. Sensing: End Sensing
    7. Emerson GO Switch or approved equivalent

Part 3 Execution

3.0 INSTALLATION

.1 Supply a multi-pole receptacle with all instruments.

.2 Mount transmitters so that interference to the function is not caused by surrounding structures.

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Technical Specification 26 05 00S Common Work Results - Electrical and Technical Specification 26 05 10 Testing and Commissioning.

3.2 CALIBRATION AND COMMISSIONING

.1 Contractor to provide commissioning services for all instrumentation unless otherwise noted in the Contract Documents.

.2 Provide manufacturer's representatives for commissioning. Confirm spans and settings with Engineer prior to commissioning.

END OF SECTION

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.2 SCOPE

.1 Materials and installation of network equipment and topology required.

1.3 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00S – Common Work Results for Electrical.

1.4 REGULATORY REQUIREMENTS

.1 TIA/EIA-568-B Commercial Building Telecommunications Cabling Standard.
.2 TIA/EIA-569-A Commercial Building Standard for Telecommunications Pathways and Spaces.
.3 TIA/EIA-606A Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
.4 TIA/EIA-607A Commercial Building Grounding and Bonding Requirements for Telecommunications.
.5 TIA/EIA-TSB140 Additional guidelines for field testing of Optical Fibre Cabling Systems.
.6 Building Industries Consulting Services, International (BICSI) Telecommunications Distribution Methods Manual (TDMM) ‑ Current edition.
.7 National Fire Protection Agency (NFPA) - 70, Canadian Electrical Code (CEC) ‑Current Edition.
.8 ISO / IEC 11801 Information Technology - Generic cabling for customer premises.

1.5 SHOP DRAWINGS AND SUBMITTALS

.1 Submit documents to the Contract Administrator in accordance with Technical Specification 26 05 00S - Common Work Results – Electrical.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S - Common Work Results – Electrical.

1.7 Measurement and Payment

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

Part 2 Products

2.0 GENERAL

.1 All equipment shall be complete with all necessary appurtenances to perform the functions indicated on the Contract Drawings with respect to input and outputs.
.2 The equipment shall be complete with all accessory items, whether specifically mentioned or not, to provide completeness of installation and operation as intended.

2.1 NETWORK SWITCHES

.1 Application: managed industrial ethernet switch
    .1 Ports: 8 10/100BaseTX RJ-45

.2 Power supply: 24VDC
.3 Mounting: DIN
.4 Configurable alarm contact
.5 Mean time between failure: minimum 1,000,000 hours
.6 Standard of Acceptance: as indicated on the Contract Drawings

Part 3 Execution

3.0 NETWORK CONNECTIONS

.1 Configure all fibre patch panels, switches, media converters, TVSS's, wall jacks, fibre patch cords, copper patch cords and other devices as required to provide a complete and functional communications system(s) as specified in this Section

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Technical Specification 26 05 00S Common Work Results - Electrical and Technical Specification 26 05 10 Testing and Commissioning.

END OF SECTION

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00S Common Work Results – Electrical
.2 Technical Specification 26 27 16S Electrical Cabinets and Enclosures
.3 Technical Specification 26 32 13 01S Power Generation – Diesel

1.2 REGULATORY REQUIREMENTS

.1 American National Standards Institute (ANSI)
- .1 ANSI C78.374-2015 Light-Emitting Diode Package Specification Sheet for General Illumination Applications
- .2 ANSI C78.377-2015 American National Standard for Electric Lamps—Specifications for the Chromaticity of Solid State Lighting (SSL) Products

.2 Illuminating Engineering Society (IES)
- .1 IES LM-79-08: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products
- .2 IES LM-80-15: Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules
- .3 IES LM-82-12: LED Light Engines and LED Lamps for Electrical and Photometric Properties as a Function of Temperature
- .4 IES LM-84-14: Approved Method for Measuring Luminous Flux and Color Maintenance of LED Lamps, Light Engines, and Luminaires
- .5 IES LM-85-14: Approved Method for Electrical & Photometric Measurements of High Power LEDs
- .6 IES TM-21-11: Projecting Long Term Lumen Maintenance of LED Light Sources
- .7 IES TM-28-14: Projecting Long-Term Luminous Flux Maintenance of LED Lamps and Luminaires
- .8 IES TM-30-15: IES Method for Evaluating Light Source Color Rendition

.3 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)
- .1 ANSI/IEEE C62.41.1-2002 (R2008), IEEE Guide on the Surge Environment in Low-Voltage (1000 V and less) AC Power Circuits
- .2 ANSI/IEEE C62.41.2-2002, IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000V and Less) AC Power Circuits

.4 Canadian Standards Association (CSA International)
- .1 CSA C22.1-15, Canadian Electrical Code, Part 1, 23rd Edition.

.5 ICES-005-2016, Lighting Equipment

.6 National Electrical Manufacturers Association (NEMA)
- .1 NEMA SSL 1-2010 Electronic Drivers for LED Devices, Arrays, or Systems

.7 Underwriters' Laboratories of Canada (ULC)
- .1 UL 1449 (2014), Standard for Surge Protective Devices

1.3 SCOPE

.1 Materials and installation of lighting.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.6 Measurement and Payment

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

Part 2 Products

2.0 KIOSK LIGHT FIXTURE

.1 LED, 120V
.2 Mounted to ceiling panel of kiosk.
  .1 Include all necessary connectors.
.3 Standard of Acceptance: Stego – Ecoline Light LED 025 or approved equal.

2.1 CHAMBER FIXTURE

.1 Construction: Vapor tight luminaire; 100% polycarbonate construction; impact resistant and UV stabilized lens; IP66 rated; Stainless steel mounting brackets, screws and washers.

.2 Vapour proof light fixture.

.3 Surface wall mounting as indicated on drawings.

.4 Lamp: 30W LED; 120V 60Hz

.5 Standard of Acceptance: Beghelli – Illumina BS100LED or approved alternative.

Part 3 Execution

3.0 INSTALLATION

.1 Locate and install luminaires as indicated in Contract Drawings.

3.1 WIRING

.1 Connect luminaires to lighting circuits:
  .1 Install flexible or rigid conduit for luminaires as indicated in Contract Drawings.

3.3 LUMINAIRE ALIGNMENT

.1 Align luminaires mounted individually parallel or perpendicular to building grid lines.

END OF SECTION

Part 1 General

1.0 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.1 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00S - Common Work Results – Electrical
.2 Technical Specification 26 05 10S – Testing and Commissioning
.3 Technical Specification 26 05 31S – Splitters, Junction, Pull Boxes and Cabinets
.4 Technical Specification 26 27 16S – Electrical Cabinets and Enclosures

1.2 REGULATORY REQUIREMENTS

.1 Not Used

1.3 SCOPE

.1 Materials and installation for heating and ventilation systems.

1.4 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00S Common Work Results – Electrical.

1.6 Measurement and Payment

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

Part 2 Products

2.0 CONTROLS

.1 Refer to electrical Contract Drawings for details on heating and ventilation control.
.2 Provide control equipment as shown on electrical Contract Drawings. Devices to be industrial quality, line voltage (120/240 volts), single-pole, white unless otherwise indicated on the Contract Drawings.
.3 Provide clear plastic thermostat guard for all heating/cooling wiring devices: thermostats, astronomical time switch.

2.1 HEATERS

.1 Element: Durable tubular heating element with fins.
.2 Finish: Epoxy-polyester powdercoat
.3 Installation: Wall mounted with surface mounting box (included)
.4 Wattage & Voltage: As indicated on Contract Drawings
.5 Control: Built-in thermostat with control knob.
.6 Heaters shall be serviceable and replaceable without removing any component in the kiosk or area. Heaters shall be located to prevent burning of adjacent components.
.7 Heaters shall be suitably shielded to prevent accidental burning.
.8 There shall be no exposed electrical parts.
.9 Standard of Acceptance: Ouellet or approved equal.

2.2 VENTILATION

.1 Kiosk Ventilation
  .1 Ventilating louvers shall be vermin, insect and rainproof with easily replaceable fiberglass, non-circular automotive type filters.
  .2 Ventilation louvres shall be adequately sized and die punched.
  .3 The controls compartment of the kiosk shall be equipped with one or more 120VAC exhaust fans. The number of fans and louvers will vary according to the kiosk size, prevailing temperature conditions and kiosk equipment heat load.
  .4 Electrical connections shall be by two insulated spade connectors.
  .5 There shall be no exposed electrical parts.
  .6 Fans shall be covered with a protective guard.
  .7 Fans shall be serviceable and replaceable without having to remove any other component in the kiosk.
.2 Chamber Ventilation Fan
  .1 Rating: As indicated on Contract Drawings.
  .2 Refer to Mechanical Specifications.

2.3 THERMOSTAT

.1 Kiosks or enclosures shall be equipped with one or more 120/240VAC thermostats as indicated in the Contract Drawings.
.2 Thermostats shall be serviceable and replaceable without removing any component in the kiosk.
.3 There shall be no exposed electrical parts.
.4 Control of heater shall be from a thermostat integral to heater enclosure.
.5 Control of fan shall be from a wall-mount thermostat.

Part 3 Execution

3.0 INSTALLATION

.1 Mount heaters on kiosk wall as indicated on Contract Drawings.
.2 Electrically connect ventilation as shown in manufacturer's installation instructions.
.3 Install control equipment in locations indicated on Contract Drawings.
.4 Install heat trace equipment in water compartment of electrical kiosk.
.5 Make power and control connections.

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Technical Specification 26 05 10 – Testing and Commissioning.
.2 Ensure that heaters, ventilation and controls operate correctly.

END SECTION

2.0 PRODUCTS

2.3 Pit Run Gravel

Add to 2.3.2

The use of recycled concrete shall be approved by the *Contract Administrator* and the City prior to use.

Add 2.3.3

Asphalt millings free from contaminated and other extraneous material, conforming to the specified gradations may be used as pit run gravel. The use of asphalt millings shall be approved by the *Contract Administrator* and the City prior to use.

2.7 Granular Pipe Bedding and Surround Material

Add to 2.7.1

All recycled or other extraneous materials shall be approved by *Contract Administrator* and the City prior to use.

2.10 Granular Base

Delete 2.10.2

Add 2.10.3

All 25 mm minus granular base is to conform to the following gradation specifications and as described in Clause 2.10.4:

Sieve Designation (mm)	Percent Passing (%)
25	100
19	80-100
12.5	75-90
9.5	50-85
4.75	35-70
2.36	25-50
1.18	15-35
0.30	5-20
0.075	0-5

Add 2.10.4

The intention of the Gradation Chart is to identify the desired mix of size of aggregate in the granular base. The Target Percentage Passing is the middle of the shown Range.

Tests that show sieve values of Percent Passing that are consistently low or consistently high in two (2) or more consecutive tests will be considered to be non-conforming.

2.11 Recycled Aggregate Material

Delete 2.11.1 and replace with the following

Aggregates containing recycled material may be utilized if approved by the Contract Administrator and the City. In addition to meeting all other conditions of the specifications, recycled material should not reduce the quality of the construction achievable with quarried materials. Recycled material shall consist only of aggregates, crushed portland cement concrete, or asphalt that is free of impurities.

END OF SECTION

1.4	**Measurement and Payment**	Delete 1.4 in its entirety and replace with the following	Payment for all work performed under this Section will be incidental unless shown otherwise in the Schedule of Quantities and Prices.

END OF SECTION

1.4	**Measurement and Payment**	Delete 1.4 in its entirety and replace with the following	Payment for all work performed under this Section will be incidental unless shown otherwise in the Schedule of Quantities and Prices.

END OF SECTION

1.0	**GENERAL**		
1.8	**Limitations of Open Trench**	1.8.1 Replace last sentence with the following	If circumstances do not permit complete backfilling of all trenches, and where permitted by the *Contract Administrator* and the City, adequately protect all open trenches or excavations with approved fencing or barricades and, where required, with flashing lights.
		1.8.2	The use of road plates to cover excavations and restore travel lanes is not permitted in Fall, Winter or if forecast indicates temperature equal to or below 2 degrees Celsius, unless otherwise permitted by the *Contract Administrator.* Where construction necessitates the use of road plates, the Contractor is responsible for properly securing them (either pinned or recessed into the pavement) and feathered a minimum of 300mm with existing road asphalt on all four sides. The Contractor is responsible for repairing any pavement damage related to the plate installation.
1.10	**Measurement and Payment**	Delete 1.10.3 and replace with the following	Payment for over excavation including supply, placement and compaction of crushed granular sub-base material (75mm minus) will be made on a volumetric basis at the unit rate tendered, and only for the volume authorized by the Contract Administrator. Payment to include removal and disposal of the unsuitable excavated native material.
		Add 1.10.9 as follows	Payment for supply, backfilling and compaction to 95% modified proctor density with imported backfill. Payment to include removal and disposal of the unsuitable excavated native material. Measurement of volume placed is limited to the trench section only and the width of the measurement will not exceed the maximum trench width as defined in the contract documents unless noted otherwise and the depth of the measurement for payment will be the portion above the pipe zone and below the subbase. Payment for import trench backfill will be made by the tonne delivered to the Place of Work based on truck weigh slips. Weigh slips must be submitted to the Contract Administrator on a daily basis. Weigh slips which are not submitted daily will not be accepted for payment.
2.0	**PRODUCTS**		
2.2	**Use of Specified Materials**	Delete 2.2.1.2	Delete Pit Run Sand
		Delete 2.2.3.3	Delete Pit Run Sand
3.0	**EXECUTION**		
3.3	**Excavation**	Delete 3.3.1.2 and replace with the following	Connections to existing waterworks systems are to be made by the *Contractor* under the inspection / supervision of the *Contract Administrator* and the City.
3.6	**Surface Restoration**	Delete 3.6.2.4 and replace with the following	Restore lawns with approved topsoil and sod to match existing lawn.

Delete 3.6.3.1 and replace with the following	Restore surface with a minimum 100 mm of 19 mm granular road base material.
Delete 3.6.7.5 and replace with the following	Restore Pavement as detailed on Coquitlam Standard Detail Drawing COQ-G4. Temporary patch shall be a minimum thickness of 50 mm thickness. Permanent restoration not required. Temporary asphalt patch to follow finished tolerances as defined in Section 32 12 16, Clause 3.10.

END OF SECTION

1.8 Measurement and Payment

Delete 1.8.4 and replace with the following

Payment under this item will only apply to removal of the components included in this item under a separate operation as shown on the Contract Drawings or as directed by the Contractor Administrator. No payment will be made under this item for removal of these components as part of the operation for common excavation, and such removal will be treated as common excavation.

Payment will be made at the respective unit prices bid in the Schedule of Quantities and Prices and will include all labour, and equipment required to complete the work, including offsite disposal. It is the responsibility of the contractor to locate and verify all utilities.

Delete 1.8.5 and replace with the following

Payment for Common Excavation includes:

1. Unless noted in the Schedule of Quantities and Prices as removal in square meters, common excavation will be measured in cubic meters calculated from measurements taken by the Contract Administrator in the areas of excavation for road widening areas.
2. Cross-sections will be taken after clearing and grubbing and after stripping of existing topsoil immediately prior to excavation of material to be incorporated into work.
3. Where determined by the Contract Administrator that truck box volume will be used to determine excavation quantities the volume per load shall be determined using 75% of the truck load quantity. The following is to be used for payment:

Truck Type	Material Type	Volume (cu.m)
Tandem	ordinary material	7
Tandem	asphalt/concrete/pipe	4
Triaxle	ordinary material	8
Triaxle	asphalt/concrete/pipe	5
Tandem and Pony	ordinary material	11
Tandem and Pony	asphalt/concrete/pipe	7.5
Triaxle and Pony	ordinary material	13
Triaxle and Pony	asphalt/concrete/pipe	9
Tandem and Transfer	ordinary material	19
Tandem and Transfer	asphalt/concrete/pipe	13

4. Contractor to provide truck slips detailing location type of common excavation, time loaded and location of dump site. The slips are to be given to Contract Administrator by the end of shift or Contract Administrator can deny quantities subsequently submitted.
5. Payment for on site re-use includes excavation, transport, temporary stockpiling, placement, compaction, boning, adjustment of moisture content, spreading and grading of material anywhere on site or within the work zone, as needed, to establish the roadway & pathway cross-section.

Payment will be made at the respective unit prices bid in the Schedule of Quantities and Prices and will include all labour, and equipment required to complete the work, including offsite disposal. It is the responsibility of the contractor to locate and verify all utilities.

		Delete 1.8.10 and replace with the following	Payment for replacement of areas of unsuitable granular base, granular subbase or sub-grade revealed during proof rooling will include excavation with off-site disposal, installation & compaction of granular base material (25 mm minus), and all remedial work required to achieve a suitable base. Payment with be based on the cubic metre volume removed.
2.0	**PRODUCTS**		
2.2	**Specified Materials**	Delete 2.2.1.3	Pit Run Sand
		Delete 2.2.1.4	River Sand
		Delete 2.2.2	

END OF SECTION

1.4	**Measurement and Payment**	Delete 1.4.and replace with the following	Payment for all work performed under this Section will be incidental, unless shown otherwise in the Schedule of Quantities and Prices.
2.0	**PRODUCTS**		
2.1	**Specified Materials**	Delete	2.1.1.1: Select Granular Subbase 2.1.1.2: 75 mm Pit Run Gravel 2.1.1.4: Pit Run Sand 2.1.1.5: Approved Native Material 2.1.1.7: River Sand

END OF SECTION

1.4	**Measurement and Payment**	Delete 1.4.and replace with the following	Payment for all work performed under this Section will be incidental, unless shown otherwise in the Schedule of Quantities and Prices.
2.0	**PRODUCTS**		
2.1	**Granular Base**	Add 2.1.1.3	25 mm minus crushed gravel conforming to the gradation specifications under Section 31 05 17S – 2.10.3.
3.0	**EXECUTION**		
3.5	**Proof Rolling**	Delete 3.5.1 and replace with the following	For proof rolling, use fully loaded single axle, to 80 KN (18, 000 lb) minimum, dump truck.
		Add 3.5.7	Prior to paving with asphalt concrete, the base surface shall be checked by the *Contract Administrator* and the City, for deflections utilizing a Benkelman Beam, in order to insure that the final rebound requirements can be obtained with the asphalt pavement. In the event that such deflection is in excess of those required to produce the final standards, then the base shall be adequately strengthened by additional gravel or asphalt concrete to insure that final deflections as follows are not exceeded. The Benkelman spring rebound value of the completed pavement surface shall not at any point exceed 0.75 mm for arterial industrial roads and lanes, 1.15 mm for collector roads, and 1.5 mm for local roads and lanes as determined in the procedures outlined in the Transportation Association of Canada publication "Pavement Management Guide."

END OF SECTION

1.5	**Measurement and Payment**	Delete 1.5.1 and replace with the following	Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.
		Delete 1.5.2 and replace with the following	Pavement surface cleaning, as per section 32 01 11, and all other work incidental to the application of tack coat is deemed to be incidental to payment for work described in other Sections unless shown otherwise in the Schedule of Quantities and Prices.
3.0	**EXECUTION**		
3.2	**Application**	Add to 3.2.3	Asphalt tack coat to be applied using a truck mounted spray bar unless otherwise approved by the *Contract Administrator* and the City. Contractor shall demonstrate, to the *Contract Administrator* and the City, prior to application that all spray nozzles are operational and providing a consistent application.

END OF SECTION

1.0	**GENERAL**		
1.4	**Submission of Mix Design**	Delete 1.4.1 and replace with the following	Submit asphalt concrete mix design, including RAP content and trial mix test results to Contract Administrator for review at least two weeks prior to commencing work.
1.5	**Measurement and Payment**	Delete 1.5 and replace with the following	Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.
1.6	**Inspection and Testing**	Add 1.6.3	Test cores will be taken by the *Contract Administrator* in the areas of new paving and will include cores along construction joints to ensure compliance with the required design and compaction.
2.0	**PRODUCTS**		
2.1	**Materials**	Add 2.1.2.1	Usage of recycled asphalt shingles will not be permitted.
		Add 2.1.2.2	Usage of softening agents, rejuvenators, or recycling agents will not be permitted.
2.2	**Mix Design**	Delete 2.2.2 and replace with the following	Mix may contain up to a maximum of 15 % by mass of RAP for Upper Course Asphalt and 20 % by mass of RAP for Lower Course Asphalt without a special mix design. The *Contract Administrator* and the City may approve higher proportion of RAP if *Contractor* demonstrates ability to produce mix meeting requirements of the specification.
		Delete 2.2.3.2 Marshall Stability and replace with the following	Marshall Stability at 60^{o}C for both lower and upper courses to be 10 KN min.
3.0	**EXECUTION**		
3.3	**Preparation**	Delete 3.3.3 and replace with the following	The *Contractor* is responsible for adjusting all utility manhole frames and valve boxes, belonging to Coquitlam and/or other agencies that are affected by the road works. All adjustments to utilities must be completed to the satisfaction of the utility owner. Utility adjustment within the paved surface will be considered incidental to the *Work* unless otherwise noted in the *Contract Documents*. The *Contractor* should note that certain utility owners may decide to complete their own adjustments. The *Contractor* will be required to cooperate with any utility company providing their own adjustments. The *Contractor* shall be responsible to contact the appropriate utility company with in minimum of seventy-two (72) hours of the work. No adjustment shall be made without the written approval of the utility company. <u>All manholes must be vertically adjusted a minimum of twenty-four (24) hours prior to paving.</u> The use of riser rings for adjusting manhole frames and value boxes will not be permitted.
3.7	**Joints**	Delete 3.7.5 and replace with the following	Construct butt joints at locations as shown on the *Contract Drawing* and as directed in the field by the *Contract Administrator* and the City.

END OF SECTION

1.0 GENERAL

1.2 Scope

Delete 1.2.1 and replace with the following

Pavement Markings: Miscellaneous taped temporary and permanent pavement paint markings including pedestrian crosswalk, merge and diverge markings, stop lines, solid and broken line road lane markings including edge lines of merge and diverge markings, bike symbols, etc. to be provided as shown on the *Contract Drawing*.

1.5 Measurement and Payment

Delete 1.5 and replace with the following

All permanent markings shall be marked with thermoplastic manufactured by LAFRENTZ ROAD MARKINGS or HITEX North America (HiBrite extrude thermoplastic), unless shown otherwise in the Schedule of Quantities and Prices.

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

2.0 PRODUCTS

2.1 Materials

Delete 2.1.1 and replace with the following

All permanent paint markings shall be marked with thermoplastic manufactured by LAFRENTZ Road Markings or HITEX North America (HiBrite extrude thermoplastic).

Delete 2.1.6 and replace with the following

Pavement Markings:

Delete 2.1.7 and replace with the following

Thermoplastic material

.1 Material composition shall be at the discretion of the manufacturer subject to the approval of the Contract Administrator and the City. Each formulation shall be identified by a code number.

.2 No retained water when tested by ASTM D-570.

.3 Specific gravity of the supplied product shall be within 3 % of that specified for the selected formulation.

.4 Material shall not deteriorate upon contact with deicing chemicals, gasoline, diesel fuel or grease dropped by traffic.

.5 Material shall not break down, deteriorate, scorch or discolour, if held within the application temperature range specified by the manufacturer for a period of four hours and it must be able to be reheated from room temperature to the application temperature four (4) times without showing any of these detrimental effects.

.6 When applied at the temperature recommended by the manufacturer and at a film thickness of 2 to 4 mm, the material shall set solid and show no tracking under traffic after elapsed times as follows:

.1 Two (2) minutes at an air temperature of 10° C, relative humidity less than 75 %, and road surface temperature from 10° C to 20° C.

.2 Five (5) minutes at an air temperature of 32° C, relative humidity less than 75 %, and road surface temperature from 35° C to 50° C.

.3 The drying time under conditions intermediate between the two air temperatures shall be interpolated using a straight line model.

.7 The quantity, type, and gradation of the component reflecting glass spheres premixed in the thermoplastic material shall be at the discretion of the manufacturer, but shall provide retroreflection levels specified below.

3.0 EXECUTION

3.3	**Application**	Add to 3.3.1.3	Temporary raised pavement markings (TRPMs) are to be provided on all multi-lane roadways as directed by the *Contract Administrator* and the City.
		Delete 3.3.3.3 and replace with the following	Thermoplastic material shall be heated in the melter to a temperature of 382 °F.

END OF SECTION

1.0 GENERAL

1.0 General Requirements

Delete 1.0.1 and replace with the following

.1 Section 32 91 21 refers to those portions of the *Works* that are unique to the supply, placement and finish grading of *Growing Medium*. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the *Works* described herein.

For the purpose of this specification, the term *"Growing Medium"* shall mean a soil produced offsite by homogeneous blending of mineral particulates, micro-organisms and organic matter which provides suitable medium for supporting intended plant growth and the term *"Topsoil"* shall mean on-site native or surface soil material which may be used as *Growing Medium* provided it meets standards set for imported material *Growing Medium* and can be modified to meet the requirements set out for specified *Growing Medium*.

Add 1.0.3

.3 For the purpose of this specification, the term *'Soil-Testing Laboratory'* shall mean an independent laboratory, recognized by the landscape nursery industry, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

1.4 Measurement and Payment

Delete 1.4.1 and replace with the following

Payment for all work performed under this Section will be incidental to payment for work described in other Sections unless shown otherwise in the Schedule of Quantities and Prices. Payment includes supply and installation of growing medium, boulevard tree trench and imported top soil that is free from any noxious weeds, fungal growth, mushroom, and any contaminants. Payment will be made separately and includes supply of material, on-site handling, preparing the landscape area subgrade, placing, grading, raking, compacting top soil and application of fertilizers. Payment for top soil will be for actual volume placed onsite at specified thickness.

1.5 Inspection and Testing

Delete 1.5 and replace with the following

.1 The *Contractor* is responsible for testing imported *Growing Medium* and all related cost incurred. Testing shall be carried out by an approved *Soil Testing Laboratory*.

.2 The sample analysis shall be of tests done on the proposed *Growing Medium* from samples taken at the supply source within a minimum of 14 days in advance of *Growing Medium* placement. Allow 7 days for soil testing by the laboratory for each sample. The sample shall be picked up by the *Soil Testing Laboratory* from the supply source. The *Growing Medium* sample shall be a composite of at least three (3) samplings for the proposed source and shall be at least one (1) litre in volume.

.3 Forward a copy of all test results directly to the *Contract Administrator* and the City for review. The analysis shall outline the testing laboratory's required amendments such as sand, organic matter, fertilizers and lime to achieve adequate growing conditions.

.4 The *Contractor* shall not deliver any *Growing Medium* to the site until the test results have been reviewed and approved by the *Contract Administrator* and the City.

.5 All submitted soil analysis must be dated and include supplier name and phone number, project location and submitted to *Contract Administrator* and the City for approval prior to commencing work. Soil analysis shall include measurements of:
- .1 Percent sand, fines, silt and clay
- .2 Organic matter to 100%
- .3 pH, acidifying additive required to achieve noted herein
- .4 Water soluble salts
- .5 Total carbon to nitrogen ration
- .6 Total nitrogen and available levels of phosphorus, potassium, calcium & magnesium

.6 At the discretion of the *Contract Administrator* and the City submit up to two (2) additional samples, at intervals outlined by the *Contract Administrator* and the City, of *Growing Medium* taken from material delivered to the site. Samples shall be taken form a minimum of three (3) random locations and mixed to create a single uniform sample of testing. Results of these tests shall be forwarded to the *Contract Administrator* and the City for review.

.7 The *Contractor* is responsible for soil analysis and requirements for amendments to supply *Growing Medium* as specified. Failure to satisfy these contractual requirements could result in the *Contractor* being required to remove unacceptable *Growing Medium* at their expense.

.8 Notify the Contract Administrator at least forty-eight (48) hours prior to Growing Medium placement for inspection.

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

1.6 Product Handling — Add 1.6

.1 All materials to be handled and adequately protected to prevent damage. Do not handle *Growing Medium* in an excessively wet, extremely dry, frozen condition or in any manner in which structure may be adversely affected. *Growing Medium* whose structure has been damaged by handling under these conditions shall be rejected and shall be replaced by the *Contractor* at their expense.

.2 Stockpile materials in bulk form in paved areas or in pre-approved areas of the site. Provide additional protection of storage under roof or tarpaulins.

.3 Take all precautions to prevent contamination of *Growing Medium* and amendments from windblown soil particles, weed seeds and from insects. Contamination of the *Growing Medium* and amendments may result in their rejection for use.

.4 Store fertilizer and chemical amendments in the manufacturer's original containers.

.5 All *Growing Medium* shall be delivered to site premixed from a recognized *Growing Medium* source ensuring consistency throughout the mix.

2.0 PRODUCTS — Delete 2.0 and replace with the following

2.1 Materials

.1 *Growing Medium* Preparation
- .1 Shall be prepared from Compost Material with Sand and other Soil Amendments as required to meet the specifications herein.
- .2 Ensure commercial processing and mixing of *Growing Medium* components are done thoroughly by a mechanized screening process. Do not mix the

components by hand. Ensure the resulting product is a homogeneous mixture having the required properties throughout free of stones 25 mm or larger in any dimension, woody plant parts, toxic materials, foreign object and other extraneous materials harmful to plant growth. Provide composted soil free from crabgrass, couch grass, equisetum, convolvulus, or other noxious weeds or seed or parts thereof.

.2 Inorganic Soil Amendments

.1 Sand: Imported pit sand or river pump sand, free of impurities, chemicals, horsetails, and other noxious weeds. The saturation extract electrical conductivity of salinity shall not be greater than 3.0 millimhos/cm at 25 degrees C.

Sieve Size (mm)	Percent passing (%)
4.75	95-100
0.50	0-40
0.050	0-5

.2 Fertilizers: Uniform in composition, free flowing and dry, granular, pill form, or pelleted commercial product with 50% of total nitrogen (if applicable) derived from natural organic material in a slowly available form delivered in unopened water proof containers with the manufacturer's guaranteed N-P-K analysis, type and trade name attached to each container. The planting soil test results will specify a formulation and application rate to achieve the levels of nitrogen, phosphorous and potassium required. Fertilizer to meet the requirements of the Canada Fertilizer Act.

.1 Lime: ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:

.1 Class: Class T, with a minimum 99 percent passing through No. 8 (2.36 mm) sieve and a minimum 75 percent passing through No. 60 (0.25 mm) sieve.

.2 Provide lime in form of dolomitic limestone.

.3 Perlite: Horticultural perlite, soil amendment grade.

.3 Organic Soil Amendments

.1 Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 25 mm sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

.1 Organic Matter Content: 50 to 60 percent of dry weight containing no cedar, redwood, wood or bark.

.2 Colour: dark brown to black in colour.

.2 Peat:

.1 Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having a water-absorbing capacity of 1100 to 2000 percent.

.3 Wood Residual

.1 Content of wood residuals such as Fir or Hemlock sawdust present in the *Growing Medium* shall not cause the total carbon to total Nitrogen ration to exceed 40:1.
.2 Cedar or redwood sawdust shall not be present in *Growing Medium*.

.4 Manure
.1 Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth and free from salt or other harmful chemicals, such as any used to artificially hasten decomposition.
.2 All particles in manure to pass a 6.35 mmm sieve.
.3 Salt content shall give a reading of less than 0.5 millimhos/cm at 25 degrees C.

2.2 Nutrient Requirements

.1 Nutrient requirements shall meet the BCSLA/BCNTA Landscape Standard *Growing Medium* requirements for nitrogen, phosphorus, potassium, calcium, magnesium, boron, sodium cation exchange capacity, carbon to nitrogen ratio.
.1 Boron: not to exceed 1.0ppm
.2 Sodium: Sodium absorption ratio(SAR) not to exceed 8.0
.3 Total Nitrogen: to be 0.2-0.4% by weight
.4 Available Phosphorous: to be 50-100 ppm
.5 Available Potassium: to be 50-70 ppm
.6 Cation Exchange Capacity: to be 30 to 50 meq.
.7 Carbon to nitrogen ratio: Maximum 40:1.

2.3 Salinity

.1 The electrical conductivity of the liquid taken from the soil pH evaluation shall not exceed 3.0 millimhos/cm at 25 degrees C before additions of fertilizers and/or liming agents.

2.4 Drainage Rate

.1 Percolation shall be such that mixing, handling and placement to be done in such a manner that the minimum saturated hydraulic conductivity show on Table – *'Growing Medium Properties for Different Applications'* (found herein these specifications) is achieved and no standing water is visible 60 minutes after at least 10 minutes of moderate to heavy rain or irrigation.

2.5 Growing Medium Source

.1 Import planting medium or manufactured planting medium from off-site sources. Do not obtain from agricultural land, bogs or marshes.
.2 Supplier of Growing Medium shall be as per the Coquitlam Approved Products List.

2.6 Bark Mulch

.1 Mulch backfilled surfaces of planting beds and other areas indicated on drawings.
.1 Organic Mulch: Apply 50 mm average thickness of organic mulch, and finish level with adjacent *Finish Grade*s. Do not place mulch against plant stems.

.2 Supplier of Bark Mulch shall be as per the Coquitlam Approved Products List.
.3 Dark brown in colour and free of all soil, stones, roots or other extraneous matter, and free of weeds, seeds and spores.

2.7 Growing Medium Properties for Different Applications

Properties	Low Traffic Lawn Areas, Trees and Large Shrubs	High Traffic Lawn Areas	Planting Areas, Planters Shrubs & Groundcover
Texture: Particle size classes by Canadian System of Soil Classification	Percent of Dry Weight Mineral Fraction (%)		
Gravel (greater than 2 mm less than 75 mm)	0-10	0	0
Sand (greater than 0.05 mm and less than 2 mm)	50-70	80-90	50-70
Silt (larger than 0.002 mm and less than 0.5 mm)	10-30	5-20	10-30
Clay (less than 0.002 mm)	7-20	2-5	7-20
Organic Content Percent of Dry Weight	5-10	3-5	25-30
Drainage Minimum saturated hydraulic conductivity (cm/hr) in place	2.0	7.0	2.0
Acidity (pH)	6.0-6.5	6.0-6.5	5.0-6.0

2.8 Miscellaneous Products

.1 Root Barrier: 400x610 mm linear root barrier, copolymer polypropylene, 50% recycled plastic, black in colour. Supplier of Root Barrier shall be as per the Coquitlam Approved Products List.

.2 Construction Adhesive shall be as per the Coquitlam Approved Products List.

.3 Drain Mat: Light duty, uv stable, impermeable cuspated core bonded to a layer of non-woven filter fabric with the following minimum properties:

.1 Compressive Strength -718 kN/m2 as per ASTM D-1621
.2 Flow Rate – 188 l/min/Metre as per ASTM D-4716
.3 Approximate profile thickness of 10 mm.
.4 Supplier of Drain Mat shall be as per the Coquitlam Approved Products List.

.4 Filter Fabric: Install root barriers in accordance with manufacturer's reviewed installation instructions where indicated on reviewed drawings with vertical root directing ribs facing inwards towards trees or plants; connect panels together as required.

1. Supplier of Filter Fabric shall be as per the Coquitlam Approved Products List.

.5 Drain Rock: Shall consist of clean round stone or crushed rock. Acceptable material includes 19 mm drain rock or torpedo gravel conforming to the following gradations.

Percent Passing		
Sieve Designation	Coarse	Fine (Torpedo gravel)
25 mm	100	
19 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

2.9 Structural Soil

.1 Soil stabilizer shall be friable, containing a minimum of 4% and maximum of 6% organic matter by dry weight, free from stones and debris over 30 mm. Acidity (ph.) shall be in the range 5.5-7.5. Carbon to nitrogen ratio shall not exceed 40:1, and salinity shall not exceed 3.0 milliohms at 25 deg C. Gravel greater than 2 mm shall not exceed 10% of total weight.

.2 Supplier of Structural Soil shall be as per the Coquitlam Approved Products List.

.3 *Growing Medium* to be a gap-graded mixture.

.4

Texture of Growing Media	Percentage of mixture
Gravel: greater than 2 mm-less than 75 mm	0%
Sand: greater than 0.0 5mm-less than 2 mm	max 60%
Silt: greater than 0.002-less than 0.0 5mm	max 35%
Clay: less than 0.002mm	max 15%
Clay and silt combined	max 40%
Acidity (pH)	6.0-7.0
Drainage: minimum saturated hydraulic Conductivity (cm/hr) in place	3.0
Salinity: saturated extract conductivity shall not exceed at 25 deg C.	3.0 milliohms/cm
Organic content: percent of dry weight	8-12%

5 Stone ballast: Clean inert stone of high angularity is preferred over washed gravel. Stone dimension aspect ratio should be 1:1:1 with a maximum 2:1:1 length: width: depth. Single size stone, 60 mm-75 mm clear sieve designation: Blasted Quarry Rock. Aggregate to be used for structural soil shall be free of any foreign elements or material.

.6 Structural Geotextile
Shall be installed as a structural filter layer directly above the compacted structural soil mixture. Do not install fabric until adequate compaction of the structural soil mixture has been confirmed. Filter fabric shall be selected and deigned to withstand wear and tear during construction without deterioration of its strength and filtering properties.
.1 Supplier of Geotextile shall be as per the Coquitlam Approved Products List.

.7 Ground dolomite limestone containing no less than 85% of its total weight as calcium carbonate and magnesium carbonate

shall be used to control ph level. The degree of grind for the limestone shall allow 100% of the total weight to pass a #10 (2 mm) sieve, 90% to pass a #18 (1 mm) sieve and 20% to pass a #40 (0.105 mm) sieve. Spread-easy fertilizer shall be used as a slow release fertilizer source of calcium and magnesium.

.8 Mixing of structural soil:
Blend as per following ratios:
.1 5 metric tones (MT) of aggregate
.2 1 cubic meter of growing media
.3 2 kg soil stabilizer

.9 Moisten mixture with fine spray of clean potable water while mixing to activate soil stabilizer product. Do not over mix. Place mixture in 300 mm lifts through entire area of structural soil mixture. Compact each lift to 95% MPD prior to placement of next lift. Install filter fabric such to ensure a minimum of 60 cm overlap of all fabric seams and beyond edge of structural soil.

3.0 EXECUTION

3.2	**Preparation of Subgrade**	Delete 3.2.4 and replace with the following	Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials, soil contaminated with calcium chloride, toxic materials and petroleum products, and debris which protrudes more than 25 mm above the surface. Dispose of all removed material off site to approved offsite disposal area at no additional cost to the *Owner*.
		Delete 3.2.5 and replace with the following	Course cultivate entire area which is to receive *Growing Medium* to depth of 250mm. Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.
		Add 3.2.6	Grade transitions shall be smooth and even and shall blend into surrounding areas as determined by the *Contract Administrator* and the City.
		Add 3.2.7	Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
3.3	**Processing Growing Medium**	Add 3.3.4	*Growing Medium* shall be imported and stockpiled on site in a location approved by the *Contract Administrator* and the City. .1 Carry out stock piling operation such that the *Growing Medium* structure is not compromised through compaction, vibration or other actions. .2 Stock piled *Growing Medium* shall be protected from rain, drying and contaminants. .3 *Growing Medium* shall be free of subsoil, pests, roots, wood, construction debris, undesirable grasses including crabgrass or couch grass, noxious or weeds and weed seeds or parts thereof foreign objects and toxic materials. Presence of these contaminates shall be grounds for rejection of *Growing Medium* and replacement at no cost to the *Owner*.
3.4	**Placing Growing Medium**	Delete 3.4.2 and replace with the following	Place *Growing Medium* to the required finished grades with adequate moisture, in uniform lifts of 100 mm to 150 mm compacted to 80 MPD during dry weather, over dry, unfrozen *Sub Grade* where planting is indicated free of any standing water.

		Delete 3.4.5 and replace with the following	Minimum depths after settlement and 80% compaction: .1 Trees pits: 900 mm .2 Shrub beds: 450 mm .3 Ground cover areas: 300 mm .4 Lawn areas: 300 mm .5 Blvd. areas: 150 mm
		Add 3.4.6	Increase sand content to 90% in the planting soil below lawns where heavy wear by pedestrians or maintenance equipment is anticipated. Increase sand content in a 1.5m wide strip at the bottom of swales, banks or other wet areas and as directed by the Landscape Architect. On steep south or west facing banks, reduce sand content in lawns and planting beds to 50 - 60% for better moisture retention.
3.5	**Applying Fertilizers**	Delete 3.5 and replace with the following	.1 Addition of amendment components shall be at the rates indicated in the *Growing Medium* analysis recommendations via the following methods: .1 Lime: Applied with mechanical spreaders over entire planting areas and contained planters. .1 Do not apply by hand. .2 Mix thoroughly into the top 100 mm of *Growing Medium*. .3 Do not allow lime to come into direct contact with nitrogen - phosphate - potash fertilizers. .2 Fertilizer: Applied with mechanical spreaders over entire planting areas and contained planters. Do not apply by hand. Do not mix into *Growing Medium*.
3.6	**Finish Grading**	Delete 3.6.1 and replace with the following	Manually fine grade *Growing Medium* installation to contours and elevations shown on drawings or as directed by *Contract Administrator* and the City. Eliminate rough spots and low areas to ensure positive drainage.
		Add 3.6.3	*Finish Grade* of *Growing Medium* shall be 25 mm from finished elevation of adjacent curb or planter wall unless otherwise noted on drawings.
3.9	**Clean-up**	Delete 3.9 and add the following	.1 Ensure all paved areas, tops of planters, adjacent surfaces have been thoroughly cleaned. Ensure all discoloration of adjacent surfaces as a result of *Growing Medium* installation have been removed. .2 Dispose of materials not required and repair any damage to adjacent surfaces (as determined by the *Contract Administrator* and the City) off site at no additional cost to the *Owner*.
3.10	**Weed Control**	Add 3.10	.1 Ensure all weeds and weed roots that have germinated during the course of work of this section have been eliminated from Growing Medium. .2 Provide the City Representative and Consultant with a written outline of weed removal methodology seven (7) days prior to starting weed removal operations.
3.11	**Structural Soil**	Add 3.11	.1 Refer to 2.9 in this specification and as shown on the Contract Drawings.

END OF SECTION

1.0	**GENERAL**	Delete 1.0.2 and replace with the following	This section is based on the "British Columbia Landscape Standards and the B.C. Nursery Trades Association. This standard is intended to set a level of quality which is equalled or bettered in the construction documents.
1.4	**Handling and Storage**	Delete 1.4.3 and replace with the following	Schedule sod deliveries such that sod installation occurs within twenty-four (24) hours of being lifted from the source sod farm.
		Delete 1.4.4 and replace with the following	Sod shall be neatly stacked or rolled at the source sod farm, delivered and unloaded on sturdy pallets which are no more than 3 pallets high.
1.5	**Drainage Control**	Delete 1.5.1 and replace with the following	Provide for proper water management and drainage of site during work of this section. Water management shall include silt traps, erosion control measures, temporary water collection ditches, as well as their adequate maintenance to ensure that storm water which may become laden with soil, growing medium or hydraulic seed is detained and cleaned prior to discharge from *Place of Work*.
1.6	**Samples**	Add 1.6.2	Submit one (1) square meter of sod to the *Contract Administrator* and the City for review. Ensure sample is complete with name of sod farm, base soil type, seed mix percentage.
		Add 1.6.3	*Contract Administrator* and the City shall review sod sample for approval prior to installation. The sample accepted by the review will form the standard by which the project will be supplied.
		Add 1.6.4	Should the *Contractor* require the source of sod supply to change during the construction a written request must be provided to the *Contract Administrator* and the City 48 hours in advance. The request shall be followed up by submission of proposed sod substitution sample and include the name of sod farm, base soil type, seed mix percentage for *Contract Administrator* and the City review prior to the delivery.
1.8	**Measurement and Payment**	Delete 1.8.1 and replace with the following	Payment for all work performed under this Section will be incidental to payment for work described in other Sections unless shown otherwise in the Schedule of Quantities and Prices. Payment for nursery sod includes supply and placing of sod as shown on the Contract Drawings or as directed by the Contract Administrator and grass maintenance to meet Conditions of Total Performance. Payment includes protection from damage caused by any living creature.
2.0	**PRODUCTS**		
2.1	**Sod**	Delete 2.1.1 and replace with the following	Sod to be approved by the *Contract Administrator* and the City and to be nursery grown, true to type, conforming to standards of nursery Sod Growers' Association and their Nursery Sod Specifications. Sod to be quality, cultured turf grass grown from seed approved by Canada Department of Agriculture, free of disease, clovers, stones, pests and debris.
		Add 2.1.1.1	Nursery sod: .1 Shall be No. 1 Premium grade and contain only species of grass indicated on the supplier's certificate. .2 Sod shall be 'non-netted'

Add 2.1.1.2

Table Guideline of Approved Sod Mix Ratios

Supreme Soil Base Sod	
(Elka II) Perennial Ryegrass	40%
(Shamrock) Kentucky Bluegrass	30%
(Cindy) Chewing Red Fescue	30%
Seed Rate: 50g per square metre	

Add 2.1.8

All sod shall be completely free of invasive and/or noxious broadleaf weeds, grasses including but not limited to poa annua, disease, fungi, detrimental nematodes and detrimental insects.

2.2 Water

Delete 2.2.1 and replace with the following

Potable, free of impurities that would inhibit seed germination. *Contractor* to ensure adequate water is available to maintain seeded areas during germination and in a vigorously growing, healthy state until *Total Performance* of work of this section.

2.3 Fertilizer

Add 2.3.2

Fertilizer shall be complete synthetic slow release fertilizer. Type and application shall be as required by the growing medium analysis report.

2.4 Wooden Pegs

Add 2.4

.1 Wooden Pegs shall be 19 mm x 19 mm x 150 mm long No. 1 grade or better Hem/fir.

2.5 Binder Twine

Add 2.5

.1 Binder Twine shall be hemp based multiple strand string.

2.6 Flagging Tape

Add 2.6

.1 Flagging Tape shall be 30 mm wide, biodegradable ribbon tape made of non-woven cellulosic material, and red color, or an approved equivalent.

3.0 EXECUTION

3.1 Finish Grade Preparation

Delete 3.1.2 and replace with the following

Prior to the placement of sod *Contract Administrator* and the City to review and direct minor adjustments and refinements of finish grades prior to the *Contractor* proceeding. Review includes grades, growing medium depth and condition of finished surface. Subsequent to the *Contract Administrator* and the City review the *Contractor* shall re-grade, add growing medium and make adjustments as directed by *Contract Administrator* and the City.

Delete 3.1.5 and replace with the following

Fine grade growing medium to lines and levels shown on Contract Drawings. Ensure that all low spots, humps and irregularities are eliminated prior to review by *Contract Administrator* and the City.

3.2 Sodding

Delete 3.2 and replace with the following

.1 Sod shall not be placed during hot dry summer periods, at freezing temperatures, or over frozen growing medium.

.2 Allow sod to dry sufficiently during wet weather to prevent tearing during lifting and handling.

.3 Handle sod carefully to minimize tearing and dropping of soil.

.4 Placement of Sod:

.1 Lay sod in rows smooth and flush to adjoining grass areas and paving and top surfaces of curbs unless shown otherwise on *Contract Drawing*. Ensure there is a full roll width between the new sod and any adjoining surfaces. Small cut pieces from a full roll will not be accepted.

.2 Stagger joints and ensure that sod sections are butted closely together without overlapping or leaving gaps between sections.
.3 Cut out irregular or thin sections with a sharp knife.
.4 Cut sod to fit tight around landscape elements.
.5 Cut sod to create clean, smooth lines along all plant beds.

.5 Placement of Sod on Slopes:
.1 Lay sod with the length of each sod section parallel to slope taking extra care to ensure that sod sections are butt tight and each sod section is set in a staggered formation.
.2 On slopes exceeding 3:1 gradient ensure sod is secured with wooden pegs at intervals of not more than 450 mm along the center of each section. Ensure wooden pegs are driven flush with the sod.
.3 Prior to acceptance of sod areas that have been secured with wooden pegs either remove the wooden pegs or drive each wooden peg at least 50 mm below finished grade.
.4 Where required, place erosion control mesh or netting and secure with stakes or staples sunk firmly into ground to a minimum depth of 150 mm at maximum intervals of 4 meters along pitch of slope. Place stakes or staples horizontally across slope at intervals equal to width of mesh or netting minus 150 mm and drive flush with top of sod.

.6 Use a light roller to ensure that there is full, close contact between sod and growing medium. Use of a heavy roller to correct irregularities in grade is not permitted.

.7 Ensure all sodded areas are watered immediately after installation. Verify that water applied to has penetrated through sod into top 100 mm of growing medium. Continue watering operations as needed to ensure that adequate moisture content is maintain to encourage deep root growth and healthy, vigorous leaf growth.

.8 Protect newly placed sod from heavy foot traffic during installation and until acceptance by the *Contract Administrator* and the City. Protection shall include but is not limited to placement of wood planks or plywood of sufficient thickness to bear the imposed weight and prevent damage to sod or displacement and/or compaction of sod/growing medium.

.9 Sod that has been damaged by construction operation, construction / site personnel or construction traffic shall be replaced at no cost to the *Owner*. Replacement shall include removal of growing medium, regarding of sub grade, replacing growing medium and sod as required.

.10 Water sod area immediately with sufficient amounts to saturate sod and upper 100 mm of growing medium. Do not allow the sod to dry out so that the joints become visible.

3.4 Grass Maintenance — Delete 3.4 and replace with the following

.1 Maintenance of sodded areas shall begin immediately after sodded operation and shall continue until all deficiencies noted in the *Substantial Performance* review have been rectified to the satisfaction of the *Contract Administrator* and the City and conditions for *Total Performance* have been achieved. The *Contractor* is to notify the *Contract Administrator* and the City in

writing forty eight hours (48) prior to stopping maintenance operations.

.2 Sod Cutting: After the 'first' cut of sodded lawn areas cutting operations shall be carried out on a weekly (seven day) basis until *Total Performance* by *Contract Administrator* and the City:
- .1 First cut of sodded lawn areas shall occur when a uniform grass height of 75 mm has been attained. First cut shall be to a height of 65 mm.
- .2 Continue regular weekly cutting at a height of 65 mm until *Total Performance*.
- .3 Cutting operations shall be such that each cut is at right angles to the previous cut.
- .4 *Contractor* to remove grass clippings after each cut and dispose of offsite.
- .5 Roll when required to remove any minor depressions or irregularities.
- .6 Immediately repair seeded areas that show deterioration or bare spots. Top-dress all areas showing shrinkage due to lack of watering and seed with seed mix that matches the original seed mix.

.3 Fertilizer analysis shall conform to recommendations provided with growing medium analysis. Application of fertilizer shall follow manufacturers' recommendations noting that after October 1 lawn areas shall not be fertilized until April 15th of the following spring.

.4 Sodded lawn areas shall be kept free of invasive and/or noxious broadleaf weeds, grasses including but not limited to poa annua, disease, fungi, detrimental nematodes and detrimental insects.

.5 All maintenance equipment and practices are to conform to the BC Landscape Standard Level 2 'Groomed'.

.6 Protect all sodded areas against trespassing and from damage at all times clearly marked, staked, string and flagging tape.

- .1 Perimeter Protection: Where directed by the *Contract Administrator* and the City, sodded areas shall be surrounded by a 900 mm high barrier made up of the following components:
  - .1 Wood posts placed at 1.8 meters on centre.
  - .2 Wood Posts to be driven to a depth of 300mm.
  - .3 String two (2) strands of hemp based binder twine (or equal product) between posts. Insure one full wrap of twine around each post.
  - .4 Tie 300 mm strands of 'red' flagging tape at 450 mm intervals along the entire length of both strands of twine.
  - .5 Maintain perimeter protection until *Total Performance* issued. Upon acceptance by *Contract Administrator* and the City, remove perimeter fence and dispose of off site.

3.5 Condition for Total Performance

Delete 3.5.1 and replace with the following

Conditions for *Total Performance* of Sodded areas:
- .1 Sodded areas exhibit fully established root systems.
- .2 No seams are visible between sod sections.
- .3 Sod areas are smooth and evenly graded. No depressions, foot marks or vehicle tracks.

			.4 Sod is free of bare and dead spots and does not have any broadleaf weeds, noxious grasses including but not limited to poa annua. .5 No surface growing medium is visible when grass has been cut to height of 65 mm. .6 Sodded areas have been cut a minimum of two (2) times, at seven (7) day intervals. .7 Sodded areas are a uniform green colour with no discoloured sections or patches. .8 Sodded areas exhibit a thick, dense, uniform and healthy appearance.
		Add 3.5.2	Lawns sodded after September 30th will be not be reviewed for *Total Performance* until April 30th the next year.
3.6	**Guarantee / Maintenance**	Delete 3.6.1 and replace with the following	The *Contractor* hereby guarantees that the sod will remain free of weeds and defects for a period of one (1) year from the date of *Substantial Performance*. The *Contractor* shall make all corrections, adjustments and replacements required as a result of failure of all products in this section. During the *Maintenance Period*, the *Contractor* will replace sodded areas, determined by *Contract Administrator* and the City, to be dead or failing at the end of the *Maintenance Period*. Replacements to be made at next appropriate season and, conditions of guarantee will apply to all replacement seeding for one full growing season.
		Delete 3.6.2 and replace with the following	The Owner reserves the right to extend the *Contractor*'s *Maintenance Period* and responsibilities for one (1) additional year if, at end of the initial guarantee period, the development and growth of the sod is not sufficient to ensure future survival.

END OF SECTION

1.8 Measurement and Payment

Delete 1.8.2 and replace with the following

Payment for all work performed under this section will be incidental to payment for work described in other Sections, unless shown optherwise in the Schedule of Quantities and Prices.

Payment for watermain will include location and exposure of existing utilities, saw cutting and disposal of pavement, trench excavation, disposal of surplus / displaced excavated material, support of utility poles and adjacent piping, supply and installation of all pipe, bends, bolts, gaskets, thrust blocks, couplings, restraints and tie rods, all nuts, bolts and fasteners to be 304 stainless steel or better, application of petrolatum mastic on all metal but non stainless water appurtenances, blind flanges, caps, fittings and related materials, tie-ins, bedding, approved native excavated backfill material compacted in place, cleaning, pressure and leakage testing including all labor, material and equipment required to complete the test, flushing, disinfection where required, granular sub-base, granular base, tack coat, 50mm temporary asphalt following the finished tolerance as defined in Section 32 12 16, Clause 3.10, pavement marking paint, all surface restoration as specified under Section 31 23 01 – Sub-section 3.6, COQ-G4 and all other work and materials necessary to complete installation as shown on Contract Drawings and specified under this Section; and

Measurement for watermain will be made along the centerline of the main, through the valves and fittings, with no deduction for length of valve or fittings, over surface after work has been completed; and

Native excavated material approved for re-use as trench backfill shall have all cobbles greater than 150 mm diameter removed and disposed off-site and shall be granular in nature and free from organic materials. Native excavated material shall not be used as trench backfill where moisture content does not permit compaction to specified density. Where native excavated material is unacceptable for use as trench backfill, imported trench backfill shall be supplied, placed, and compacted to specified density. Payment for imported trench backfill will be made under Section 31 23 01S - Clause 1.10.9.

Delete 1.8.3 and replace with the following

Payment for inline gate valves or butterfly valves including Terminal City Nelson Type valve boxes, restraints; and for fittings (crosses, tees, bends, reducers, blind flanges, caps, anchors and etc) will be made for items identified on Contract Drawings and installed as part of watermain as described under 1.8.2 in this Section.

Payment for fittings, unless specified in the Schedule of Quantities and Prices, performed under this section will be incidental to payment for work described in other Sections.

No payment will be made under this item for capping an existing main as part of the operation for watermain tie ins.

Delete 1.8.4 and replace with the following

Payment for new and/or transfer of service connection includes locating and cutting the existing service supply, removal and disposal of concrete meter box, curb stop, piping and meter (where applicable), supply and installation by direct tapping, corporation stops, reconnecting to the existing main using a MacDonald 6130 compression coupling (where specified) or connecting to a new main, curb stops, service pipes and all related fittings and appurtenances

specified and/or shown on Standard Detailed Drawing COQ-W2b (except where noted), all labor, material and equipment including use of tapping machine and reconnecting to the existing service at or near property line or as shown on the Contract Drawings including any fittings and repair couplings. Payment also includes all applicable work described in 1.8.2.

Measurement for service connection will be for each complete service installed, including all appertunances, length of service pipe installed and length of riser.

Payment includes re-use of existing cast iron Terminal City Nelson Type style valve box c/w lid marked "WATER" and supply and installation of new pvc riser.

NOTE: PAYMENT FOR SERVICE CONNECTIONS WILL NOT BE MADE UNTIL RESTORATION WORK IS COMPLETE TO CITY'S SATISFACTION.

Delete 1.8.6 and replace with the following

Payment for the installation of an air valve assembly and chamber on a new main includes all materials, works and appurtenances as shown on the Contract drawings. Payment includes all applicable work described in 1.8.2.

Payment for test points is considered to be incidental to payment for work described herein.

Delete 1.8.7 and replace with the following

Payment for supply and installation of a new blow-off assembly includes supply and installation of all materials, works and appurtenances as shown on the Contract Drawings. Payment includes all applicable work described in 1.8.2.

Delete 1.8.13 and replace with the following

Payment for all tie-ins to existing watermains will include all pipe materials, fittings, test points, blow off assembly, joint restraints, excavation to expose the existing main to confirm location, grade, size, material & condition and prepare the existing watermains, couplers, caps, restraints, tie-rods, all nuts, bolts and fasteners to be 304 stainless steel or better, application of petrolatum mastic on metal but non stainless water appurtenances, bedding and backfill material on pipe zone, testing and disinfection, cutting and disposal of the existing mains, permanent capping c/w restraints, removal of any decommissioned valves boxes, removal of any decommissioned valves and fittings to accommodate the new and existing main, temporary fittings to provide service changeovers and coordinating all tie-in works with City Staff and as described on the Contract Documents and Drawings. Payment includes all applicable work described in 1.8.1 and 1.8.2.

Add 1.8.14

Payment for new hydrants installed on the new main includes the hydrant body, c/w Storz "quick connect" pump nozzle, lateral connections from mainline tee off watermain to hydrants, all new pipe, isolation gate valve, valve box & cover, valve stem riser pipe, bends, couplings (Robar 1506), any necessary pipe extensions to achieve the required hydrant height, concrete thrust block, tie rods, bedding material, testing and disinfection, surface restoration as indicated in the requirements in 1.8.2 of this Section and all other incidental work as shown on Standard Detail Drawing W4.

2.0 PRODUCTS

2.2 Mainline Pipes, Joints and Fittings

Add to 2.2.1.1

Pipe: to AWWA C151, and shall meet the following Pressure Class or Thickness Class:

.1 100 mm – 350 mm – Thickness Class 50
.2 400 mm & greater – PC 350

Delete 2.2.2.2 and replace with the following

Joints: It is mandatory that the push-on integrally thickened bell and spigot type conform to ASTM D3139 Clause 6.2 with single elastomeric gasket to ASTM F477.

Delete 2.2.4.13 and replace with the following

Joint Restrain Devices: General Requirements:

.1 Ductil iron castings to ASTM A536.
.2 Anti-corrosion coating of ductile iron castings to AWWA C219, AWWA C210, AWWA C213 or AWWA C550.
.3 Bolts and nuts high strength low alloy steel to AWWA C111 or as specified in Contract Documents, stainless steel to ASTM F593 or ASTM F738 for bolts and ASTM F594 or ASTM F836 for heavy hex nuts. Rolled threads, fit and dimensions to AWWA C111.
.4 Tie rods to 2.2.3.8 of this Section
.5 Restrainers for ductile iron pipe shall be mechanical joint fittings or push-on joint fittings with tie rod.
.6 Restrainers for PVC pipe shall be mechanical joint fittings or push-on joint fittings with tie rod lugs.
.7 Restrained harnesses or integral restrain systems manufactures as part of the pipe joint.
.8 All joint restraint systems for PVC pipe be approved by the specific PVC pipe manufacturer, and that they do not derate the pipe manufacturer's recommended working pressures.
.9 Restrainers for PVCO pipe shall be mechanical joint fittings or push-on joint fittings with tie rod lugs.
.10 All joint restraint systems for PVCO pipe be approved by the specific PVCO pipe manufacturer, and that they do not derate the pipe manufacturer's recommended working pressures.

Add 2.2.7

Oriented Polyvinyl (PVC) Pressure Pipe:

.1 Pipe:
  .1 Pipe to be manufactured to specifications for pipe size ranges as follows:
    .1 Pipes 100 to 600 mm diameter – AWWA C909.
    .2 Pipes to be certified by Canadian Standards Association for pipe size ranges 100 mm to 600 mm dia. – CSA B137.3.1.
  .2 Cast iron pipe equivalent outside diameter.
  .3 To be compatible with specified mechanical joint and push-on joint fittings and valves without use of apecial adapters.
.2 Joints: Push-on integrally thickened bell and spigot type to AWWA C909 Clause 4.3.3.2 (a.) with single elastomeric gasket to ASTM F477.

2.3	**Valves and Valve Boxes**	Delete 2.3.1.3 and replace with the following	Valves 400 mm and larger shall be butterfly valves.
		Delete 2.3.1.4	
		Delete 2.3.4 and replace with the following	Blow-Down or Blow-Off Valves: 50 mm to 300 mm as specified for mainline gate valves.
		Delete 2.3.6.1.1	
		Delete 2.3.6.1.2 and replace with the following	Circular type valve box shall be Nelson style cast iron.
		Delete 2.3.7.1 and replace with the following	Curb stop valve boxes on 19 mm dia. to 38 mm dia. shall be as shown on Coquitlam Standard Detail Drawings COQ-W2b, COQ-W2j.
		Delete 2.3.7.2	
		Delete 2.3.7.3 and replace with the following	Curb stop valve boxes (300 mm from property line) alternative on 19 mm dia. to 38 mm dia. services without operating rods to be assembled as specified for Mainline Valve Boxes 2.3.6.1.2, and shown on Coquitlam Standard Detail Drawings COQ-W2b, COQ-W2j. Service boxes may be Nelson style PVC, except when located in driveways.
		Delete 2.3.7.5 and replace with the following	Corporation stop valve boxes (at mainline tees or tappings) on services 50 mm dia. and larger as specified for Mainline Valve Boxes per Coquitlam Standard Detail Drawings COQ-W2e, COQ-W2f.
2.5	**Service Connections, Pipes, Joints and Fittings**	Delete 2.5.1 and replace with the following	Pipe diameter 19 mm to 75 mm to be Type K annealed copper to ASTM B88M.
2.6	**Hydrants**	Delete 2.6.1.6 and replace with the following	Pump nozzle shall be “quick connect” STORZ type. STORZ type nozzle must be painted gloss black.
		Delete 2.6.2 and replace with the following	Colour: Tremclad Rust Paint Body – Fire Red Hose Caps and Bonnet – Bright Yellow
2.8	**Granular Pipe Bedding and Surround Material**	Add 2.8.3	Bedding and surround material shall be Type 1 under Section 31 05 17 – 2.7 or 19 mm minus clear crushed gravel.
3.0	**EXECUTION**		
3.6	**Pipe Installation**	Add 3.6.15	When the watermain crosses a storm or sanitary sewer, the watermain shall be installed a minimum 0.5 m clear above the sewer. Where this is not possible, the watermain shall have a minimum 0.3 m clearance under the sewer with all joints within a 3.0 m horizontal distance from the sewer wrapped with heat shrink plastic or packed and wrapped with petrolatum tape in accordance to the following standards: .1 ANSI/AWWA C214 (factory applied) .2 ANSI/AWWA C209 (field applied)

.3 ANSI/AWWA C217-90 (petrolatum tape)
.4 All materials used are to have zero health hazard

Installation shall be in accordance with the requirements of the Regional Health Engineer under the Health Act.

3.10	**Service Connection Installation**	Delete 3.10.4	
		Delete 3.10.5 and replace with the following	Tappings in cast iron or ductile iron mains to AWWA CISI pipe to be made using double strap saddles specified in 2.5.3 of this Section.
		Add 3.10.13	Water service connections (19 mm and 25 mm) must be installed as one continuous length of pipe.
3.23	**Connection to Existing Mains**	Delete 3.23.1 and replace with the following	Connections to existing waterworks systems will be made by the Contractor under the supervision of the Contract Administrator. Make all necessary arrangements with the Contract Administrator and the City to schedule work to prevent construction delays.
		Add 3.23.2	Provide written notification to all affected residents a minimum 48 hours prior to service interruption.
		Add 3.23.3	Arrange shutdown of the existing valves by the City. *Contractor* shall not operate any valves without prior approval of the *Contract Administrator* and the City.
		Add 3.23.4	Provide temporary water service while existing service is interrupted as detailed in *Contract Drawing* or Project Specific Specifications.
		Add 3.23.5	Fittings used for tie ins should be cleaned of all foreign material and sprayed with a 1% hypochlorite solution prior to assembly. Disinfect all pipes and fittings installed at the connection.
		Add 3.23.6	*Contractor* shall be responsible for the costs for the City to flush and purge all air from existing mains and services in the area affected by the water service interruption.
		Add 3.23.7	Procedures for Bateriological Tests shall be as described in AWWA C651-99.No connection to existing watermains will be authorized until final results of coliform bacterial testing have been received and reviewed by the Water Superintendant. All samples shall be taken by the City Water Utility. All valve operation shall be handled by the City Water crews. The *Contractor* shall provide sampling points, one every 366m plus the end of each main segment. The *Contractor* shall provide all labour to temporarily connect and disconnect the new main in order to properly acquire test samples. Initial flushing, testing and chlorination will be undertaken by the *Contractor* from a water source approved by the Water *Superintendent*. Coordination for the bacterial testing and tie in shall be coordinated by the project Engineering Inspector and the Water *Superintendent* prior to final flushing.

The *Contract Administrator* shall review with the Water *Superintendent* and the *Contractor* sampling locations and appurtenances.

The *Contract Administrator* shall check and record chlorine residual prior to final flushing.

After final flushing the City Water crew will collect two sets of samples 24 hours apart. Samples will be taken at least every 366m of the new main as well as the terminus and all branches.

Test results will be delivered to the Water Superintendant who will provide a copy to the Contract Administrator.

The Water *Superintendent* will judge the adequacy of the test results and issue an authorization to connect.

City Water crews will provide shutdown and flushing as required.

3.25 Permanent Capping of Existing Water Service Connections Add 3.25

Permanent capping of existing water service connections to be completed as per Coquitlam standard Detail Drawings COQ-W2g, COQ-W2h, COQ-W2i.

END OF SECTION

1.0 GENERAL

1.1	**Related Work**	Add 1.1.6	Hot Mix Asphalt Concrete Pavement	Section 32 12 16
		Add 1.1.7	Portland Cement Concrete Paving	Section 32 13 13

1.5 Measurement and Payment

Delete 1.5.1 and replace with the following

Payment for manholes will be made by items or components installed for each type and size as shown on Contract Drawings and specified in the Schedule of Quantities and Prices. No payment will be made for excavation and all other associated work required to accommodate manhole in the new sewer system constructed under this Contract for which manhole forms a part; and

Delete 1.5.1.1 and replace with the following

Payment for manhole includes supply and installation of pre bench gasketed base, lid, slab, donut ring, concrete frame, metal frame, cover and all as shown on Contract Drawing and as described on Standard Detail Drawing S1 and S2 for manholes except for riser. Payment includes base preparation, dewatering, all in-situ concrete work, manhole base preparation to accommodate new sewer installation c/w rubber resilient seat gasket, import backfill, granular subbase and base, compaction, all labor, material, equipment and necessary work for installing the manhole.

Delete 1.5.1.2 and replace with the following

Payment for manhole riser sections includes supply and installation of standard and non standard heights required to complete manhole from specified invert to finishing level, and all necessary work as shown on Contract Drawing and as described on Standard Detail Drawing S1 and S2 for manholes. Payment includes aluminium or non slip ladder rung, all in-situ concrete work, import backfill, compaction, all labor, material, equipment and necessary work for installing the manhole; and

Measurement will be made vertically for the length of the riser required from the top of the manhole base or tee section to reach the underside of concrete lid or slab.

Add to Clause 1.5.1.5

Payment for outside drop manhole includes excavation, import backfill, compaction, tie-in to existing sanitary main, shear band couplers, pipe stubs, fittings, dewatering, all in-situ concrete work and all necessary work as shown on Contract Drawing and as specified in the Schedule of Quantities and Prices.

Delete 1.5.4 and replace with the following

Payment for removal and/or abandon of existing manhole includes excavation, disposal off site of all components, disposal of all unsuitable material, import backfill, plugs, caps, stubs, compaction and all necessary work as shown on Contract Drawing and as specified in the Schedule of Quantities and Prices.

2.0 PRODUCTS

2.1 Materials

Add 2.1.7.3

Any frame and cover assembly creating a point load on the concrete riser rings will not be permitted.

Delete 2.1.12 and replace with the following

Catchbasin lids manufactured to ASTM C478M

Delete 2.1.16.2

Delete 2.1.17

3.0 EXECUTION

3.1	**Excavation and Backfill**	Add 3.1.2	For manholes, when base gravels are complete, excavate for grade rings and manhole frame assembly. Do not disturb the compacted road base beyond the excavation requirement.
3.3	**Manhole Installation**	Delete 3.3.12.2 and replace with the following	Allowable products are precast concrete risers and cast-in-place form system. Individual riser heights shall be 50mm, 75mm, or 100mm.
		Delete 3.3.12.5 and replace with the following	Proper layer of grout between the spacers, covering the entire surface of the rings, should be utilized.
		Delete 3.3.15 and replace with the following	Install drop structures as shown on the contract drawings to Coquitlam Standard Detail Drawing COQ-S4 and Standard Detail Drawing S3. Maximum allowable inside ramp shall be 250 mm invert to invert.
		Delete 3.3.17 and replace with the following	Ensure frames conform to design contour of pavement or existing surface. Manhole lids left raised in preparation for overlay paving shall have a rubberized protector ring or asphalt ramp. The use of riser rings for adjusting manhole frames will not be permitted.
3.5	**Catchbasin Installation**	Delete 3.5.1 and replace with the following	Install catch basins as shown on Coquitlam Standard Detail Drawings COQ-S11A, COQ-S11B and Standard Detail Drawing S11, to general standards and installation procedures described under 3.3 of this Section.

END OF SECTION

1.0 GENERAL

1.1 Description

.1 This section describes the pipe materials, fittings, appurtenances, and of the process mechanical and plumbing.

.2 Piping supports and seismic bracing are generally not shown on the mechanical layout drawings. Piping supports and seismic bracing, if shown on drawings, are for reference only.

.3 Design, select, locate and provide piping supports, pipe guides, seismic bracing, expansion joints and anchors required for final piping layout. Typical details and acceptable attachments shown on the drawings are provided only for general guidance.

.4 The Contractor must provide the necessary submittals and ensure the piping systems and system components as fabricated in accordance to ANSI B31.3, Normal Fluid Service.

.5 For Testing, Flushing and Disinfection procedures refer to Section 33 11 01 Waterworks

1.2 Reference Sections

.1 American Society of Mechanical Engineers (ASME)

.2 ASTM International (ASTM)

.3 American Water Works Association (AWWA)

.4 ASME B31.3 Process Piping

1.3 Definitions

.1 Pipe and appurtenance location terms used in this and other related sections are defined as:

.3 Pump Houses, Valve Chambers and Buildings: Within an environmentally controlled enclosure where temperature is maintained above 5°C.
.4 Exposed, Aboveground: Outside or within an enclosure which is not environmentally controlled so that the temperature is maintained above 5°C. For the purpose of defining exterior protection systems, this definition is extended to vertical piping to a point of 0.5 metres below finished ground level.
.5 Underground (or buried): Placed in soil and not tied to structures.
.6 Below Structures: Below concrete slabs such as tanks, channels, buildings, pipe chases, foundation slabs, etc; but not including roadways or walkway structures.
.7 Submerged: Regularly or occasionally immersed in liquid; inside tanks and/or channels, and within 3.0 metres above maximum water level of open tankage. Includes pipe and appurtenances within manholes, vaults and chambers.

1.4 System Description

.1 Piping supports and seismic bracing are generally not shown on the mechanical layout drawings.

.2 Design, select, locate and provide piping supports, pipe guides, seismic

bracing, expansion joints and anchors required for final piping layout. Typical details and acceptable attachments shown on the drawings are provided only for general guidance.

1.5 Submittals For Review

.1 Submit in accordance with Section 01 33 00S and 01 33 23S.

.2 Product Data: For each piping system, submit document listing pipe, fittings, flexible connectors, linings, coatings, and valving to be used for each pipe size and category.

.3 Radiographic Weld Testing: Submit the name and qualifications of an independent firm for the radiographic weld testing to be undertaken by the Contractor. The selected firm will be subject to the review and acceptance of the Contract Administrator.

.4 For all pipe greater than or equal to 50mm diameter, submit isometric drawings, to indicate the assembly details, the welds, flanges, valve placement, cathodic protection, seismic restraint system, expansion joints, guides, anchors, hangers, supports, and the provisions for thrust restraint, as well as any other pertinent details.

.5 Submit piping layout and section drawings by plant area which indicate location and placement of valves, fittings and other appurtenances for all piping, greater or equal to 50 mm diameter, in that area. Indicate overall and centre to centre dimensions and location and clearances from structures and other utilities (ductwork, conduit, electrical tray, etc.)

.6 Where specified or directed by the Contract Administrator, provide mill test results or product samples.

.7 Detail all the pipe supports required on this project and provide shop drawings with the location of supports and details of all the hangers, expansion joints, guides and support systems. Drawings shall be signed and stamped by a Professional Engineer registered in British Columbia.

.8 Submit copies of all original submittals and all related correspondence made as part of the regulatory submission required by the British Columbia Power Engineers and Boiler Power Engineers Safety Branch and any submissions required by other regulatory authorities.

.9 The Contractor shall submit the following documentation for review a minimum of two (2) weeks prior to commencing any welding work

.1 The Contractor's Quality Control Manual

.2 Welding Procedure Specification (WPS), signed by a registered Professional Welding Engineer, as well as sealed by the BC Safety Authority. Include a statement that the procedures have been reviewed and accepted as appropriate for the commodity and exposure in which the piping will be placed.

.3 Procedure Qualification Records (PQR) for all welders engaged on this project.

.4 Welder Performance Qualifications (WPQ).

.5 Mill certificates for all required materials.

.6 Shop and fabrication drawings with dimensional details of each pipe spool, identifying materials and weld map.

1.6 Quality Assurance

.1 Welding Certification

.1 All welders to be certified under the Government of British Columbia Boiler and Pressure Vessels Act. As a minimum, welders will hold a Level B Journeyman Welders Certificate.

.2 All welders who work on this project must provide the correct documentation

.2 Weld Tests

.1 Provide for 2 radiographic inspections. All sizes and types of pipe welds to be tested at locations identified by the Contract Administrator.

.2 Have a radiographic weld test results submitted directly to the Contract Administrator

.3 Regulatory Submissions

.1 Complete all regulatory submissions as required by the BC Power Engineers and Boiler Pressure Vessel Safety Act and Regulations.

.2 Complete all other submissions as required by other regulatory authorities.

.4 Conflicts

.1 Review the drawings prior to installation of piping, conduit services, and fixtures by this or any other division. Identify any conflicts and cooperate with the Contract Administrator to determine the adjustments necessary to resolve these conflicts.

.2 Confirm the routing of each section of pipework with other services prior to commencement of installation.
.3 Advise the Contract Administrator of any conflicts with existing services or services yet to be installed.
.4 Where necessary, amend the routing of pipework to avoid conflict and confirm with the Contract Administrator.

1.7 Shipment, Protection and Storage

.1 Deliver pipe, fittings, and specials to site using loading methods which do not damage pipe or coatings.

.2 Piping materials delivered to site will be clearly marked to indicate size, type, class/schedule and coatings.

.3 Until ready for incorporation in the work, store on site as recommended by the piping materials manufacturer to prevent damage, undue stresses, or weathering.

.4 Store materials at least 200 mm above ground with sufficient supports to prevent undue bending.

.5 Protect non-UV light inhibited plastic from sunlight.

1.8 Measurement and Payment

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

2.0 PRODUCTS

2.1 General

.1 Provide the pipe materials, fittings, and appurtenances as described below, for the piping systems shown.

.2 All pipe materials to be new, free from defects.

.3 Where any standard referenced has been superseded prior to bidding, the Contractor shall comply with the new standard.

2.2 Carbon Steel Piping up to 600 mm Nominal Diameter

.1 All steel pipe shall be ASTM A53, ERW, Grade B or steel pipe with equivalent or better mechanical, chemical properties with the following wall thickness

.1 100 mm to 250 mm diameter inclusive: Schedule 40.

.2 300 mm diameter: standard weight, 0.375 inch wall.

.3 350 – 600 mm diameter: 0.375 inch wall thickness.

.2 Steel Plate: to CAN3-G40.21-92, Grade 300W.

2.3 Small Bore Instrument and Related Piping

.1 Locations and lengths of small-bore piping are shown in schematic form only and the Contractor shall be responsible for making all on site measurements required to confirm material quantities.

2.4 Non-Threaded Stainless Steel Piping

.1 All non-threaded piping to be used in the project shall be fabricated from Schedule 40S, 304L stainless steel pipe.

2.5 Threaded Stainless Steel Piping

.1 All threaded piping, unless otherwise specified, shall be fabricated from Schedule 40S, 304L stainless steel pipe.

2.6 Joints - General

.1 Connect piping using joints not readily disassembled only where shown and where not otherwise specified.

.2 Provide joints which may be readily disassembled within 1.0 m of any connection to equipment, on both sides of structural penetrations, within 0.6 m of all threaded end valves, and at the spacing specified in detailed piping specification sheets.

.3 For steel or stainless steel piping equal to or greater than 75 mm in diameter, use grooved couplings or buttwelds as shown on the drawings; predominately grooved couplings are to be used for above ground steel piping, buttwelded, steel pipe for underground services. Flanges are to be used around equipment and valves conforming to ANSI B16.5, Class 150. Unless otherwise indicated (on the drawings) where disassembly is required, flanges shall be used.

.4 For thin wall or schedule rated steel pipe equal to or greater than 75 mm in diameter, butt-weld pipe or use Victaulic grooved couplings as shown.

.5 For schedule rated steel pipe smaller than 75 mm in diameter use threaded unions.

.6 For stainless steel tubing use stainless steel compression fittings.

2.7 Fittings

.1 For steel pipelines 75 mm in diameter or greater, fittings to conform to ANSI

B16.9, ANSI B16.11 or ANSI B16.5. Provide fittings with a wall thickness equal to or greater than the pipe. In steel pipelines less than 75 mm in diameter provide threaded malleable iron fittings, conforming to ANSI B16.3.

.2 Provide long radius steel grooved-joint fittings conforming to ANSI B16.9 in steel grooved-joint pipeline systems. Grooved joint adapters may be welded to fitting ends; dimension and cut the groove of the adapter in accordance with the coupling manufacturer's recommendations; materials and inside diameter to be the same as the pipe; grind the interior weld smooth and meet the lining manufacturer's recommendations.

.3 Provide butt welding fittings in steel pipelines less than 75 mm of the same class as the pipe, conforming to ASTM A403 and ANSI B16.11. Provide socket welding fittings in steel pipelines less than 75 mm to Cl. 3000, same material as the pipe, and ANSI B16.11. Fabricate fittings in steel pipelines equal to or greater than 75 mm in diameter using similar materials and classes as the pipe and conform to ASTM A774.

.4 Provide eccentric reducers in horizontal lines with the flat side on top, unless shown otherwise on the drawings.

.5 Provide concentric reducers in vertical lines unless indicated otherwise.

.6 Provide long radius elbows unless otherwise shown on the drawings. Provide smooth flow carbon or stainless steel elbows 350 mm and less, to ANSI B16.9. Provide mitred elbows greater than 350 mm, to AWWA C208 unless otherwise shown or specified. Use 3-piece construction unless otherwise shown or specified.

2.8 Grooved Joint Couplings

.1 Couplings:

.1 Couplings used on above ground standard wall steel pipe, thin walled steel pipe, standard wall stainless steel pipe and PVC pipe shall be Victaulic couplings.

.2 Use Victaulic coupling for maximum working pressures in accordance with manufacturer's recommendations

.3 For rigid connections in water or wastewater piping use:
Victaulic Style 07 and Style W07, ductile iron coupling with a fusion bonded epoxy coating (safety blue) direct from manufacturer.
Victaulic Style 89 and Style W89, ductile iron coupling with a fusion bonded epoxy coating (safety blue) direct from manufacturer.
Victaulic Style 489, 316 stainless steel couplings for submerged or for corrosive conditions.

.4 For flexible couplings allowing for expansion, contraction and deflection use:
.1 Victaulic Style 77 and Style W77, ductile iron coupling with a fusion bonded epoxy coating (safety blue) direct from manufacturer.
Victaulic Style 77S, 316L stainless steel coupling for submerged or for corrosive conditions
Victaulic Style 475, 316L stainless steel coupling for submerged or for corrosive conditions.

.5 Coupling gaskets:
.1 Grade E "EDPM" Standard type for water from -34°C to +110°C
Grade E "EDPM" FlushSeal type, suitable for vacuum service
Bolts and nuts – Stainless steel

.6 Coupling Materials:
.1 Ductile iron to ASTM A536 for normal conditions
316 stainless steel as specified for submerged or corrosive conditions.

.2 Victaulic Fittings

.1 Steel to ASTM A106 Grade B – segmentally welded
Ductile Iron to ASTM A536
ASTM A403 Type 304 or 316 stainless steel

.3 Victaulic Flanges

.1 Victaulic Style 741 and Style W741, ductile iron flange adapter, for steel piping systems

.2 Victaulic flange adapters shall not be used on stainless steel piping systems.

.4 Victaulic Grooves

.1 Steel Pipe, shall be roll grooved using standard grooving rolls to Victaulic specifications, or cut grooved where piping thicknesses allow to Victaulic specifications.

.2 Light Wall Stainless Steel Pipe, schedule 5S and 10S, shall be roll grooved to Victaulic specifications using "RX" roles.
.3 Standard Wall Stainless Steel Pipe, greater than schedule 10S, shall be roll grooved using standard grooving rolls to Victaulic specifications, or cut grooved where piping thicknesses allow to Victaulic specifications. Standard grooving rolls or cut grooving tools shall be dedicated for the use on stainless steel pipe or be thoroughly cleaned to prevent groove contamination and corrosion.

.5 Where any standard referenced has been superseded prior to bidding, the Contractor shall comply with the new standard.

2.9 Sleeve Couplings

.1 Straight and Transition Couplings:

.1 Ductile iron body and end rings;

.2 Fusion bonded epoxy lined and coated to AWWA C213-01, 12 mils minimum thickness interior and exterior;
.3 Gaskets to suit pipe outside diameters as confirmed by Contractor;
.4 Approved product: Romac Style 400 or equal Robar;

2.10 Restrained Flange Adapters

.1 EBAA Iron Series Megaflange or equal with pressure ratings as required;

.2 Gaskets to suit pipe outside diameters as confirmed by Contractor;

2.11 Flanges

.1 Welded flanges shall be Class 150 weld-neck or slip-on type with continuous weld as shown on drawings.

.1 Steel pipe flanges for steel fittings shall be forged carbon steel to ASTM A181, Grade II, Class 150.

.2 Stainless steel flanges shall be to ASTM A182 and 304L material and welded to pipe inside and outside.

.2 General requirements for flanges are as follows:

.1 Compatible flanges for mating to equipment or valves.

.2 Provide flat-faced flanges on each side of butterfly valves.
.3 Provide weld neck flanges on both sides of wafer or lug body valves.

2.12 Threaded Couplings

.1 Make screwed joints using American Standard threads to ANSI B1.20.1.

.2 Use Teflon tape as thread lubricant for threaded joints.

.3 Conform to ASTM A182 or ASTM A276, Class 150, for threaded connections to stainless steel pipe, threadolets to be shop welded to the pipe at the locations specified.

.4 Provide threaded-end to flanged-end adaptors where required to connect to flanges.

2.13 Bolts and Nuts

.1 General

.1 Provide hex head bolts and nuts. Threads to be ANSI B1.20.1, standard coarse thread series.

.2 Provide hex nuts equal to or less than 25 mm. Greater than 25 mm, provide heavy hex.
.3 Provide a washer for each nut and bolt head. Washer shall be of the same material as the nut.
.4 Cut and finish flange bolts to project a maximum of 8 mm beyond outside face of nut after assembly.
.5 Stainless steel bolts and nuts to be installed with anti-seize lubricant.

.2 Bolts and nuts for flanges shall be Type 316 stainless steel in accordance with ASTM A 193, Grade B8M for bolts and in accordance with ASTM A 194, Grade 8M for nuts.

2.14 Conventional Flange Gaskets

.1 Conventional flange gaskets shall be die-cut and material shall consist of aramid fibers in a nitrile elastomeric binder with a minimum continuous temperature rating of 200°C.

.2 Thickness shall be 1.6 mm (1/16”) for flanges up to 600 mm, 3.2 mm (1/8”) for larger flanges.

.3 Shall be Garlock Multi-Swell 3760 as available from Custom Gaskets (604-263-1426).

2.15 Pipe Supports

.1 Contractor is to design, supply and install all pipe supports and anchors. Piping drawings to be signed and sealed by a Professional Engineer registered in British Columbia to meet all applicable building and seismic codes.

.2 Miscellaneous pipe support steel shall be galvanized unless otherwise shown on the drawings.

2.16 Dissimilar Metal Connections

.1 Provide pipe flanges with electrical insulating materials (insulating flange kits) at locations indicated on Drawings and where dissimilar metals are to be connected to provide electrical isolation of valves and specified sections of pipeline from other sections.

.2 Install insulating flange kit materials in strict accordance with manufacturer’s instructions and recommendations;

.1 Align pipe flanges for installation of bolts, flange gasket, insulating sleeves and washers, and metallic washers and nuts.

.2 Use lubricant or anti-seizing compound, as recommended by insulating flange kit manufacturer, on bolt and nut threads to provide proper engagement and facing of parts.

.3 Install bolts and associated parts finger-tight in sequence as outlined in manufacturer's installation instructions.
.4 After installation is completed, torque nuts in proper sequence as directed by manufacturer's installation instructions.

.3 Following completed installation of each insulating flange kit, conduct electrical resistance testing to ensure that all flange insulation components have been properly installed and proper electrical insulation has been achieved.

.1 Measure electrical resistance across each individual bolt in flange, in accordance with NACE Standard RP0286.

.1 Accomplish testing in presence of Contract Administrator.
Accomplish testing with a Model 601 insulation tester acceptable to the Contract Administrator.

.2 Remove and replace any defective insulating parts with new parts:
.1 Following removal and replacement of defective parts, repeat resistance tests on all flange bolts

.3 The section shall not be backfilled until all flange kits pass testing.

2.17 Mechanical Type Wall and Floor Seals

.1 Where indicated on drawings, piping passing through floors and walls to the building exterior or water holding structures shall have a metal sleeve shall first be cast into the floor during construction. This shall have an integral formed waterstop that is a minimum of 50 mm larger than the outer diameter of the sleeve itself. Sleeve shall be Link-Seal Model WS.

.2 After insertion and final assembly of piping, the opening between the sleeve and the pipe itself shall be sealed by utilizing insertable elastomeric links, bolt compressed to expand. Links shall be of EPDM with reinforced nylon compression plates and stainless steel fasteners. Link assemblies shall be Link-Seal Model LS-XXX-S-316.

2.18 Structural Element Penetrations

.1 Structural element penetrations are shown and referenced to a detail or Process/Mechanical Standard Details. Where a structural element penetration is not referenced, conform to the Standard Detail relevant to the type of structure, exposure and type of pipe.

.2 Provide pipe sleeves capable of supporting the loads applied during placement of concrete or during blockwork erection.

.3 Supply and discharge wall penetrations to be pipe spools with welded thrust rings that are to be cast into the building structure. Thrust rings are to be sized by AWWA M11.

.4 Wall or floor penetrations into submerged areas, under slab areas, and where shown with a 6 mm thick water stop flange at least 50 mm larger than the pipe or pipe sleeve outside diameter (o.d.). Continuously weld the water stop flange, both sides, onto the pipe or pipe sleeve. Fill annular space between the sleeve and pipe, where a sleeve is used, with non-shrink grout in accordance with Section 03 60 00. Form reglets between the grout and the concrete and between the grout and the pipe, on "wet" sides of the wall penetration. Fill reglet with sealant.

3.0 EXECUTION

3.1 Preparation

.1 Prior to installation, inspect and field measure to ensure that previous work is not prejudicial to the proper installation of piping.

.2 Make all minor modifications to suit installed equipment and structural element locations and elevations.

.3 Piping arrangements indicated on the drawings have been established on the basis of the "Design Standard" listed in the specific process equipment sections. If the equipment to be provided is not the Design Standard, at no additional expense to the City, modify the piping arrangement as necessary.

.4 Advise the Contract Administrator of all modifications. Do not commence work on the related piping until all modifications have been reviewed by the Contract Administrator.

.5 Include any piping modifications in the shop drawings submitted prior to fabrication or installation.

3.2 Pipe Handling

.1 Inspect each pipe and fitting prior to installation. Do not install damaged pipe or pipe with damaged protective coatings.

.2 Remove all foreign matter from inside of pipe prior to installation.

.3 Repair pipe with damaged protective coatings with material similar to the original in accordance with the

.4 Damaged glass lining cannot be repaired. Damaged pipe must be replaced.

.5 Use proper implements, tools, and facilities for the proper protection of the pipe. Exercise care in the installation so as to avoid damage to pipe or coatings.

3.3 Piping Installation - General

.1 The types and sizes of pipes to be used shall be as specified and shown. Where sizes of small pipe are omitted from the drawings and not mentioned in the specifications, the sizes to be used shall be determined by the Contract Administrator.

.2 All pipe shall be carefully placed and supported at the proper lines and grades, and where possible shall be sloped to permit complete drainage. Piping runs shown on the drawings shall be followed as closely as possible, except for minor adjustments to avoid architectural and structural features. If major relocations are requested, they shall be submitted to the Contract Administrator for approval.

.3 In erecting the pipe a sufficient number of screwed unions, flanged or grooved end type joints shall be used to allow any section or run of pipe to be disconnected without interfering with, or removal or adjacent pipe runs. Flanged, grooved end type, and mechanical pipe coupling joints shall be employed on pipelines 75 mm in diameter and larger.

.4 Provide the required number of take-down fittings, along straight runs of pipe.

.5 Provide take-down fittings, after every second bend or fitting.

.6 Provide take-down fittings to allow for the removal of valves, strainers, equipment, in-line instrumentation, and all other appurtenances along the piping rows.

.7 Provide take-down fittings wherever a pipe passes through a concrete or masonry wall.

3.4 Installation of Pipe Underground/Buried And Below Structures

.1 Refer to the drawings and Part 1.

.2 Trenching and backfill for buried pipe: conform to Section 31 23 01.

.3 Unless otherwise shown, protect pipe laid below structures with a concrete surround having a minimum coverage of 100 mm all around the pipe and extend concrete surround to undisturbed ground.

.1 Install pipe in straight alignment. Do not exceed 10 mm variance from the true alignment in any direction.

.2 Ensure the pipe alignment stays true during and after placement of concrete surround.

.3 Ensure that the method used to prevent pipe uplift during placement of concrete surround results in a level invert and crown.

.4 Maintain pipe circular cross section.

.4 Provide lean concrete to within 150 mm of the underside of the slab or footing for backfill over pipe laid below structures, except as detailed otherwise.

.5 Place concrete in accordance with Section 03 30 53.

.6 Apply petrolatum-based tapewrap system on all fittings and flanged, grooved, plain end and welded joints underground and below structures.

.7 Use anti-seize compound with all stainless-steel nuts and bolts.

3.5 Interior Installation

.1 Make adequate provision in piping and pipe support systems for expansion, contraction, slope, and anchorage.

.2 Install a pipe support system to adequately secure the pipe and to prevent undue vibration, sag or stress.

.3 Install expansion joints where shown and at other locations as necessary to allow for piping expansion and contraction.

.4 Provide temporary supports as necessary during construction to prevent overstressing of equipment, valves or pipe.

.5 Accurately cut all piping for fabrication to field measurements.

.6 Install pipes in straight alignment. Do not exceed 10 mm in 10-meter variance from the true alignment, in any direction. Fabricate and assemble pipe runs so that the pipework is not stressed to achieve the desired alignment and that no stresses are transferred to equipment or equipment flanges. The "springing" of pipework to ensure alignment is not permitted. Undo and subsequently remake all pipework connections where so instructed by the Contract Administrator to ensure that springing does not occur. Take care not to damage equipment, valves or flanges.

.7 Slope instrument air piping condensate traps. Provide condensate traps as recommended by the manufacturer of the instrument air compressor.

.8 Do not cut or weaken the building structure to facilitate installation.

.9 In parallel pipe runs, offset flanges and/or grooved joint fittings by a minimum of 200 mm.

.10 In vertical pipe runs of diameter greater than 250 mm, provide 200 mm long spool piece on lower side of each valve.

Manual air vents shall be installed at the high points of all pipelines carrying water of any service class which cannot be vented through vent cocks provided with equipment. Manual air vents for liquid pipelines 65 mm and larger shall consist of a 12 mm valve and for smaller piping shall be 6 mm size consisting of an acceptable bronze cock and short copper tubing return.

All exposed liquid lines 100 mm and larger shall be provided with a half coupling, nipple and valve drain on the bottom of the pipe. This drain connection shall be provided at all low points and where shown on the drawings.

3.6 Threaded Joints

.1 Conform to the requirement of ANSI B31.1.

.2 Ream the end of all pipes to remove all burrs and cuttings when fabricating threaded joints.

.3 Clean out pipe and repair linings and coatings prior to joining.

.4 Apply Teflon tape to male threads and then apply Loctite Food Grade Anti-Seize Lubricant prior to joining pipe.

.5 Use both Teflon tape and Loctite Food Grade Anti-Seize Lubricant on stainless steel pipe threads. Do not use extra tape to make up for slack in the joint.

3.7 Flanged Joints

.1 Clean flanges and gaskets prior to connection.

.2 Lubricate gaskets with soapy water and apply anti-seize compound to the bolts.

.3 Bring flanges into close parallel and lateral alignment.

.4 Tighten bolts according to ASME PCC-1.

.5 Bolt length shall be such that after the joints are made up the bolts shall protrude at least two threads past the nut, but not more than 12 mm.

.6 Washers are to be used on each side of bolted flange connections.

.7 Washers may not be used to take up excess bolt length.

.8 When joining steel to cast iron flanges, take care to avoid damage to the cast iron flange. Ensure both flanges are flat-faced and use full face gaskets.

.9 Align flanges which connect piping to mechanical equipment to close parallel and lateral alignment prior to tightening bolts. Do not place undue strain on the equipment.

.10 Allow a minimum of 150 mm to face or 200 mm to edge of flange from wall, floor or ceiling unless otherwise shown.

3.8 Grooved End Gaskets

.1 All grooved end gaskets shall be fully lubricated both inside and out with a manufacturer approved lubricant.

.2 Evidence of improper lubrication at any connection shall be grounds for requiring all joints to be disassembled and relubricated. Alternatively, approved dry lubricated gaskets may be utilized. VicPlus gasket system approved.

3.9 Rigid Grooved End Couplings

.1 The nuts of rigid type couplings shall be tightened to within manufacturer's specified torque range utilizing a torque wrench.

.2 Evidence of improper torque on any rigid coupling shall be grounds for requiring all rigid couplings to be disassembled and retorqued.

END OF SECTION

1.0 GENERAL

1.1 Description .1 This section Isolating valves shall be installed were indicated on drawings.

1.2 Measurement and Payment Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

2.0 PRODUCTS

2.1 NRS Flanged Gate Valves

.1 Shall be NRS (Non-Rising Stem) resilient wedge gate type, meeting the requirements of AWWA C-509 or C-515.

.2 Bodies shall be of A536 ductile iron having a fusion bonded epoxy coating, conforming to AWWA C550, with Class 125 flanged ends and a minimum 1725 kPa (250 psig) working pressure rating.

.3 The wedge gate shall be cast or ductile iron with full resilient encapsulation. Screw shall be 300 series stainless steel and a stuffing box with dual o-rings shall be utilized.

.4 Handwheel shall be cast or ductile iron.

.5 NSF-61 approval for potable water is required.

.6 Mueller A-2362, Clow 2639, AVK 45/5X, AFC Series 2500, Terminal City 3500 approved.

2.2 Isolating Ball Valves

.1 Isolating ball valves shall be full port with 2-piece body, NBR o-rings, Teflon seats with FNPT ends, quarter turn lever handle and a minimum 2068 kPa (600 psig) working pressure rating.

.2 M.A. Stewart & Sons Ltd., NVC approved.

3.0 EXECUTION .1 Not used

END OF SECTION

1.0 GENERAL

1.1 Description

.1 This section includes pilot-operated automatic valves, including pressure reducing valves, altitude valves, and their associated accessories.

1.2 Application

.2 Valve shall be installed as shown on drawings to maintain downstream pressure, in a pre-determined range.

.3 Pilot settings to be confirmed shall be confirmed by the Contract Administrator and set by the supplier prior to delivery of the valves.

1.3 Measurement and Payment

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

2.0 PRODUCTS

2.1 Construction

.1 Pilot-operated automatic pressure reducing valve shall be provided with a cast ductile iron globe pattern body, Class 150 flanged ends, ductile iron cover, fusion bonded epoxy coating conforming to AWWA C550, 300 stainless steel stem, spring, seat, and retainer, plus a full-port seat nominally the same size as the valve end openings.

.2 Valves to have a pressure rating of 1724 kPa (250 psi).

.3 Valves shall be provided with an oxy-nitride coating (or Dura-Kleen) main valve stem to assure valve opening when required.

.4 Valve piloting shall include lever-operated isolating stainless steel ball valves at each body and cover tapping utilized, adjustable closing speed type pilot restrictor and an Arion J1521G type pilot supply strainer with transparent debris collection bowl, minimum 1200 kPa working pressure rating, 40 mesh, 300 series stainless steel element and fitted blow-off cock and 180° return tube.

.5 Pilot shall be of 300 series stainless steel with 300 stainless steel seamless tube and Parker (CPI 316) fittings.

.6 Valves shall include a check feature to prevent reverse flow.

.7 Each valve shall include a visual stem position indicator. Assembly shall be as furnished by the valve manufacturer.

.8 Valve piloting shall additionally include an XP2F-X35 flow metering package complete with X56 mounting assembly, X117H magnetic position transmitter, X141 pressure transmitters and X35 flow calculation module, installed on standard side with reducing pilot system. The system is to utilize permanent site power, and not be battery operated.

.9 Valve shall have certification for NSF/ANSI Standard 61 Drinking Water System Components.

.10 Cla-Val 94-01BCSVKX Pressure Reducing Valve available from Summit Valve and Controls Inc (778-285-7590), approved.

3.0 EXECUTION

3.1 Installation

.1 The Contractor shall confirm “right-hand” or “left-hand” piloting from Drawings. Piloting shall be away from walls.

.2 The City have a bespoke pilot schematic as shown in the drawings. The standard pilot schematic is not acceptable.

END OF SECTION

1.0 GENERAL

1.1 Description .1 This section applies to the supply and installation of water air valves and its associated appurtenances.

Reference Standards .2 Conform to the following reference standards:

.1 NSF/ANSI 61 – Drinking Water System Components

1.2 Measurement and Payment Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

2.0 PRODUCTS

2.1 Combination Air Valves - 50mm .1 Combination automatic air valves shall be provided to relieve vacuum or air when line is filling or draining, and to relieve accumulated air when under pressure.

.2 Valves shall have ductile iron body and meet the requirements of AWWA C-512.

.3 Valves shall be suitable for potable water service and fitted with an inlet isolating ball valve and outlet 180 degree (°) return.

.4 Isolating valve and installation fittings shall be stainless steel.

.5 Inlet shall be 50 mm NPT, and minimum working pressure shall be 2070 kPa (300 psig).

.6 Valves shall be certified for NSF/ANSI 61 – Drinking Water System Components.

.7 Crispin UL series and Val-Matic 202C/DI approved.

3.0 EXECUTION

3.1 Testing .1 After completion of installation, provide testing to demonstrate compliance with the requirements of these specifications.

END OF SECTION

1.0 GENERAL

1.1 Description

.1 This section applies to the supply and installation of water treatment and distribution system valve accessories.

1.2 Reference Standards

.2 Conform to the following reference standards:

.1 NSF/ANSI 61 – Drinking Water System Components

1.3 Measurement and Payment

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

2.0 PRODUCTS

2.1 Basket Strainer

.1 The basket strainer shall have a ductile iron body, a cover with Class 150 flanged ends, a minimum working pressure rating of 1725 kPa (250 psig), and fusion bonded epoxy coating. Cover fasteners shall be stainless steel.

.2 The internal strainer epoxy coating shall be certified for NSF/ANSI 61 – Drinking Water System Components.

.3 Strainers shall be 316 stainless steel with a 2000-micron mesh.

.4 A drain or blow-off connection shall be provided, c/w a stainless steel ball valve of equal size to strainer port.

.5 Cla-Val X43H as available from Summit Valve and Controls Inc. (604-422-6900), or Singer ZS as available from CB Process Instrumentation & Controls (604-690-6395), approved.

3.0 EXECUTION

3.1 Testing

.1 After completion of installation, provide testing to demonstrate compliance with the requirements of these specifications.

END OF SECTION

1.0 GENERAL

1.1 Preparation and Coating of the Internal and External of Pipe

.1 Potable Immersed Applications or Internal of Potable Water Pipe

.1 Outside of submersible pumps.....

.2 Outside of pump bowl assembly
.3 Outside of all cast valve bodies
.4 Inside of pump head (if steel)
.5 Inside and outside of piping and fittings
.6 Inside and outside of pump inlet barrels
.7 Wall penetrations
.8 Inside of piping and fittings

.2 External of Non Buried/Exposed Sewage or Potable Water Pipe

.1 Outside of submersible pumps

.2 Outside of pump bowl assembly
.3 Outside of all cast valve bodies
.4 Inside of pump head (if steel)
.5 Inside and outside of piping and fittings
.6 Inside and outside of pump inlet barrels
.7 Wall penetrations
.8 Inside of piping and fittings

.3 External of Buried Sewage or Potable Water Pipe

.1 Outside of submersible pumps.....

.2 Outside of pump bowl assembly
.3 Outside of all cast valve bodies
.4 Inside of pump head (if steel)
.5 Inside and outside of piping and fittings
.6 Inside and outside of pump inlet barrels
.7 Wall penetrations
.8 Inside of piping and fittings

.4 All pipe internals and externals are to be prepared, coated and inspected/tested in accordance with the latest version of AWWA C210.

.5 Prior to abrasive blast cleaning, surfaces shall be inspected and if required cleaned according to SSPC-SP1 to remove oil, grease, or other foreign matter.

.6 Pipe surfaces shall be abrasive blast cleaned in accordance with:

.1 SSPC-SP10 for the internal and external of potable immersed, sewage immersed or buried pipe.

.2 SSPC-SP6 for the external of non-buried or exposed sewage or potable water pipe.

.7 The blast anchor pattern or profile depth shall be 2.0 mils to 4.0 mils.

.8 Coatings and Linings for the internal and external of potable immersed, sewage immersed or buried pipe to consist of the following:

.1 Two or more coats of the same two-part, chemically cured epoxy coating or a single coat of a chemically cured epoxy coating.

.2 Minimum thickness. Unless otherwise specified below or by the purchaser, the minimum DFT provided shall be at least 16 mils.

.9 Coatings and Linings for the external of non-buried or exposed sewage or potable water pipe shall be high durability (15+ year) rated and suitable for a classification C4 high corrosivity according to ISO Standard 12944. It is to consist of the following:

.1 Two or more coats of the same two-part, chemically cured epoxy coating or a single coat of a chemically cured epoxy coating.

.2 One final coat of acrylic polyurethane to provide gloss and colour retention.

.3 Minimum thickness. Unless otherwise specified below or by the purchaser, the minimum DFT provided shall be at least 16 mils.

.10 Any addition requirements or changes to the requirements of AWWA C210 shall be referenced below where required for the specific application. Only products referenced below shall be used.

1.2 Measurement and Payment

nt for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

2.0 PRODUCTS

2.1 Potable Immersed Applications or Internal of Potable Water Pipe

.1 In addition to the requirements AWWA C210, all products shall be applied to meet the latest ANSI/NSF 61 listing.

.2 Immediately following surface preparation spray apply one of the following:

.1 Two coats of Epoxy:

i. Bar Rust 233H or Interseal 670HS, as available from International Paint; or

ii. NSP-120, as available from Cloverdale Paint.

.3 Coatings are to be “white” colour.

.4 The Total DFT of the applied coatings system shall be a minimum 16 mils.

2.2 External of Non Buried/Exposed Sewage or Potable Water Pipe

.1 Immediately following surface preparation spray apply one of the following one or two layer coating products:

.1 Two coats of Epoxy:

i. Bar Rust 233H or Bar Rust 236 or Interseal 670HS, as available from International Paint; or
ii. Clova Mastic 83110 or Jotamastic 87 or Tankguard 550, as available from Cloverdale Paint.
iii. Prime coat to be White or Grey and Finish Coat to be “safety blue” colour.

.2 One coat of Epoxy:

i. Interzone 954, as available from International Paint; or
ii. NSP120 as available from Cloverdale Paint
iii. Coating to be “safety blue” colour.

.2 Immediately following epoxy application, spray apply one of the following to provide gloss and colour retention:

.1 One coat of Acrylic Polyurethane:

i. Devthane 379UVA / Interthane 990 (990HS used for field touch up), as available from International Paint; or
ii. Armour Shield 837 or 839 or Hardtop Flexi for UV protection as available from Cloverdale Paint.

2.3 External of Buried Sewage or Potable Water Pipe

.1 Immediately following surface preparation spray apply one of the following:

.1 Two coats of Epoxy:

i. Bar Rust 233H or Bar Rust 236 or Interseal 670HS as available from International Paint; or
ii. Clova Mastic 83110 or Jotamastic 87 or Tankguard 550 as available from Cloverdale Paint.
iii. Prime coating is to be “tan” colour and final coating to be “safety blue” colour.

.2 One coat of Epoxy

i. Bar Rust 234P or Interzone 954 as available from International Paint; or
ii. Cloverdale/NSP120 as available from Cloverdale Paint.
iii. Coating to be “safety blue” colour.

3.0 EXECUTION

3.1 Application Quality

.1 The Contractor shall be responsible for self-inspection of the coating systems as outlined, but subject to independent inspection at all times.

.2 The Contractor shall employ a NACE certified coating inspector, acceptable to the Engineer, to inspect the work and provide written progress reports and digital photographs.

.3 Inspection shall be conducted immediately after surface preparation as well as each coating step.

.4 Only an approved applicator shall be utilized for surface preparation and coating systems. Approved applicators are:

.1 Dynacor Coatings 2004 Ltd. ..... (604) 946-0136

.2 Seaside Painters & Sandblasters Inc. (604) 583-6758
.3 Mainland Painting (604) 589-7949
.4 CorrCoat Services (604) 881-1268
.5 Certified Coating Services (CCS) (604) 255-1001
.6 Clara Industrial Services (604) 882-8608
.7 Midvalley Sandblasting (250) 766-1323

3.2 Caution Areas

.1 Grooved end piping and fittings for use with Victaulic couplings and flange adapters shall be coated for immersed service internally as well as on the gasket seating surface and in each groove at the end of the pipe or fitting. Coating applied to the gasket seating surface and within the groove on pipe and fitting exteriors shall not exceed 0.25 mm (0.010 inches), or as recommended by the manufacturer

.2 Flexible rubber jacketed cables, liquid tight flexible conduit, nameplates, aluminum and stainless steel components and valve internals shall not be painted.

3.3 Field Touch Up Procedures

.1 Damage to shop applied coatings occurring in storage, erection or installation shall be repaired to standards equal to the project specifications.

.2 Immediately prior to repairing damaged or unpainted surfaces, and before the specified surface preparation is carried out, all grease, oil, dirt, and foreign matter shall be removed as per SSPC SP1.

.3 Edges of sound remaining coating on the surface shall be feathered by sanding/grinding prior to painting.

.4 Gloss paint surfaces shall be sanded or abraded to provide a bond for successive coats.

.5 The minimum coating requirements for spot coating repairs shall be as follows:

.1 No corrosion, primer exposed:

i. Apply one or more finish coats to restore specified film thickness.

.2 No corrosion, primer damaged:

i. Clean area to substrate and reapply the specified system

.3 Rusted areas:

i. After cleaning to the original standard of surface cleanliness, reapply specified system

.4 All areas to be repaired shall be inspected by the coating inspector before, during and after such repairs to confirm compliance with the foregoing and /or the project specifications.

END OF SECTION

1.0 GENERAL

1.1 Description

.1 This section includes the supply and installation of pressure gauges and associated accessories for monitoring system pressures.

1.2 Reference Standards

.2 Conform to the following standards:

.1 NSF/ANSI 61 – Drinking Water System Components – Health Effects

.2 NSF/ANSI 372 – Drinking Water System Components – Lead Content

1.3 Measurement and Payment

Payment for all work performed under this Section will be incidental to payment for work described in other Sections, unless shown otherwise in the Schedule of Quantities and Prices.

2.0 PRODUCTS

2.1 Pressure Gauges

.1 Each gauge connection shall be provided with a 15 mm isolating ball valve.

.2 A piston and rod-type snubber, Ray Model 060B approved, shall be mounted on the gauge connection. The small rod shall be inserted into the snubber.

.3 Gauges shall have a minimum 100 mm dial, stainless steel case, brass internals, liquid filled, 6 mm MNPT bottom connection of stainless steel or brass, and dual-scale readings in kPa and psi.

.4 Gauge range shall be selected such that the system normal operating pressure is approximately 50 percent of the full-scale reading. Gauge range shall be selected to ensure the maximum operating system pressure does not exceed the full-scale reading. Gauge spans shall be confirmed with the Contract Administrator prior to ordering.

.5 Isolating valve and installation fittings shall be stainless steel. Hex nipples, not close type, shall be utilized.

.6 USG 656-6C, ENFM 7211, WIKA 213.53, Winters LF, NuovaFima 18/3-A4, approved.

3.0 EXECUTION

3.1 Testing

.1 After completion of installation, provide testing to demonstrate compliance with the requirements of these specifications.

3.2 Certifications

.2 Provide calibration certificates for all pressure gauges.

END OF SECTION

Appendix A -
Traffic Management Detail Specifications

1.0 GENERAL

.1 This Traffic Management detail specification refers to the Contractor's specific plans to identify project traffic risks affecting the *Work*, provide Traffic Control Plans, and to implement the traffic control for the safe passage of vehicles and pedestrian through the work zone.

1.1 Related Works

.1 Traffic Control, Vehicle Access and Parking MMCD Section 01 55 00S.

1.2 References

.1 WorkSafe BC, Occupational Health and Safety (OHS) Regulation, Section 18 – Traffic Control.

.2 B.C. Ministry of Transportation and Infrastructure (MOTI) Traffic Management Manual for Work on Roadways

1.3 Project Requirements

.1 A Road and Sidewalk Closure Permit is required by Coquitlam for all work affecting traffic flow related to construction. A permit is required for each specific construction interference with traffic flow. The Road and Sidewalk Closure Permit Request form is attached as **Appendix 1** to this document. A digital copy of the Road and Sidewalk Closure Permit form can be obtained for use during the contract from the City's website at: Road & Sidewalk Closure Permit Application.

A Road and Sidewalk Closure Permit form application must be submitted to City's Traffic Operation Division 10 working days prior to start of work.

1.4 Measurement and Payment

.1 For this Contract, payment for all work performed under this section, unless included in the Schedule of Quantities and Prices shall be treated as incidental work, including a Traffic Management Plan (TMP), Traffic Control Persons (TMP), traffic markings & all temporary traffic signs, devices as required for traffic & pedestrian safety; and all other items described in the Section 01 55 00S.

2.0 PRODUCTS

2.1 Traffic Management Plan

.1 The Contractor is required to assign a Traffic Manager for the Contract with the responsibility of preparing the Traffic Management Plan and the Traffic Control Plans, as well as the responsibility for continuing implementation of traffic control for the Work.

.2 The Traffic Management Plan (TMP) will consist of the following components:

- .1 Category identification through risks and project category assessment as per MOTI Traffic Management Manual for Work on Roadways;
- .2 Traffic Control Plans for individual stages of the construction;
- .3 Incident Management Plan for the response to an unplanned event and recording of incident information;
- .4 Category 3 TMP must be signed and sealed by a qualified Professional Engineer.

.3 Submission of the TMP is to be made to the *Contract Administrator* within five (5) working days after the *Notice of Award* of the *Contract*,

and must be approved by the *Contract Administrator* prior to start of the *Work*.

.4 Review of the TMP will be performed by the Contract Administrator. Comments for revisions to the TMP will be returned to the *Traffic Manager* for implementations.

.5 The Contractor shall comply with all the requirements of applicable laws, rules, regulations, codes and orders of the municipal and other appropriate authorities concerned with work on streets or highways and shall post proper notices and/or signals, and provide necessary barriers, guards, lights, flagmen or watchmen as may be necessary for proper maintenance of traffic and protection of persons and property from injury or damage. All costs involved in respect to the above requirements will be deemed to be included in the Contract Price.

.6 The Contractor shall give due notice to local police and fire departments prior to beginning construction and shall comply in all respects with their requirements.

.7 The Contractor, during the progress of the work, shall make adequate provision to accommodate the normal traffic along streets and highways immediately adjacent to or crossing the work so as to cause the minimum of inconvenience to the general public.

.8 The Contractor is required to maintain local traffic and driveway access during all stages of construction. This includes maintaining a 1.5m width walkway or pathway through the construction site for pedestrians.

.9 Where existing streets or roads are not available as detours, all traffic shall be permitted to pass through the work with as little inconvenience and delay as possible unless otherwise provided or authorized. If half the street only is under improvement, the other half shall be conditioned and maintained as detour.

2.2 Incident Management and Reporting

.1 The Contractor shall facilitate incident response vehicles and staff and move traffic safely and expeditiously through or around an incident on site and provide assistance to emergency response personnel as required. An incident includes, but is not limited to, motor vehicle accidents, emergency road repairs, disabled vehicles, and debris on the road. The immediate response to an emergency shall by necessity make use of available devices and equipment.

.2 If an incident occurs on site, the Contractor will be required to submit a report to the Contract Administrator documenting details of the incident including event, location, date, time, action taken, duration and restoration of site.

2.3 Traffic Control Plans

.1 The Contractor shall designate a qualified Traffic Control Supervisor for the works, per the requirements of WCB regulations Section 18. The designated Traffic Control Supervisor may be the same individual that is designated as the Traffic Manager, or may be a separate individual qualified for the responsibilities of this function.

.2 The Contractor shall prepare weekly the anticipated traffic control activities, locations, and durations for the upcoming week.

.3 Permissible delays shall only be considered outside Peak Hours. Permissible delays are categorized as follows:

a) Minor Delays - Less than two (2) minutes in duration; for occasional interruption due to construction activities. These delays shall be coordinated with available breaks in the traffic flow.

b) Major Delays - Maximum ten (10) minutes in duration; for occasional interruption of traffic for construction activities if traffic volumes permit.

.4 The Contractor is responsible for ensuring that the flow of traffic is unimpeded by construction-related activities.

3.0 EXECUTION

3.1 Traffic Control Plan

.1 A copy of the approved current Traffic Plan must be held on site by both the Site Superintendent as well as the person/company responsible for the traffic control implementation.

.2 Failure to produce a valid approved Traffic Plan on site, or having work not follow the Traffic Control Plan will result in immediate shut-down of the work. The Contractor will be required to safely restore facility conditions to allow traffic flow at their expense. The Contractor must take all steps to acquire an approved Traffic Control Plan before work can re-start on site. No claim will be accepted by the Owner for costs associated with this work shut-down.

3.2 Road and Sidewalk Closure Permits

.1 The Contractor must have, on-site, a copy of an approved Road and Sidewalk Closure Permit valid for the work being done. Failure to produce a valid Road and Sidewalk Closure Permit on-site will result in shut-down of the work. Failure to comply on what is stated on the approved permit will result in shut-down of the work. The Contractor will be required to safely restore facility conditions to allow traffic flow at their expense. The Contractor must take all steps to acquire a Road and Sidewalk Closure Permit before work can re-start on site. No claim will be accepted by the Owner for costs associated with this work shut-down.

3.3 Traffic Control Personnel & Equipment

.1 The Contractor shall supply all necessary traffic control devices required to perform traffic control services for the project. Signs and traffic control devices not applying to existing conditions shall be removed. Where operations are carried out in stages, only those traffic control devices that apply to the current stage are to be left in place.

.2 There must be sufficient Traffic Control Persons (TCPs) on site to appropriately and safely direct traffic in all sections of the Work.

3.4 Signage

Supply, installation, maintenance and removal of all works-related signs shall be the responsibility of the Contractor. The location and type of each sign shall be indicated on the approved Traffic Control Plan, for each stage of the works.

Traffic control signs and devices must be positioned and used as specified in the Traffic Control Plan and signs and devices must be located so as to allow traffic to move by or through the work area in a controlled manner and, if necessary, to come to a controlled stop with due regard for the prevailing weather and road conditions.

Signs shall be checked daily for legibility, damage, suitability and location. Signs and delineators shall be cleaned as frequently as necessary to ensure full legibility and reflectance.

3.5 Detours

Any proposed detours must be approved by the Contract Administrator and conducted in accordance with the approved Traffic Plan and the Traffic Control Manual for Work on Roadways.

3.6 Abrupt Changes in Surface Elevations

The Contractor shall minimize any abrupt changes in roadway elevation left exposed to traffic during both working and non-working hours.

A wedge of asphalt must be used as a transition to vertical differences in travelled areas and have a slope of 4:1 or less.

3.7 Cyclist and Pedestrian Access

The Contractor shall make provision for pedestrians, wheel chairs and bicycles to have safe access across the work zone at all times. If this cannot be readily accommodated, then acceptable detours and appropriate signs shall be provided.

3.8 Good Neighbor Practice

The Contractor, crew and subcontractors, shall not park their private vehicles on the same street they will be working on. Contractor is responsible to find alternative parking accommodation to minimize any inconvenience to the residents.

3.9 Temporary Pavement Markings

The Contractor shall be responsible for the application and removal of all temporary pavement markings and reflective devices.

All temporary markings must be removed after installation of permanent markings.

4.0 TRAFFIC RESTRICTIONS

4.1 Road and Sidewalk Closure Permits

.1 Minimum of Single Lane Alternating Traffic must be accommodated at all times.

.2 A Road and Sidewalk Closure Permit is required for each instance of closure and will be valid for a maximum period of one (1) week and, if still necessary, re-submittal of a Road and Sidewalk Closure Request is required.

A copy of the approved Road and Sidewalk Closure Permit must be held on site by both the Site Superintendent and the person/company responsible for the traffic control implementation.

.3 Total Road Closure Is Not Permitted.

.4 Detours will only be permitted as approved by the Contract Administrator and must have a complete Traffic Control Plan indicating detour route, signing, and duration. Detours will not be allowed without sufficient lead time for commercial and retail operation to react appropriately to detour information provided to them.

4.2 Lane Closure Restrictions

.1 **For each of the road sections affected:**

- Road and Sidewalk Closures will be reviewed for appropriateness during the allowable hours of work.
- Access to properties to be maintained
- Sufficient Traffic Control Persons are required for each Road and Sidewalk Closure (or any work activities), including side street intersections, to safely guide traffic through the work site.

5.0 HOURS OF WORK

5.1 Allowable Hours of Work

.1 **The hours of work shall be from 0700 h to 1900 h inclusive Monday to Friday. Written permission from the Contract Administrator must be obtained 48 hours prior to any Saturday work. No Saturday work is to occur without the Contract Administrator's permission.**

.2 Some allowances may be made for paving operations, depending on a proposal acceptable to the Contract Administrator.

.3 Line Marking work may be performed at night, (21:00 to 05:00). No work is allowed on Sundays without specific written permission from the Contract Administrator.

6.0 CONSTRUCTION OPERATIONS

6.1 Truck Routes

.1 The Contractor is restricted to the City's designated Truck Routes. The current Truck Route Map is available on the City's website at www.coquitlam.ca and can be found under **Residents, Transit & Transportation, Trucking Routes**.

6.2 Road Specific Considerations

.1 The Contractor shall ensure safe passage of all pedestrians and all types of vehicles. The Traffic Management Plan must accommodate businesses, school, residences and pedestrian during construction activities.

***All travel lanes must be open to all traffic at the end of working hours.**

All City Traffic Counts are available on the City's web site at: Coquitlam Traffic Data

.2 Contractor shall not schedule paving during garbage pick-up day.

6.3 Work Stoppage Due to Traffic

The City will not control or direct traffic control activities of the Contractor, but may require an immediate stop to any work where, in the sole opinion of the Contract Administrator, the provided traffic management plan is ineffective. Contractor is responsible for the costs associated with this work shut-down.

6.4 Construction Activity and Signage

The Contractor will be responsible to place other construction information signs as required to inform the public of construction activities, and ensure safe travel through the work site.

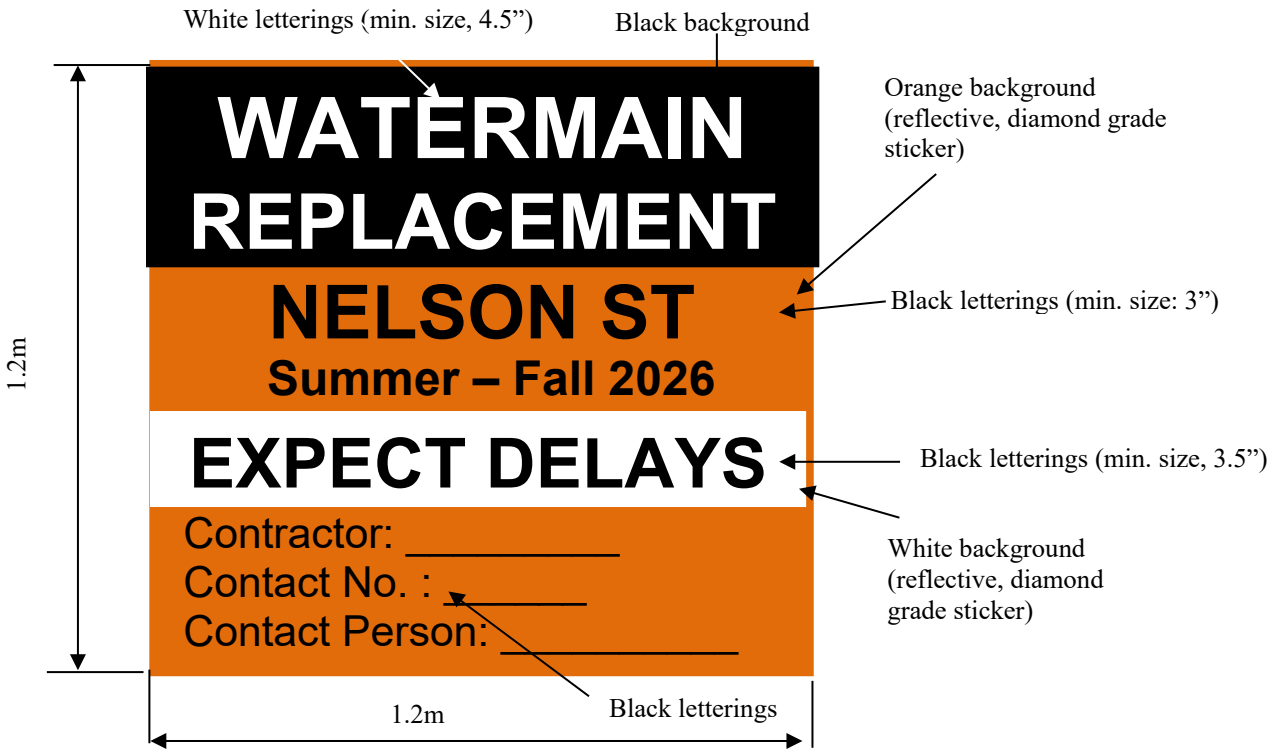
6.5 Construction Zone Information Signs

The Contractor is required to provide, one week prior to start of work and for the duration of the Contract, stationary signs to inform traffic of existing and anticipated conditions at the following locations:

- westbound, NW corner of Delestre Ave & Marmont Street
- eastbound, SE corner Delestre Ave & Lebleu Street
- northbound, NE corner Nelson Street & Brunette Ave
- southbound, SW corner Nelson Street & Rochester Ave

Exact locations to be determined on site by Contract Administrator. Ensure that signs and locations are addressed in the Traffic Management Plan. All signs are to be removed at the end of the construction period.

Construction Zone Information Signs to follow specifications below:



APPENDIX 1

Coquitlam

City of Coquitlam
Road and Sidewalk Closure Permit Request

Traffic and Street Use Management Section
3000 Guildford Way, Coquitlam BC V3B 7N2
Phone: 604-927-6250 Email: StreetPermits@coquitlam.ca

~~Initial Permit: $150 ☐ Renewal Permit: $75 ☐~~

87419

Application Date: _____ **City Project or Film Permit Number** (if applicable): _____

- An Initial Permit is required for all new applications and when the location, type of work, or the type of traffic controls change from what was approved for the Initial Permit. The application needs to be received a minimum of 10 business days prior to the intended closure date.
- A Renewal Permit extends the rights and privileges of the approved Initial Permit and is required when the timeline needs to be extended. The application must be received a minimum of 5 business days prior to the intended extension date.

Development Site Address (if applicable): _____

Work location (street name, block number, to/from, at, etc.) _____

Contact Information

Applicant Company Name: _____

Applicant (person completing application form)

Name: _____ **Title:** _____

Phone: _____ **Email:** _____

Applicant's Signature: _____

Company Name (Prime Contractor): _____

Site Superintendent

Name: _____ **Title:** _____

Phone: _____ **Mobile:** _____ **Email:** _____

Permit Information

Start Date: _____ **End Date:** _____

Day(s) and Time(s): ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday From: 00:00 To: 00:00
☐ Saturday From: 00:00 To: 00:00 ☐ Sunday From: 00:00 To: 00:00

Specific Lanes: ☐ Curb ☐ Inside/Centre Lane ☐ Left Turn Lane ☐ Right Turn Lane ☐ Parking Lane
☐ All Lanes ☐ Sidewalk/MUP ☐ Bicycle Lane

Direction: ☐ Northbound ☐ Southbound ☐ Westbound ☐ Eastbound

Purpose of Work: ☐ Concrete Pour ☐ Utility Installation ☐ Curb Installation ☐ Other _____

This permit is related to: ☐ City Design and Construction ☐ City Parks ☐ External Environmental
☐ Development ☐ External/Utilities

City Contact (if applicable): _____

Office Use Only

Permit Conditions/Comments:

_____

_____ _____

Approved by *Date*

Application Checklist

⚠ **The following information must be provided. Incomplete applications will not be reviewed.**

1. ☐ Traffic Management Plan (TMP); **OR**
   ☐ Traffic Management Manual for Work on Roadways Figure Number: _____
2. ☐ **Project Category Determination** (per 2020 Traffic Manual for Work or Roadways).
   ☐ Initial Project Category Assessment
   ☐ Project Risk Analysis
   ☐ Category 1 ☐ Category 2 ☐ Category 3
3. ☐ **Prime Contractor Designation Letter**
4. ☐ **City of Coquitlam Certificate of Insurance**
5. ☐ **Notification Letter and Map** (required for all full road closures). A Notification Letter must be provided to all affected residents and businesses.
   ☐ Yes ☐ No ☐ Not Applicable
6. ☐ **Traffic Control Persons** (flag persons) **required?** All operations within the road right-of-way must comply with WorkSafe BC regulations and BC Ministry of Transportation standards for work on roadways.
   ☐ Yes ☐ No If yes, how many? _____
7. ☐ **Bus routes/stops impacted?** Applicant is to contact Coast Mountain Bus Company (with a minimum of 3 days' notice) Temporary Transit Changes Request Form. General information can be found by visiting Temporary Transit Changes.
8. ☐ **City of Coquitlam Solid Waste has been contacted?** Coquitlam Environmental Services contacted regarding impact to garbage/recycling routes and pick up Phone: 604-927-4300 Email: wastereduction@coquitlam.ca
   ☐ Yes ☐ No
   Are operations impacted? ☐ Yes ☐ No
   If Yes:
   - a plan to ensure continuous collection has been provided: ☐ Yes ☐ No
   - Day(s) of the week impacted: _____
   - Time(s) of the day impacted: ☐ a.m. ☐ p.m.
9. ☐ **Pedestrian / Bike Lanes impacted?** Please describe sidewalks and/or bicycle facilities that will be impacted by the proposed work.

   _____

   _____
10. ☐ **Is the work on, or will it impact a road along our Major Road Network?**
    ☐ Yes ☐ No

Additional information

- Only vehicles actively engaged in the performance of cleaning, clearing, maintenance, repair, construction or other work are permitted within work zones. Vehicles being used by Superintendents, Traffic Control Persons, and other construction personnel that are not actively engaged in work described above are not permitted within the work zone and are not permitted parking /stopping prohibitions.
- Closures of sidewalks, cycling facilities, lanes, and full road closures are only permitted during the time periods indicated on the approved permit. Traffic controls are not permitted outside of these approved permit hours.

Appendix B -

Archaeological Chance Find Procedures

Archaeological Chance Find Procedures

City of Coquitlam

DRAFT 2

November 2021 (version 2)

BROWN & OAKES
ARCHAEOLOGY

Table of Contents

Introduction

This document is presented as an accompaniment to Kwikwetlem Cultural Heritage and Archaeology Chance Find Procedures training provided by Brown & Oakes Archaeology to City of Coquitlam (or the “City”) staff and contractors.

The Chance Find Procedure (CFP) is intended to provide City planners and onsite project personnel guidelines for the appropriate response to an unanticipated discovery of known or suspected archaeological or cultural heritage materials during City operations. A CFP is NOT a substitute for professional archaeological assessment of project areas considered to hold archaeological potential. Thorough archaeological assessment will always reduce project risk of harms to protected archaeological sites and minimize the potential for encountering unanticipated material. This CFP training is intended to promote the preservation and proper management of heritage resources that are unexpectedly encountered during City activities.

The document presents a summary of archaeology site protection legislation, steps to follow in the case of suspected or observed archaeological materials, a list of appropriate authorities to contact in the case of archaeological site encounters, and a guide to archaeological site and materials recognition. Information on Kwikwetlem culture history and connections to traditional lands is not presented in this document and this information is best shared via virtual or in-person presentations.

Purpose

The purpose of CFP documentation is to aid in the protection and proper management of archaeological materials encountered during City of Coquitlam activities. Many land-altering activities have the potential to expose and/or negatively impact undocumented archaeological materials.

The purpose of this document is to:

- Ensure project personnel are aware that undocumented archaeological sites are likely to be present in the City of Coquitlam.
- Promote awareness of activities that may lead to the exposure of archaeological materials, including excavations, vegetation clearing, field survey and inspections, and more.
- Provide personnel the appropriate steps to follow if suspected or observed archaeological resources are encountered during work or personal activities.
- Provide education and resources to assist recognition of archaeological site types and materials in the lower Fraser River region.

Archaeological Sites in British Columbia

Archaeological sites are places that exhibit physical evidence of past human activity. Archaeological sites in British Columbia are automatically protected under the *Heritage Conservation Act* (HCA) when located on provincial, crown, municipal, or private land[1]. The vast majority of archaeological sites in BC include places and belongings of Indigenous peoples. Some post-1846 sites related to newcomer history may also be registered and protected under the HCA if of significance to a place, industry, or region, for example. HCA protection is extended to ship and plane wrecks more than 2 years old.

Many First Nations consider the widely accepted definition of an archaeological site as a place featuring only the material remains of human activity too restrictive and instead advocate for the recognition and protection of a wider range of "cultural heritage" site types, including places of spiritual significance, named locales, known travel routes, and other places of cultural value.

The majority of the City of Coquitlam has not been surveyed for archaeological sites and it is reasonable to expect that many archaeological sites are buried and/or undetected. These sites are collectively referred to as undocumented archaeological sites.

HCA Legislation and Policies

Archaeological sites are automatically protected under the terms of the *Heritage Conservation Act* whether known or undocumented. Sites are protected whether previously disturbed by historic activities or intact. The HCA prohibits the alteration or disturbance of archaeological sites in whole or in part, on provincial public and private lands, whether impacts are intentional or inadvertent, and irrespective of previous land disturbance.

The HCA provides substantial penalties for the destruction or unauthorized disturbance of archaeological sites including imprisonment for up to two years and fines of up to $1,000,000.

Alterations to archaeological sites may proceed under appropriate HCA permits held by professional archaeologists following provincial assessment guidelines[2]. Work plans and methodologies related to archaeological site investigations must meet provincial regulatory standards and are expected to conform to participating First Nation cultural heritage policies and best-practice standards.

Archaeological materials on federally managed lands may be protected by other legislation and policies. Many federal agencies will adhere to the requirements outlined in the *HCA* when managing archaeological sites.

[1] http://www.for.gov.bc.ca/archaeology/index.htm.

[2] The HCA is administered by the Archaeology Branch, Ministry of Forests, Lands, Natural Resources and Rural Development.

First Nation Cultural Heritage Management

Many BC First Nations maintain cultural heritage policies and/or heritage permitting systems to assert oversight over Indigenous cultural heritage management and to ensure a high standard of archaeological practice. Contact should be made with locally affected Nations prior to any heritage study or project work with the potential to encounter cultural heritage materials to ensure adherence to Nation-preferred heritage protections, permits, and policy.

Potential to Encounter Archaeological Sites

Any project involving ground alterations has the potential to expose undocumented archaeological sites. Common forms of ground disturbances that have led to site discoveries include land grading, vegetation clearing/grubbing, excavation, asphalt/concrete removal, geotechnical drilling, access road or trail building, foundation demolition, heavy equipment movement, habitat planting, stream and pond channeling or dredging.

Other kinds of work activities where teams may encounter undocumented archaeological sites include field teams working in proximity to natural, undeveloped or minimally disturbed terrain. Teams involved in field surveys, field inspections, or inventories of natural ground and waterways, riparian areas, municipal parks and trails, forested areas, cut bank or erosion area, and so on may encounter exposed archaeological materials.

City workers or contractors engaged in any activity that may result in archaeological materials identification should be made aware of HCA site protection legislation and field supervisors properly versed CFP procedures.

Types of Archaeological Sites

The following site types are well-known across the lower Fraser River region and may be encountered in the City of Coquitlam. The following site types may contain a range of artifact types and sediment signatures.

- **Stone tool sites** containing isolated artifacts or accumulations of stone tool working debris.
- **Habitation sites** show accumulations of food remains, tools, and evidence such as hearths indicating short term and seasonal camps and settlements used for travel and resource procurement as well as large and permanent villages.
- **Surface features** such as cultural depressions created by former habitations, earthen fortifications, burial mounds, and rock cairns.
- **Wet sites** contain preserved organic materials like woven basketry or wood tools in addition to other cultural material; these sites form under special preservation conditions typically anaerobic water saturated sediments along waterways and floodplains.
- **Culturally Modified Trees (CMTs)** include bark stripped trees, planks, and territory markers.
- **Rock art** including pictographs (painted rock images) and petroglyphs (images carved or pecked into rockfaces or boulders).

Archaeological Chance Find Procedure

In the event of found or suspected archaeological material, follow the procedures outlined below.

STEP 1: WATCH for potential archaeological materials

- ⇨ Know that undocumented archaeological sites are expected throughout Coquitlam.
- ⇨ Know that archaeological materials are protected by law and must be reported.
- ⇨ If you believe you may have encountered archaeological materials (either intact or disturbed) follow the steps outlined below.

STEP 2: STOP work in proximity to the material

- ⇨ If known or suspected archaeological materials are encountered, STOP work in the immediate vicinity.
- ⇨ Do not disturb, move, relocate, or collect the material.

STEP 3: REPORT observed materials

- ⇨ Alert the site supervisor that suspected archaeological materials have been observed.
- ⇨ The site supervisor will ensure appropriate contact is made with City managers who will in turn reach out to archaeological professionals.

STEP 4: CONTACT archaeological professionals

- ⇨ Seek immediate advice from an archaeological professional.
- ⇨ Teams may be advised to protect the area with flagging or cones until the area can be assessed by the appropriate representative.
- ⇨ Teams may be requested to provide locational details or photographs of the material.

STEP 5: AWAIT advisement

- ⇨ Wait for instructions from the appropriate representative; do not begin ground disturbing work until cleared to do so.
- ⇨ Prepare and submit an incident report to ensure compliance with appropriate regulators and interest groups.

Archaeological Chance Find Procedure - Suspected Ancestral (Human) Remains

In the event of found or suspected human remains, follow the procedures outlined below*.

STEP 1: STOP all activity at the job site immediately, including the removal of backfill. Do not rebury the remains.

STEP 2: REPORT to the City Project Manager. The Project Manager will contact an archaeological professional and determine the appropriate course of action. In most cases, the archaeology professional will visit the site to determine if the materials are reasonably expected to be human and archaeological. If warranted, the consultant will notify the Archaeology Branch and the RCMP, the Office of the Coroner, and affected First Nations. The Coroner will affirm whether the remains are archaeological and not of forensic concern. The archaeologist will inform the Archaeology Branch and First Nations will be consulted to determine culturally appropriate handling protocols and subsequent project management options.

STEP 3: PROTECT the affected location with flagging or cones to prevent additional disturbance and for privacy. Do not photograph the material.

STEP 4: TREAT the remains with dignity and respect. Do not allow bystanders to take photographs or video.

STEP 5: AWAIT advisement.

* If it is reasonable to think the human remains are not archaeological but forensic in nature, an immediate call to the RCMP is required.

Management Options

If determined that an archaeological or cultural heritage site (intact or disturbed) is present, an archaeologist will coordinate communications with the City, local affected First Nations, and the Archaeology Branch to evaluate management options. Archaeology Branch and First Nations approval and additional permitting may be required prior to the implementation of management options.

Examples of potential management options are provided below. Options will vary based on site characteristics, proponent needs, and Archaeology Branch and First Nation requirements.

Option A: Site avoidance through project redesign or relocation. Site avoidance is always preferred. Avoidance minimizes impacts to irreplaceable archaeological sites and reduces cost and schedule impacts.

Option B: Systematic data recovery through controlled archaeological excavation or other method. Data recovery is destructive to archaeological sites and will entail consideration of costs and schedule coordination.

Option C: Monitoring of construction activities by a professional archaeological team. Monitoring is appropriate where project impacts cannot be evaluated before construction (due to impenetrable surfaces or underground facilities, for example) or where potential to encounter archaeological materials is present following impact assessment or systematic data recovery.

Best Practices for CFP Implementation

- A Chance Find Procedure is best applied as an outcome stemming from archaeological assessment – as a last step verification that archaeological materials have not been overlooked in project area assessments, or where there is a professional assessment that documents a low expectation for encountering archaeological materials in a work area.
- A Chance Find Procedure is not an acceptable replacement for a professional archaeological overview (AOA) or archaeological impact assessment (AIA) or a well-designed and implemented archaeological construction monitoring plan for many areas. Engagement with professional archaeological teams, affected First Nations, or the Archaeology Branch will assist in appropriate heritage study approaches.
- Chance Find Procedure training must be delivered by professional archaeologists and local area First Nations who wish to contribute to CFP presentations.
- Chance Find Procedures should be summarized regularly as part of job or project requirements, and CFP training repeated by the archaeological and First Nation team for new employees, project teams, and subcontractors.
- Chance Find Procedures do not supersede any requirements or policies pertaining to cultural heritage management by First Nations with interests in the area. Proponents are encouraged to seek input from interested First Nations on area-specific CFPs as part of any project engagement process.

Contact List

Archaeology Branch

Paula Thorogood	Planning and Assessment Manager	250-953-3300	Paula.Thorogood@gov.bc.ca
Nathan Friesen	Planning and Assessment Supervisor	250-953-3306	Nathan.P.Friesen@gov.bc.ca

City of Coquitlam

Main Reception		604-927-3000

Police and Coroner

RCMP (Non-emergency)	Coquitlam	604-945-1550
BC Coroners Service	Lower Mainland Region	604-660-7708

Area First Nations

Kwikwetlem First Nation	604-540-0680
Katzie First Nation	604-465-8961
Kwantlen Nation	604-888-2488
Musqueam Indian Band	604-263-3261
Stó:lō Nation	604-824-2420
Tsleil Waututh Nation	604-929-3454

Archaeological Site and Materials Identification

The following archaeological sites and artifacts are common to the lower Fraser River region. This guide is to assist in the recognition and protection of archaeological materials found by chance. If you identify any archaeological material, stop work immediately and contact a professional archaeologist.

Artifacts

Artifacts are objects made or modified by humans and may be formed of stone, bone, antler or wood. Bone, antler and wood tools were produced in abundance, but stone artifacts are the most common artifacts found in the lower Fraser region because of the preservation durability of stone. Bone and antler were fashioned into a variety of items, including needles, knives, points, jewelry, awls and scrapers. Wood was used to make implements like spoons and bowls, handles, ceremonial objects, canoes, houses, and much more.

Photo Credit: RBCM, Archaeology Collection. Antler and wood tools (https://learning.royalbcmuseam.bc.ca)

Stone tools common to this region include projectile points, knives, adzes (axes), scrapers, mauls (hammers), net weights, beads, and more. Archaeologists distinguish chipped stone from ground stone artifacts, each distinguished by the mode of manufacture, either flaking scars or grinding and polishing marks. Stone flakes or ‘debitage’ is produced during the process of making stone tools. These flakes were sometimes used as tools themselves or were left behind at the stone tool working site. Culturally produced debitage shows features distinctive from naturally broken rock, gravel or crush, but these signatures can be difficult to identify to an untrained eye. Stone artifacts were produced from dacite, quartzite, slate and nephrite as well as obsidian, chert, and other materials. Stone was acquired locally or transported or traded over long distances; high-quality materials like obsidian has been traced to locations from Prince Rupert to Oregon and beyond.

Artifacts may be found as isolated finds or in association with other cultural materials.

Photo Credit: B&OA, Chipped stone artifacts from Coquitlam Lake.

Photo Credit (left): B&OA, Nephrite ground stone adze from Port Coquitlam. Photo Credit (right): RBCM, Archaeology Collection. Ground stone hand mauls (https://learning.royalbcmuseam.bc.ca)

Photo Credit: B&OA, Stone tool debitage from BC Interior.

Beads

Beads were made from a variety of materials including stone, shell, bone and glass (in more recent times). Shell and stone disc beads were used in jewelry, regalia and in mortuary practices across the Northwest Coast. On the Lower Fraser it is most common to find stone beads at archaeological sites fashioned from mud or silt stone, slate, or other softer stone. At some burial sites, individuals of rank were laid to rest with thousands of stone and shell beads.

Photo Credit: B&OA, Ground stone beads from near Agassiz.

Indigenous Historical Artifacts

Indigenous use of European materials in the years following contact are often found in early historic sites. Ceramics, glass, and metal were valued for their strength, durability, ease of access, or aesthetic properties. Glass was worked using traditional stone tool techniques in the same way as obsidian (a natural volcanic glass). Clay pipes were adopted by Indigenous peoples who several centuries earlier had introduced the practice of tobacco smoking to European traders. Glass beads were used by European fur traders to trade with Indigenous peoples; trade beads were initially valued for their vibrant colour and the expectation of beads as a wealth item.

Photo Credit (left): B&OA, Worked glass and clay stone pipe, Coquitlam.

Photo Credit (middle): https://www.canadashistory.ca/explore/fur-trade/tobacco-pipes. Photo Credit: Oregon Museum of Natural and Cultural History, Glass trade beads (https://mnch.uoregon.edu/index.php/collections-galleries).

Hearths

Hearths are the remnants of fires identifiable by dense black charcoal, ash and heat oxidized sediments. While natural forest fires may also leave traces of burning, hearths tend to be more defined and frequently show concave bases, evidence of repeated use, and contain or are in proximity to burned bone, fire-altered rock, and artifacts.

Fire-Altered Rock

Fire-altered rock (FAR) is rock modified by repeated heating and cooling. Heating small, rounded river cobbles and immersing the hot stones in water filled baskets or boxes was a frequently used cooking technique called ‘stone boiling’. Heated stones were also used to warm clothing and bedding. The repeated heating and cooling of FAR created distinctive fracture and colour patterns that are easily distinguished from naturally broken rock. FAR shows irregular breakage patterns, is frequently deeply pitted, is often deep rust or black in colour, and may be found mixed in charcoal and ash laden sediments. As FAR is often found in abundance around settlement areas or near cooking features and hearths, it is a frequent first indicator of the presence of archaeological sites. Often mixed in FAR deposits are boiling stones—small, rounded pebbles that have not yet been fractured by thermal processes

Photo Credit: B&OA, Fire altered rock, Coquitlam.

Shell and Non-Shell Midden

Midden deposits are generally indicative of camp or village sites. Middens accumulate through the repeated, ongoing use of an area where food remnants or the debris of daily living build up in layers at a site over time. In coastal areas, shellfish provided an abundant food source and, middens contain abundant fragmented or whole shell typically embedded in dark, greasy, sediments rich in charcoal, ash, fire cracked rock, burnt materials, and artifacts. Because shell neutralizes the acidity in soil, shell middens enhance preservation of organic food remains and tools, and fish and mammal bone, wood, antler, and botanical remains are often well-preserved in shell midden sites.

Non-shell middens are accumulations of living materials formed at camps and settlements away from marine waterways. Non-shell midden shows layered deposits of dark sediments, ash, and sometimes sand and clay in sediments with little to no shell. These deposits rarely contain bone, antler, or wood remains due to poorer preservation environments.

In Coquitlam, non-shell middens are the more common site type but there are a few examples of inland shell midden sites associated with camps or settlements where shellfish was transported to locations by travel or trade.

Photo Credit (left): B&OA, Non-shell stratified midden Port Coquitlam. Photo Credit (right): Shell midden, Vancouver Island (*https://learning.royalbcmuseum.bc.ca/pathways/can-)*

Surface Features

Surface features are non-portable cultural formations visible on the landscape. Features may include pits or depressions, earthen mounds or rock cairns, petroforms (rock arrangements) or trails. Cultural depressions may indicate the location of semi-subterranean winter dwellings, plank houses where midden accumulated around the outside of structures, cache pits used for tool or food storage, or pits and trenches used for food cooking or processing. Cultural depressions are identifiable by their uniform shape (usually round or rectangular), a berm may be present around the edge of features, the presence of associated artifacts, or concentrations of charcoal, ash, and fire altered rock.

Cultural mounds or rock cairns are other familiar surface features. Earthen burial mounds and rock cairns are part of a mortuary tradition found throughout the lower Fraser region over the past 1,500 years. Cultural mounds and cairns range in size from around a meter in diameter to more than 12 meters across. Individual occurrences or clusters of well-formed oval or circular mounds of earth and rock should trigger archaeological assessment.

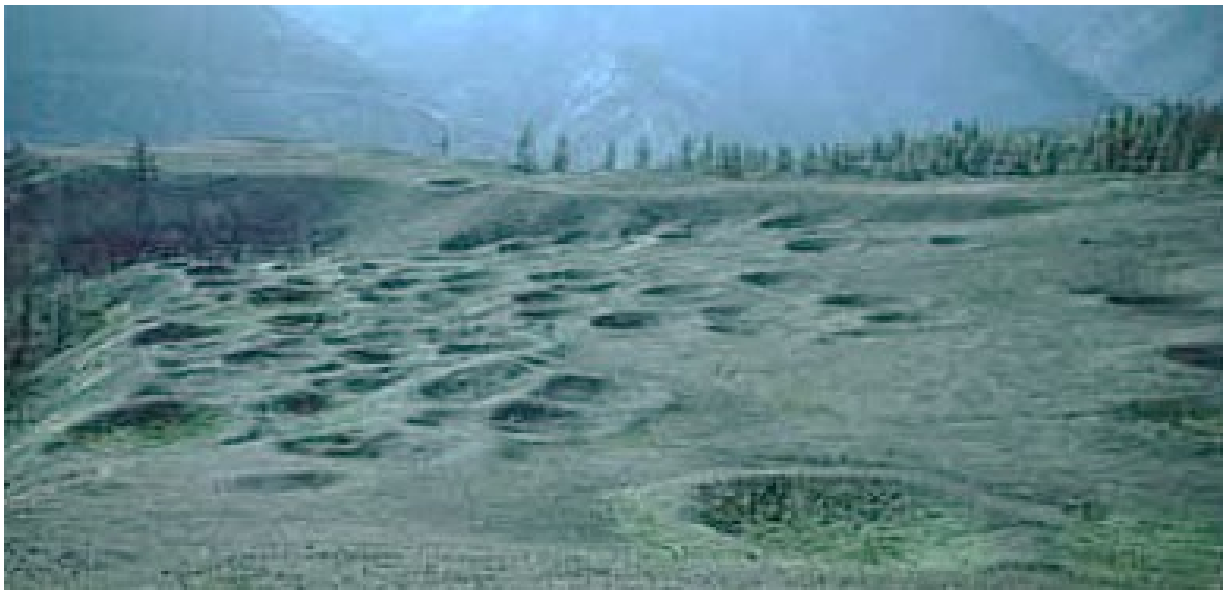


Photo Credit: SFU Museum, Winter pit house village, Lilloeet.

Rock Shelters and Caves

Rock shelters were used, among other purposes, as camps, spiritual or burial locations, and storage caches. Shelters can be found associated with overhangs of large boulders, indentations in rock bluffs or in caves. Shelters often associate with artifacts, rock art, and hearth features.

Ancestral (Human) Remains

Human remains are especially sensitive and significant finds. Any potential human bone requires immediate implementation of the CFP. Ancestral remains are frequently present at archaeological locations and may be found articulated in a burial context or as scattered fragments.

Petroglyphs and Pictographs (Rock Art)

Northwest Coast rock art includes images depicted on boulders, rock overhangs, rock faces, or other exposed rock surfaces. Pictographs are drawings or designs painted on rock using pigments like ochre or charcoal mixed with grease. Petroglyphs are images incised or pecked into stone. Designs vary widely and often depict animals, humans, or an extensive variety of geometric shapes.

Photo Credit: B&OA, Portion of petroglyph panel at Petroglyph Provincial Park, Nanaimo.

Photo Credit: B&OA, Portion of pictograph panel at Pitt Lake.

Fish Weirs and Traps

Fish weirs are structures constructed to funnel and trap fish for harvesting. Traps were built in intertidal areas along marine and river shorelines and near stream mouths. Weirs vary in form and structure depending on water and shoreline conditions, fish species targeted for harvest, intended volume of harvest, and community preferences. Fish weir sites are identifiable by linear or patterned arrangements of wooden stakes protruding from beach or bank edges or boulder alignments along waterways.

Photo Credit: Washington State Archives, Yelm Jim Fish Trap 1885 (http://www.digitalarchives.wa.gov/Record/View/DAA73FC7A57E989D65B6DBEA419FC89E)

Wet Sites

Wet sites are special preservation environments that form in low oxygen water saturated environments along waterways, in bogs and on floodplains. These locations permit enhanced preservation of organic artifacts like wood, bark, and botanicals. Artifacts found in wet sites have included basketry, twine and rope, wooden tools and weapons, architectural structures, and ceremonial implements made of wood and bone.

Photo Credit (left): Mike Blake. Ground slate knife with wooden handle, Agassiz. Photo Credit (right): Katherine Bernick, Waterlogged and preserved basket, Coquitlam.

Culturally Modified Trees (CMTs)

Culturally Modified Trees are trees that have been utilized by Indigenous Peoples for a broad range of cultural uses. Wood was used to build houses, canoes, tools, and weapons. Branches, boughs, and leaves were used to fashion tools, for medicine and in cultural ceremony. Harvesting cedar bark and roots was undertaken regularly to make clothing, cordage, basketry, and sleeping mats, ceremonial regalia, and much more.

Triangular bark stripped cedars are the most common form of CMT; a long, linear triangular bark scar will show where bark was removed from the trunk of a living tree. The exposed scar will heal over time creating a seam on the outer tree bark. This form of sustainable harvesting allowed the same tree to be used multiple times for bark harvesting. CMTs can also show evidence of wood removal where wedges were used to pry rectangular planks of wood from standing, living trees.

Logging and clearing throughout much of Coquitlam municipality reduces the chance that archaeological CMTs remain in most forested areas today, but more recent CMTs where bark or wood was harvested from second-growth forest by Kwikwetlem for cultural uses may be present.

Photo Credit: B&OA, Bark stripped cedars, Coquitlam.

Additional Resources

Learning Portal, Royal BC Museum - https://learning.royalbcmuseum.bc.ca

SFU Museum of Archaeology & Ethnology - https://www.sfu.ca/archaeology/museum.html

References Cited

Archaeology Branch (1999). Found Human Remains. On file with the Archaeology Branch, Victoria, BC. From http://www.tca.gov.bc.ca/archaeology/policies/found_human_remains.htm

Archaeology Branch (2010). Heritage Conservation Act (RSBC 1996). On file with the Ministry of Tourism, Culture, and the Arts, Victoria, BC. From